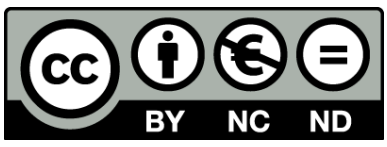
UNIVERSITAT DE BARCELONA

Historical Models of Music Listening and Theories of Audition

Towards an Understanding of Music Listening Outside the Aesthetic Framework

Marta García Quiñones



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Marta García Quiñones

TESI DOCTORAL

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AGRAÏMENTS

Cap treball que demani un esforç considerable, sostingut al llarg d'uns anys, va endavant només perquè el seu autor o autora s'hi capfiqui. Calen condicions i comprensió, i aquesta tesi n'és un exemple. En primer lloc vull agrair al Dr. Josep Martí que acceptés dirigir-la el 2003, i que al llarg dels anys hagi vist com anava canviant d'orientació, fins i tot de llengua, i mai n'hagi fet un problema. Al Dr. Miguel Morey, tutor, per la disponibilitat i els dubtes foucaultians resolts. Hearfelt thanks are due to Prof. Anahid Kassabian, formerly at the University of Liverpool, for inviting me to take part in the Ph.D. seminars that she held there, in Autumn 2007, and for the projects and the friendship that we have shared thereafter, also with Dr. Elena Boschi (grazie!). To Jens Papenburg, Holger Schulze and the late Maria Hanacek, founders of the Sound in Media Culture research network, for giving me the opportunity to meet an extraordinary collection of colleagues. A l'equip de la biblioteca de la Facultat de Filosofia, en especial al servei de Préstec Interbibliotecari, per l'eficiència i l'amabilitat.

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SUMMARY

Introduction

In the introduction I present an "experiment" devised for *The Washington Post* by Gene Weingarten, who in 2007 invited the famous violinist Joshua Bell to pose as a street musician at a central underground station of Washington D.C. Bell's brief act, though, did not succeed in capturing the commuters' attention, and got a very scarce reward. The disappointing scene was narrated in a piece by Gene Weingarten and recorded in a short video. Both were reproduced and commented internationally, causing scandal and incredulity. I propose instead to use this episode to think about our categories and assumptions in dealing with music. I reflect on the notion of music and on the activities and aspects that our understanding of it leaves out. Then I examine what arguably is still the normative attitude in listening to music, concert listening, and consider it both as a historical form of etiquette, and as an aspect of the ideology of absolute music. I then examine listening in connection with writing and recording, and criticize the identification of works with scores and systems of transmission. I argue that the characteristics of the golden period or recording, that of hi-fi, have favoured the subsistence of the model of concert listening, which has been reinforced by its presence in educational curricula and the promotion of music appreciation. Coming back to the listening conditions of the present, I pay attention to the proliferation of music of all kinds in the everyday and make the case for an understanding of music listening within the framework of sound studies and the so-called "sensory turn". Finally, I define the aims and methodology of this work.

Chapter 1: Thinking about Hearing and Listening after the "Sensory Turn" I

The first section of the chapter deals with the folk notion of the senses and explains some of the philosophical assumptions on which current scientific discourses on the senses are based. Among those assumption I focus particularly on the conceptual pair sensation-perception, which developed at the end of the 19th century, and which is also related to the distinction between hearing and listening. I then explain how current notions of the senses draw on a series of conceptual metaphors or models: the electric (or electrochemical) model, the information-theory model, and the brain model, which have shaped both common and expert discourses on the subject. The second section of the chapter presents the history of the notion of "cultural construction of the senses", which provides the theoretical framework wherein the senses (including hearing) are studied nowadays by most humanities and social sciences scholars. In this section I review the history of the theoretical shift called the "sensory turn", and particularly of the anthropology of the senses, from the establishment of the cultural paradigm in anthropology at the beginning of the 20th century, through the contributions of Marshall McLuhan and Walter J. Ong in the 1960s and 1970s, to the work of the Concordia group in the 1980s. In connection with these developments, I discuss the coining of the concept of soundscape by R. Murray Schafer and the first steps towards what is now known as sound studies.

Chapter 2: Thinking about Hearing and Listening after the "Sensory Turn" II

This chapter goes beyond the work of the Concordia group on the anthropology of the senses to review the relatively recent reaction against some of its tenets by some ethnographers influenced by the anthropology of the body and phenomenology—a reaction represented here by the contrast between sensory models and sensory skills.

Since the notion of sensory skills seems to leave language out, I subsequently address the question of the language of the senses by reviewing some research lines in linguistics, and situating the way in which the anthropology of the senses and sensory ethnography have approached the subject within the history of linguistic anthropology. Then I trace the development of another field that has grown in parallel to the anthropology of the senses, since the 1980s to the present: the anthropology of the emotions, where, by contrast, language and discourse have occupied a central place. The following subsection focuses on phenomenological research into listening and the voice, and particularly on Steven Feld's research into the sensory ethnography of the Kaluli people of Bosavi, in the rain forest of Papua New Guinea. I explain how Feld initially tried to go beyond the characterization of the anthropology of music by Alan Merriam, and the communicative models of music listening proposed by John Blacking, to create an anthropology of sound. I also show how, since the mid-1990s, Feld has reframed his research drawing on some of the theoretical developments reviewed in this chapter (mainly, the phenomenological notion of embodiment), and has coined the notion of "acoustemology". This section also discusses the notion of auditory (or aural) skill, and closes with some reflections about the application of "skill" to music, and on the concept of listening styles.

Chapter 3: Hearing and Listening in the History of the Senses and Emotions

The third chapter reviews the historical emergence of an awareness of the historicity of the senses and emotions in Europe. Thus, the first section focuses mainly on the contribution of the French Annales School, from the first steps taken by Lucien Febvre and Marc Bloch, who raised attention towards the subject during the 1930s, to the developments by younger members of the school during the following decades, under

such diverse headings as the history of mentalities, the history of sensibilities, or the history of representations. Within this context, I underline the differences in treatment by French-speaking and English-speaking historians, and explain how an English-speaking history of the senses or sensory history grew in parallel to the neighbouring fields of the history of the body and the history of emotions. The second section deals with theoretical and methodological problems related to the historiography of the senses and emotions, in particular with the difficulties in establishing a periodization. Then I turn to consider the specific problems of studying the history of audition. For that purpose, in the third section I review some of the literature published in the last decades, including research into the soundscapes of specific periods and investigations focused mainly on theories and technologies of listening. The chapter concludes with some observations on the notion of auditory regime, and with an analysis of Jonathan Sterne's concept of "audile technique".

Chapter 4: Studying Hearing and Music before Acoustics

This chapter opens with a discussion of the tension between the humanities and social sciences approaches, and the natural sciences approaches to hearing. The first section presents the main disciplines that have traditionally dealt with hearing: physics (acoustics), music, rhetoric (later, linguistics), medicine and physiology, psychology, and the convergence of electroacoustics, electrophysiology and psychoacoustics that in the first decades of the 20th century constituted something close to a hearing science. My purpose here is to provide a short introduction to their history and to the specificity of their approaches to hearing, stressing their connections to music. In this section I also point to some problems in the historicization of audition. The next section reviews ancient and medieval notions of hearing and the senses in relation to what we would

now call “music theory”. In the third section I sketch a historical panorama of early modern discourses on audition, including advances in anatomical and physiological knowledge. Then I touch upon the relationship between rhetoric and music in Renaissance humanism, with reference to the Florentine Camerata and the Parisian Baïf’s Academy. The next subsections deal with physical research into consonance, which many scholar consider key to the establishment of the experimental programme and the so-called “Scientific Revolution”, and with the various attempts to explain the passions according to the mechanistic programme, in particular in Descartes’ *Passions of the Soul*, which was also influential in music. The chapter closes with a review of the activities related to sound, hearing and music in the first scientific academies, towards the end of the 17th century, around the time when Joseph Sauveur proposed the foundation of acoustics.

Chapter 5: Inventing the Musical Ear in the 18th century

The first section of the chapter focuses on the emergence of the concept of sensibility. I then trace its roots in Locke’s empiricism, and in the physiological research on sensibility and irritability that was led mainly by Haller, and later by the physicians of the Montpellier school. These developments transformed the semantic field of the senses (sentiments, sensibility), making it less about the senses, and more about the connection between the senses and moral life. The next subsection goes back to physiology, in particular to the physiology of the senses and hearing. I comment on some important works of the *philosophes* (Condillac, Diderot, Rousseau) on the differentiation of the senses, the sense of hearing, and the education of the senses. The next subsection combines a brief explanation of Rameau’s theory of harmony with the narration of the mathematical development of acoustics in the 18th century. The section

finishes with a long consideration of the particularities of musical life and music aesthetics in 18th-century France, and aims at explaining the obstacles that the culture of sensibility initially found in music. For that purpose I review some of the most influential works on music as one of the fine arts, and finally compare them with medical reports on the therapeutic effects of music, which were also popular at the time. I then mention the question of musical taste and the types of listeners that appeared in France, but also in the German countries, where instrumental music was more established than in France. I trace the transformation of meaning of the terms *Kenner* und *Liebhaber* from Johann Mattheson to Nikolaus Forkel, and finally hint at the increasing definition of hearing as an "inner sense", towards the end of the 18th century.

Chapter 6: Studying Hearing and Music Listening after 1800

The chapter begins with an introduction to the novel approach to music listening that can be found among the Romantics at the beginning of the 19th century. In particular, the faculty of the imagination links their musings on music to the research of Ernst Chladni, the scientific and instrument maker responsible for the revival of acoustics at the time. I then review the development of new instruments, including new musical instruments, which fuelled the emergence of a psychology of audition. In the next section I review the definition and institutionalization of otology as a medical speciality, in the second half of the 19th century, and then turn to nerve physiology and the principal figure of the period: Hermann von Helmholtz, who developed physiological acoustics. Helmholtz's concern with delimiting the fields of aesthetics and science can be seen in parallel to Eduard Hanslick's efforts to define the beautiful in music, efforts that are at the root of the ideology of absolute music. The chapter closes with a narration

of the reshaping of sensation in the definition process of experimental psychology, and with a brief reference to the beginnings of the psychology of music.

RESUM

Introducció

En la Introducció presento un "experiment" ideat i promogut per *The Washington Post*, que el 2007 va convidar el famós violinista Joshua Bell a fer-se passar per un músic de carrer en una estació central del metro de Washington D.C. El seu petit concert, però, va tenir una minsa recompensa econòmica. Gene Weingarten, periodista del diari, va explicar els fets en un article, que va tenir gran ressò en la premsa internacional i va causar escàndol i incredulitat. Proposo fer servir aquest episodi per pensar sobre les nostres categories i pressupòsits quan parlem de música. Començo reflexionant sobre la noció de música i sobre les activitats i aspectes que el nostre concepte no inclou. Després examino el que podríem considerar l'actitud normativa en escoltar música, l'escolta de concert, i presentant-la com una forma històrica d'etiqueta social, però també com un aspecte de la ideologia de la música absoluta. Em refereixo a continuació a l'escolta en relació amb l'escriptura i la gravació, per criticar la identificació de les obres amb les partitures i amb els sistemes de transmissió. Hi argumento que les característiques del període d'or de la registració, el de l'alta fidelitat, han afavorit la subsistència del model de l'escolta de concert, reforçada pels currículums escolars i la promoció de l'educació musical a l'estil de la *music appreciation*. Tornant a les condicions d'escolta del present, paro atenció a la proliferació de tot tipus de músiques en la quotidianitat i argumento en favor de repensar l'escolta musical dintre del marc dels estudis de so i tenint en compte l'anomenat "gir sensorial". Finalment, defineixo els objectius i metodologia d'aquest treball.

Capítol 1: Pensar en l'audició i l'escolta després del "gir sensorial" I

La primera secció del capítol tracta de la noció comuna dels sentits i explica alguns dels pressupòsits filosòfics en què es basen avui dia els discursos científics sobre els sentits. Entre els pressupòsits, em concentro de manera especial en el parell conceptual sensació-percepció, que es va desenvolupar cap a finals del segle XIX, i que també té relació amb la diferència entre sentir i escoltar. Després explico com les idees corrents sobre els sentits es basen al capdavall en una sèrie de metàfores conceptuals i models: el model elèctric (o electroquímic), el model de la teoria de la informació, i el model-cervell, que han contribuït a modelar tant el discurs comú com els discursos experts sobre l'escolta. La segona secció d'aquest capítol presenta la història de la noció de "construcció cultural dels sentit", que aporta el marc conceptual en el qual els sentits (incloent-hi l'oïda) són estudiats avui dia per professors de l'àmbit de les humanitat i les ciències socials. En aquest secció repasso els precedents històrics del canvi de perspectiva anomenat "gir sensorial", en particular en l'antropologia dels sentits a començaments del segle XX, passant per les aportacions de Marshall McLuhan i Walter J. Ong als 60 i 70 del segle XX, i també pel grup de la Concordia University als 80. En connexió amb aquests esdeveniments, tracto de la invenció del concepte de *soundscape* o "paisatge sonor" per part de R. Murray Schafer i de les primeres passes cap al que avui dia es coneix com a estudis de so.

Capítol 2: Pensar en l'audició i l'escolta després del "gir sensorial" I

Aquest capítol va més enllà del treball del grup de Concordia sobre l'antropologia dels sentits i repassa la reacció relativament recent contra alguns dels seus postulats per part d'alguns etnògrafs influenciats per l'antropologia del cos i la fenomenologia–-una reacció que representem aquí amb la contraposició entre models sensorials i habilitats

sensorials. Com que la noció d'habilitat sensorial sembla haver deixat fora el llenguatge, tot seguit prenc en consideració la qüestió del llenguatge dels sentits, repassant algunes línies d'investigació lingüística i situant la manera en què l'antropologia dels sentits i l'etnografia sensorial han tractat el tema dintre de la història de la lingüística antropològica. Després traço el desenvolupament d'un altre camp que ha crescut en paral·lel a l'antropologia dels sentit, des dels anys 80 al present: l'antropologia de les emocions, on en canvi, llenguatge i discurs han ocupat un lloc central. La següent subsecció se centra en la recerca fenomenològica sobre l'escolta i la veu, i en especial en la investigació de Steven Feld sobre l'etnografia sensorial dels Kaluli de Bosavi, a la selva de la Nova Guinea. Explico després como Feld va intentar inicialment anar més lluny de la caracterització de l'antropologia de la música per part d'Alan Merriam, i del model comunicatiu de l'escolta musical proposat per John Blacking, per mirar de crear una antropologia del so. També mostro com, des dels anys 90 Feld ha resituat la seva investigació partint d'alguns dels desenvolupaments teòrics tractats en aquest capítol (principalment, la noció fenomenològica d'*embodiment* o corporeïtat), i ha encunyat la noció d'"acustemologia". Aquesta secció també tracta sobre la noció d'habilitats auditives o aurals, i es tanca amb algunes reflexions sobre l'aplicació de la noció d'habilitat a l'escolta musical, i sobre el concepte d'estils d'escolta.

Capítol 3: Sentir i escoltar en la història dels sentits i de les emocions

El tercer capítol repassa l'aparició d'una consciència de la historicitat dels sentits i de les emocions en Europa. Així, la prima secció es concentra principalment en l'aportació de l'escola francesa dels Annales, des de les primeres passes fetes per Lucien Febvre i Marc Bloch, que van atiar l'interès pel tema durant els anys 30, fins als

desenvolupaments per part de membres més joves de l'escola, durant les dècades successives, i sota noms tan diferents com història de les mentalitats, història de les sensibilitats, o història de les representacions. En aquest context, subratllo les diferències en el tractament entre els historiadors francesos i els angloparlants, i explico com la història dels sentits i la història sensorial (*sensory history*) dels anglòfons van créixer en paral·lel amb els camps veïns de la història del cos i la història de les emocions. La segona secció tracta dels problemes teòrics i metodològics que tenen a veure amb la historiografia dels sentits i de les emocions, en especial les dificultats per establir-ne una periodització. Després prenc en consideració els problemes específics de l'estudi de la història de l'audició. Amb aquest propòsit, a la tercera secció repasso una part de la bibliografia publicada en les darreres dècades, incloent-hi les investigacions sobre els paisatges sonors de períodes concrets i les recerques centrades sobretot en les teories i les tecnologies de l'escolta. El capítol conclou amb algunes observacions sobre la noció de règim auditiu (*auditory regime*), i amb una anàlisi del concepte d'*audile technique* emprat per Jonathan Sterne.

Capítol 4: Estudiar l'audició i la música abans de la formació de l'acústica

El capítol s'obre amb una discussió sobre la tensió entre els punts de vista de les humanitats i les ciències socials sobre l'audició, i el de les ciències naturals. La primera secció presenta les principals disciplines que tradicionalment han tingut a veure amb l'audició: la física (acústica), la música, la retòrica (després, la lingüística), la medicina i la fisiologia, la psicologia i la convergència d'electroacústica, eletrofisiologia i psicoacústica que durant les primeres dècades del segle XX va constituir alguna cosa semblant a una ciència de l'audició. El meu propòsit és oferir una introducció breu a la seva història i a les especificitats de les seves aproximacions a l'audició, tot subratllant-

ne les connexions amb la música. En aquesta secció també assenyalo alguns problemes en la historització de l'audició. La següent secció repassa les nocions antigues i medievals d'audició i de sentit en relació amb el que ara anomenaríem "teoria musical". A la tercera secció esbosso un panorama històric dels discursos sobre l'audició en la primera modernitat, incloent-li els avenços en anatomia i fisiologia. Tot seguit m'ocupo de les relacions entre retòrica i música en l'humanisme renaixentista, amb referència a la Camerata Fiorentina i a l'Académie de Baïf de París. Les següents subseccions tracten de la recerca física sobre la consonància, que molts estudiosos consideren clau per a l'establiment del programa experimental i de l'anomenada "Revolució Científica", i també dels diversos intents per explicar les passions humanes en el marc del programa mecanicista, en particular la de Descartes a *Les Passions de l'âme*, que va tenir molta influència sobre els discursos musicals. El capítol acaba amb un repàs a les activitats relacionades amb el so, l'audició i la música a les primeres acadèmies científiques, cap a finals del segle XVII, al voltant del moment en què Joseph Sauveur va proposar la fundació de la ciència de l'acústica.

Capítol 5: La invenció de l'oïda musical al segle XVIII

La primera secció d'aquest capítol se centra en l'emergència del concepte de sensibilitat. Després n'esbosso les arrels a l'empirisme de Locke i en la recerca fisiològica sobre la sensibilitat i la irritabilitat que va ser conduïda principalment per Haller, i després va ser adoptada també pels metges de l'escola de Montpeller. Aquests desenvolupaments van transformar el camp semàntic dels sentits (sensacions, sentiments, sensibilitat), tendint a subratllar la connexió entre els sentits, les emocions i la vida moral. La següent subsecció torna a la fisiologia, en particular a la fisiologia dels sentits i l'audició. Hi comento algunes obres importants d'alguns dels *philosophes*

(Condillac, Diderot, Rousseau) sobre la diferenciació dels sentits, el sentit de l'oïda i l'educació dels sentits. La següent subsecció combina una breu explicació de la teoria de l'harmonia de Rameau amb la narració del desenvolupament matemàtic de l'acústica al segle XVIII. La secció acaba amb una llarga consideració sobre les particularitats de la vida i l'estètica musicals a la França del segle XVIII, amb la intenció d'assenyalar els obstacles que la cultura de la sensibilitat havia de trobat inicialment en el camp musical. Amb aquesta intenció repasso algunes de les obres més influents sobre la música com a una de les belles arts, i finalment les comparo amb els informes i publicacions mèdiques sobre els efectes terapèutics de la música, que van ser molt populars a l'època. Esmento després la qüestió del gust musical i dels tipus de públics que van aparèixer a França, però també als països de parla alemanya, on la música instrumental estava més establerta que a França. Traço també la transformació del significat dels termes *Kenner* (expert, coneixedor) i *Liebhaber* (amateur, aficionat, *dilettante*) des de Johann Mattheson a Nikolaus Forkel, i finalment suggereixo que a finals del segle XVIII l'audició es defineix cada vegada més com un "sentit interior".

Capítol 6: L'estudi de l'audició i de l'escolta musical després del 1800

El capítol comença amb una introducció a les noves idees sobre l'escola musical que es troben entre els romàntics, a començaments del segle XIX. En concret, el protagonisme que atorguen a la facultat de la imaginació lliga les seves divagacions musicals amb les investigacions d'Ernst Chladni, el científic i constructor d'instruments que es considera responsable de la revifalla de l'acústica. Després repasso el desenvolupament de nous instruments acústics, inclosos alguns instruments musicals, un procés que va contribuir a l'emergència de la psicologia de l'audició. En la següent secció repasso la definició i institucionalització de l'otologia com a especialitat mèdica, en la segona meitat del

segle XIX, i després m'ocupo de la fisiologia del sistema nerviós i de la figura principal del període: Hermann von Helmholtz, que va desenvolupar l'acústica fisiològica. La preocupació de Helmholtz per delimitar els camps de l'estètica i de la ciència es pot interpretar en paral·lel amb els esforços d'Eduard Hanslick per definir el bell en la música; esforços que són a la base de la ideologia de la música absoluta. El capítol es tanca amb una narració de la reconfiguració de la sensació en el procés de definició de la psicologia experimental, i amb una breu referència als començaments de la psicologia de la música.

INTRODUCTION

On Music, Hearing and the Senses

On 8th April 2007 *The Washington Post* published an article under the headline "Pearls Before Breakfast", by Gene Weingarten, which recounted an "experiment" conducted by the internationally renowned violinist Joshua Bell.[1] At the newspaper's request, the violin virtuoso acted as street musician, playing his Stradivarius during the rush hour in the hall of the L'Enfant Plaza underground station, in downtown Washington D.C. A video camera recorded both his performance and the reactions of the people that walked across the place, while some assistants took note of the details of selected passengers to question them later. Bell's brief act was meant to answer a solemn question: "In a banal setting at an inconvenient time, should beauty transcend?" However, the so-called "experiment" (or, as Bell called it, his "stunt") tested a very particular kind of beauty, since the famous violinist played mostly classical music works. His programme included the chaconne from Bach's *Partita no. 2 in D minor*, which the violinist repeated at the end, Schubert's *Ave Maria* of worldwide fame, Manuel Ponce's *Estrellita,* which would rather be classified as light music, an unidentified work by Jules Massenet, and a Bach gavotte. In spite of the high popularity of some of these pieces, Weingarten stressed that these were not "popular tunes whose familiarity alone might have drawn interest", but "masterpieces that have endured for centuries on their brilliance alone, soaring music befitting the grandeur of cathedrals and concert halls".[2] The story was thus presented as an inquiry into the recognizability of "one of the finest

[1] Gene Weingarten, "Pearls Before Breakfast. Can one of the nation's great musicians cut through the fog of a D.C.

[2] Regarding the classicism of the works played by Bell, it is significant that Weingarten included comments on the works of Bach and Schubert in programme-note style, whereas he only mentioned in passing Ponce's song and Massenet's piece.

classical musicians in the world", playing in an unusual and hostile environment "some of the most elegant music written on one of the most valuable violins ever made".

Yet, in spite of the excellent elements involved in the "experiment", and the optimistic predictions of the consulted "expert"—Leonard Slatkin, music director of the National Symphony Orchestra, who was obviously not acquainted with the difficulties of performing on the street—the video recording showed that only seven people stopped to listen to the great artist, who managed to collect just thirty-two dollars. Although Weingarten had also consulted an art curator and a Kant scholar, who warned that the appreciation of beauty depends on the context, he nevertheless considered the "experiment" outcome quite surprising. So did also the staff of other international newspapers that in the following days republished and commented on the story.[3] For instance, the 9th April's edition of Spain's *El País* included a short article under the headline: "La belleza pasa desapercibida" ("Beauty goes unnoticed"), adding that a virtuoso armed with a Stradivarius did not succeed in catching the attention of Washington's underground passengers.[4] The same day the Italian newspaper *La Repubblica* published a longer version of the facts, choosing this headline: "Joshua Bell, concerto nella stazione. Nessuno riconosce il genio del violino" ("Joshua Bell, concert at the station, no one recognizes the violin genius").[5] Eight days later, *The Times* published the article "Virtuoso violin recital falls on deaf ears in DC", signed by Richard Morrison, who presented *The Washington Post* test as "one of the most revealing stunts of the year" and "a story that has torn through American cultural circles

[3] The article was also linked and commented on a myriad of webpages, most of which echoed the arguments and tone of the original piece. In October 2015 Google found more than 16,000 results for the keywords "pearls before breakfast".

[4] "La belleza pasa desapercibida", *El País*, 9th April 2007, http://www.elpais.com/articulo/cultura/belleza/pasa/desapercibida/elpepucul/20070409elpepucul_1/Tes [last access: October 2015]. Translation is mine.

[5] "Joshua Bell, concerto nella stazione. Nessuno riconosce il genio del violino", *La Repubblica*, 9th April 2007, http://www.repubblica.it/2007/04/sezioni/persone/bell-metro/bell-metro/bell-metro.html [last access: October 2015]. Translation is mine.

like a forest fire". Thus, while Weingarten regretted the "grim *danse macabre* to indifference, inertia and the dingy, gray rush of modernity" that the fast walking passengers seemed to play around the talented soloist, Morrison concluded that beauty was doomed to pass unnoticed in the midst of our (Western, urban, we may suppose) everyday life. He ended the piece with a rhetorical question: "Is the rat race of modern urban existence simply too frenetic and relentless for any of us to pause when we see or hear something beautiful, put our workday routine on hold and think: 'Gosh, that's extraordinary. I want to savour it'?" [6]

The way in which Weingarten interpreted the effects of Joshua Bell's performance on commuters revealed that he was expecting from them not only interest and attention, but also some particular signs of that attention. They were expected not only to get mentally involved in the music, but also to stop and look at the performance in silence. Thus, while the "experiment" included personal interviews with some passers-by, the analysis of their videotaped responses mainly tried to discover fixed gazes and immobility. Other possible ways of engaging in the music, like synchronizing the walking pace to the rhythm, singing along, secretly conducting with a hand, tapping fingers, etc., were not even mentioned. On the other hand, the decision to videotape the performance turned what was essentially an open space, accessible from different directions, and thus with a particularly complex acoustics, into a visually confined place, creating a kind of framework. As a consequence, the video recording shows the attitudes and trajectories of passers-by as they enter the hall and cross it, while they are able to see (and be seen by) Bell. Still, it gives us no clue about what they did before or after entering the space, when they were already (or still) able to hear him play. In fact,

[6] Richard Morrison, "Virtuoso violin recital falls on deaf ears in DC", *The Times*, 17th April 2007, http://www.thetimes.co.uk/tto/opinion/columnists/richardmorrison/article2045056.ece [last access: February 2008; in October 2015 the article was only accessible to subscribers].

Weingarten and his assistants did not seem that interested in what the commuters may have actually heard (and possibly appreciated) in crossing the hall. In my opinion, Weingarten's analysis was implicitly based on the listening model that belongs in the concert hall, which I will call "concert listening". For that reason, he assumed that passers-by would mimic, to the extent that it was possible in that unwelcoming environment, the static, mentally focused listening of concertgoers.

Besides, Weingarten's reflections included a number of apparent contradictions. While he considered the programme selected and played by Bell as universally appealing, he underlined that some of the passengers that stopped to listen had knowledge of classical music, implying that their ability to appreciate beauty in that unusual context depended on their understanding of the musical idiom. Also, he commented amply on Bell's fame as a performing artist, recording star and occasional contributor to Hollywood soundtracks, but refused to count as valid the twenty dollars given by a passer-by who identified the violinist, arguing that that money was "tainted by recognition". In view of these elements, we may conclude that Weingarten's expectations regarding commuters' reactions were most probably influenced by a certain ideology of music and music listening: works alone, recreated in a brilliant, flawless performance, should be able to raise commuters' attention, regardless of the context. This conviction is commonly known under the name of "absolute music"—in Mark Evan Bonds' definition, "the idea of music's essence as autonomous, self-contained, and wholly self-referential".[7]

[7] Mark Evan Bonds, *Absolute Music: The History of an Idea*, New York, Oxford University Press, 2014, p. 1. On the concept of "absolute music" see also Carl Dahlhaus, *The Idea of Absolute Music,* translated by Roger Lustig, Chicago-London, The University of Chicago Press, 1989, and Lydia Goehr, *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music*, Oxford, Clarendon Press, 1992For a more critical analysis of the notion see chapter 1 ("The Problem of Musical Absolutism"), in Philip Tagg and Bob Clarida, *Ten Little Title Tunes: Towards a Musicology of the Mass Media*, New York-Montreal, The Mass Media Musicologists' Press, 2003, pp. 3–30.

Considering that nowadays the majority of everyday musical experiences of the average inhabitant of the so-called Western World (and probably elsewhere) involve mainly recorded music, Joshua Bell's stunt might not seem particularly relevant. Yet, there are a number of reasons why I have chosen to introduce this thesis with a brief analysis of Weingarten's piece. In the first place, the interpretations and comments that the "experiment" raised in international media project a powerful image of how music—either live or recorded, chosen by its potential listeners or not—and attitudes towards music may embody moral and political values. The stunt is also a good example of how music—again, live or recorded, selected or not—may take part in a situation without being its main focus, as it happens very often in everyday life (I will comment on this below). In addition, it could be interpreted as evidence of the effects of mediatized environments on the status of liver performances, according to Philip Auslander's theoretical elaborations on the notion of liveness.[8]

More generally, I am interested in Joshua Bell's act, or rather in how it was interpreted at the time, because it offers, in my opinion, a good example of how decisively ideas—ideologies, models, concepts—contribute to shape not only our opinions, but also our perceptions. In other words—and this is one of the theoretical premises on which this research is based—ideas, in spite of being often considered as representations or images, cannot be separate from real experiences, as they are created and live in interaction with them.[9] In this sense, the *Washington Post* piece shows how certain normative models of music, music listening and general notions about listening have still currency in public debates and continue to be accepted uncritically. Therefore, if we want to have a better comprehension of current everyday listening experiences

[8] Philip Auslander, *Liveness*: *Performance in a Mediatized Culture*, New York, Routledge, 2008.

[9] This is, indeed, the approach taken by proponents of enactivism; see for instance Francisco J. Varela, Evan Thompson and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge, MA, MIT Press, 1991.

with music, we do not only need substantial and well structured empirical data, but also models and concepts that are better suited to grasp those experiences.

Finally, both the conception of Joshua Bell's stunt and the evaluation of its outcome prompt us to think about the seemingly obvious relationship between music, sound and listening, the performative aspects of music, and more general notions, like hearing and listening, or attention. In sum, Weingarten's "experiment" shows how ideas about music listening ultimately refer to the structuring of the human psyche, as well as to the interface between the psyche and the world. But before I elaborate on music listening, please let me take a short detour through the notion of music.

On the notion of music

Music has often been defined as an art of sound, an acoustic aesthetic practice. This is how many English dictionaries still define it, and probably also how most English speakers think of it. A few years ago the entry "music" in the *Oxford English Dictionary* read like this: "1.That one of the fine arts which is concerned with the combination of sounds with a view to beauty of form and the expression of emotion; also, the science of the laws or principles (of melody, harmony, rhythm, etc.) by which this art is regulated".[10] However, the same dictionary currently defines "music" in this way: "1.Vocal or instrumental sounds (or both) combined in such a way as to produce beauty of form, harmony, and expression of emotion", and then gives a couple of examples: "couples were dancing to the music", "baroque music".[11] The new definition

[10] See Oxford Dictionaries Online, entry "music", first meaning: http://oxforddictionaries.com/view/entry/m_en_gb0543390#m_en_gb0543390 *[access: September 2011].* The *Webster's Encyclopedic Unabridged Dictionary of the English Language* also defines *music* as "an art of sound", or "the tones or sounds employed" in it, specifying that these can be "vocal or instrumental sounds (or both)"; see *Webster's Encyclopedic Unabridged Dictionary of the English Language*, New York-Avenel, Gramercy Books, 1996, entry *music*, p. 943.

[11] See Oxford Dictionaries Online, entry "music", first meaning: http://oxforddictionaries.com/view/entry/m_en_gb0543390#m_en_gb0543390 [last access: October 2015].

of music sets aside its status as one of the fine arts, but it maintains two key elements of the old one. Firstly, music is described as a combination sounds, more precisely of "vocal or instrumental sounds (or both)". This is in line with what is probably the most basic definition of music and one of the most quoted and controversial: according to composer Edgar Varèse music would be "organized sound", namely an intentional combination of sounds. Secondly, the *Oxford English Dictionary* states that music is aimed at producing beauty of form—also "harmony"—and emotions.

The definition of music that I have just reported could be applied to equivalent terms in other languages, particularly in those (mostly European) languages that have equivalent terms to "music" stemming from the Greek term *mousiké* via the Latin *musica*: *música* in Catalan, Spanish and Portuguese, *musique* in French, *musica* in Italian, *Musik* in German, Danish and Swedish, *musiikki* in Finnish, *muusika* in Estonian, *muzyka* in Russian, *al-Musiqa* in Arabic, etc.[12] Besides, terms like the Hindu *Saṅgīta,* the Chinese *Yīnyuè*, or the Japanese *ongaku* also refer to more or less artistic activities with sounds aiming at arousing emotions and a sense of beauty. Nevertheless, as many other authors have observed, the concept of music is neither universal, nor perfectly translatable into other languages. Ethnomusicological field research has revealed that some cultures do not possess an abstract concept equivalent to our "music", whereas some other cultures have concepts of music that are markedly divergent from ours. The examples are too numerous to review, so I will just provide a few of them. Charles Keil has observed that many African cultures are notably specific in naming musical activities; in them "[i]t is easy to talk about song and dance, singers and drummers, blowing a flute, beating a bell, but the general terms 'music' and

[12] However, the Greek term *mousiké* apparently comprehended also drama and some forms of poetry; see Thomas Mathiesen, "Greek Music Theory", in Thomas Christensen (ed.), *Cambridge History of Western Music Theory*, Cambridge, Cambridge University Press, 2002, pp. 109–135.

'musician' require long and awkward circumlocutions that still fall short, usually for lack of abstraction".[13] The Inuit, studied by Jean-Jacques Nattiez, apparently used the word *nipi* to designate not only what we call "music", but also "noise as well as the sound of the spoken voice".[14] According to John Baily the Igbo term *egwu* "embraces music, song, dance, and drama, which are thought of as inseparable components of a performance of 'music'". [15] Bruno Nettl has also observed that for the Blackfoot people of North America the word *saapup* "means something like singing, dancing, and ceremony all rolled into one". [16]

These examples beg the obvious question of what is excluded from our notion of music. Labelling something "music" inevitably means labelling other fields, objects or experiences as non-musical. In particular, as Jean Molino has pointed out, thinking of music in terms of sound implies to detach "pure music" from performance (from the body, ultimately),[17] and to leave off-limits the neighbouring activities of ritual, dance and drama. Besides, our notion of music implies that it must be distinguished from noise—usually considered as annoying and/or devoid of meaning—, as well as from other meaningful activities with sounds, particularly from speech. The distinction speech-music is a particularly elusive one, even if it is often dismissed as self-evident: whereas speech (language) would be referential, that is a system a conventional signs standing for something else (meanings), music would be non-referential. Yet, it should

[13] Charles Keil, *Tiv Song: The Sociology of Art in a Classless Society*, Chicago-London, University of Chicago Press, 1979, p. 27.

[14] Jean-Jacques Nattiez, *Music and Discourse: Toward a Semiology of Music*, translated by Carolyn Abbate, Princeton, Princeton University Press, p. 56.

[15] John Baily, "10. Music Structure and Human Movement", in Peter Howell, Ian Cross, and Robert West (eds), *Musical Structure and Cognition*, London, Academic Press, 1985, pp. 237–258, on p. 239.

[16] Bruno Nettl, "An Ethnomusicologist Contemplates Universals in Musical Sound and Musical Culture", in Nils L. Wallin, Björn Merker and Steven Brown (eds), *The Origins of Music*, Cambridge, MIT Press, 2000, pp. 463–472, on p. 466.

[17] Jean Molino, "La musique et le geste: Prolegomènes à une anthropologie de la musique", *Analyse Musicale*, no. 10, 1988, pp. 8–15, on p. 8.

suffice to think of song, commonly thought of as a practice in which "proper music" and language converge, to understand the problems involved in that distinction. Difficulties also arise in the field. For instance, while doing ethnomusicological research among the Suyá Indians of Mato Grosso, Brazil, Anthony Seeger struggled to tell apart what they "glossed as 'song' and what they glossed as 'telling'", since—he has reported—"some examples of their speech seemed more 'musical' in the traditional western sense of tonal structuring than examples of song, yet they insisted that those performances were not song".[18] Besides, repeated attempts at establishing a list of music universals, that is of characteristics shared by all types of music, have proven unsuccessful so far.[19] As Marcia Herndon and Norma McLeod have written: "If a hard line is taken, defining music as a form of sound with certain characteristics, such definition will be forced to exclude numerous examples of sound from consideration. If, on the other hand, the cultural definition of music is followed in each case, some kinds of sound normally thought of as music may be omitted."[20] As a result, in some cultural contexts ethnomusicologists seem to have developed their research on the basis of an analogy with what they call "music", favouring thus their (etic) audition and concepts over the ideas and auditory experiences of the locals. As John Chernoff has argued with reference to African musical styles, the difficulties that non-Africans may find in

[18] Anthony Seeger, "Oratory is Spoken, Myth is Told, and Song is Sung, but They Are All Music to My Ears", in Joel Sherzer and Greg Urban (eds.), *Native South American Discourse*, Amsterdam, Mouton de Gruyter, 1986, pp. 59–82, on p. 59. On speech and song, see also the classical essay by George List, "The Boundaries of Speech and Song", *Ethnomusicology*, vol. 7, no. 1, January 1963, pp. 1–16.

[19] On universals in music, see the special issue of *Ethnomusicology*, vol. 15, no. 3 (September 1971), with contributions by Klaus P. Wachmann, David P. McAllester, Charles Seeger, and George List; Dane L. Harwood's "Universals in Music: A Perspective from Cognitive Psychology", *Ethnomusicology*, vol. 20, no. 3, September 1976, pp. 521–533; and the special issue of *The World of Music*, vol. 19, no. 1–2 (1977), with contributions by John Blacking, Frank Harrison, Mantle Hood, Gertrude Kurath, Alan Lomax, Jean-Jacques Nattiez, Bruno Nettl and Tran Van Khe; W. Jay Dowling and Dane L. Harwood in their *Music Cognition*, San Diego, Academic Press, 1986, pp. 238–239; Nettl, "An Ethnomusicologist Contemplates Universals in Music Sound and Musical Culture"; and also Catherine Stevens and Tim Byron, "Universals in Music Processing", in Susan Hallam, Ian Cross and Michael Thaut (eds), *The Oxford Handbook of Music Psychology*, Oxford, Oxford University Press, 2009, pp. 14–23.

[20] Marcia Herndon and Norma McLeod, *Music as Culture*, Pt. Richmond, MRI Press, 1990, p. 6.

making sense of them have to do with the fact that they cannot be set apart from their context: they are not to be listened to.[21]

Cultural discrepancies about what should count as music are a necessary premise to this investigation insomuch as they prompt us to think that music—not just "other", more or less exotic musical traditions, but also our (Western, European) music—may not solely or principally be "organized sound" or a combination of sounds. It may have to do with performance, and therefore with the body, that is with senses other than ear, and with our ability to move and be affected by emotions. Music may not be just something to be listened to, and listening itself may be more connected to the body than we can imagine. Indeed, it would probably be more productive to conceive music as a practice, than as an object. In the terms proposed by Christopher Small, we would not speak of "music", but of "musicking", which he defined as "to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practicing, by providing material for performance (what is called composing), or by dancing".[22]

Music and listening in Western history

As a matter of fact, if we look at Western music history, we will neither find a univocal, transhistorical meaning of music, a closed set of conditions. As Carl Dahlhaus has pointed out, speaking of a European (or Western) concept of music can only be accepted on the basis of the historical evolution of the term, not as a statement of

[21] John M. Chernoff, *African Rhythm and African Sensibility: Aesthetics and Social Action in African Musical Idioms*, Chicago, University of Chicago Press, 1979, p. 33; see also by him, "'Hearing' in West African idioms", *The World of Music*, vol. XXXIX, no. 2, 2006, pp. 19–25.

[22] Christopher Small, *Musicking: The Meanings of Performing and Listening*, Hanover, NH, Wesleyan University Press-University Press of New England, 1998, p. 43, on p. 9.

univocality.[23] While this historical evolution may result in different concepts of music, or in subtle changes and displacements of meaning—like the one that I have underlined at the beginning of this chapter, regarding two definitions of "music" separated only by a few years—, it corresponds, more importantly, to a continuous transformation of the contexts, agents, spaces and technologies involved in musical activities, as well as in the reconfiguration of the relationship between music and other practices and types of knowledge. The reality and scope of this historical transformation becomes apparent if we consider, for instance, the inclusion of music in the medieval *quadrivium* and its long-lasting classification among the sciences, the close relationship of music and language before and during the Enlightenment, or the diversity of contemporary musical scenes.

As it is evident, changes in musical listening have been and are part of the historical transformation in the conditions of "musicking". As Leon Botstein has recently argued, the way in which we construe what is significant in music history has been influenced by "the shifting character of musical perception, as well as the changing preconditions surrounding the attribution of meaning to musical experience".[24] In other words, both the act of music listening—in its mental and physical dimensions—and the notions and circumstances that contribute to shape it must be considered as important elements in the study of music history. Indeed, awareness of the historicity of music listening is hardly new. It can be traced back at least to Heinrich Besseler's "Grundfragen des musikalischen Hörens" (1925, translated as "Fundamental Issues of Musical Listening," 2011), where he dealt with the "possibilities of access" to different types of music, and with the "social formations"

[23] Carl Dahlhaus and Hans Heinrich Eggebrecht, *Che cos'è la musica?,* Bologna, Il Mulino, 1988, p. 31.

[24] Leon Botstein, "The Eye of the Needle: Music as History after the Age of Recording", in Jane F. Fulcher (ed.), *The Oxford Handbook of the New Cultural History of Music*, New York, Oxford University Press, 2011, pp. 256–304 (quoted from p. 13 of the digital edition).

derived from those possibilities.[25] As Matthew Pritchard has argued, Besseler's interest in the historical conditions of listening did not only originated from his research into medieval and Renaissance music, but it responded also to the debate on the lost community-building power of concert music that was in course at the time.[26] A few years later, Besseler published his book *Das musikalische Hören der Neuzeit* (Musical Listening in the Modern Era, 1959),[27] which was followed by Zofia Lissa's reflections on the methodological problems associated with the investigation of musical perception, and on the relationship between changes in musical perception and changes in musical styles.[28]

It is widely acknowledged that among the different historical configurations of "musicking", the one involving concert music and concert listening has been particularly influential, at least until recent decades, and has also conditioned the way in which other, non-classical music styles have been and are still enjoyed and understood. Concert listening is associated with the notion of an aesthetics of music—that is, music understood as one of the fine arts—, which emerged in Europe towards the end of the 18th century. The aesthetic approach to music reclaimed attention to sound over the circumstances of performance, invoked the superiority of instrumental music over vocal music, and of European music over other musics. As Tomlinson has argued, within that framework music "came to function as a kind of limit-case of European uniqueness in

[25] Heinrich Besseler, "Grundfragen des musikalischen Hörens" (1925), in *Aufsätze zur Musikäesthetik und Musikgeschichte*, ed. Peter Gülke, Leipzig, Reclam, 1978, pp. 29–53; in English as "Fundamental Issues of Musical Listening (1925)", translated Matthew Pritchard, with Irene Auerbach, *twentieth-century music*, 8(1), pp. 49–70 (on p. 50). See also Rob C. Wegman, "'Das musikalische Hören' in the Middle Ages and Renaissance: Perspectives from Pre-war Germany", *Musical Quarterly*, vol. 82, no. 3/4, special issue: "Music as Heard", 1998, pp. 434–454.

[26] See Matthew Pritchard, "Who Killed the Concert? Heinrich Besseler and the Inter-War Politics of *Gebrauchsmusik*", *twentieth-century music*, 8/1, 2012, pp. 29–48; on the role of Besseler in the scholarly rediscovery of medieval and Renaissance music before and after the World War II, see Daniel Leech-Wilkinson, *The Modern Invention of Medieval Music*, Cambridge, Cambridge University Press, 2002, pp. 169–179.

[27] Heinrich Besseler, *Das musikalische Hoeren der Neuzeit*, Berlin, Akademie-Verlag, 1959.

[28] See for instance Zofia Lissa, "On the Evolution of Musical Perception", translated by Eugenia Tanska, *The Journal of Aesthetics and Art Criticism*, vol. 24, no. 2 (Winter 1965), pp. 273–286, and also by her, "Zur Theorie der musikalischen Rezeption", *Archiv für Musikwissenschaft*, 31.Jahrg., H.3, 1974, pp. 157–169.

world history and an affirmation of the gap, within the cultural formation of modernity, between history and anthropology". The aesthetic approach to music was also functional to the construction of music as a social and cultural field, and of musicology as an academic discipline in the second half of the 19th century. According to Tomlinson the conception of music as mainly instrumental has tended to obscure the importance of song, which, being the product of human voice, is intrinsically rooted in the body and in the physicality of gesture and performance.[29] It has also diminished the historical importance of certain musical genres tightly connected to ritual and performance, such as opera, liturgical music, military marches, dance music, etc. As Alan Durant and Christopher Small have contended, it has even diverted attention from the theatrical and ritual aspects of the most paradigmatic of Western musical institutions: the symphonic concert.[30]

In parallel to the emergence of an aesthetic view of music new listening attitudes and ideals developed and consolidated in Europe and the United States. At least since the 19th century—with significant variations among different European regions, and also between Europe and America—a form of etiquette regulating social and individual behaviour in concert halls, opera theatres, auditoriums and chamber music rooms was slowly established. Good manners required that audiences, which were clearly separated from performers, remained seated, engaged in silent attention to the music. While behaviour at the opera or concert hall was sometimes discussed in etiquette manuals or commented in reviews, the rules of concert listening were often tacit, and were normally transmitted by imitation. Silent attention was, if not always the

[29] See Gary Tomlinson, "Musicology, Anthropology, History", in in Martin Clayton, Trevor Herbert and Richard Middleton (eds.), *The Cultural Study of Music. A Critical Introduction*, London, Routledge, 2003, pp. 31–44, quote is on p. 32. On this see also chapter 2 ("Scholarship and the Definition of Musical Cultures"), in David Gramit, *Cultivating Music: The Aspirations, Interests, and Limits of German Musical Culture, 1770–1848*, Berkeley, University of California Press, 2002, pp. 27–62.

[30] See Alan Durant, *Conditions of Music*, London, Macmillan, 1994; and Small, *Musicking: The Meanings of Performing and Listening*.

most common behaviour in concert halls, certainly the one increasingly perceived by cultural and social elites as the most appropriate. As James Johnson and William Weber have argued, particular groups belonging to cultural elites, e.g. connoisseurs, or *dilettanti*, were instrumental in the promotion of concert listening in different historical moments and musical scenes.[31]

As it is conceived and practiced today in auditoriums and opera theatres around the world, concert listening may appear like a quite homogeneous set of manners. However, since the publication of Weber's *Music and the Middle Class*, in 1975, we have gained a better understanding of the emergence and consolidation of the institution of the concert, which in fact could correspond to different typologies of concerts, disparate forms of organization, audiences, places, repertoires and forms of sociability.[32] Also, in the last decades some scholars have also traced changes in other musical institutions, genres and periods traditionally associated with concert listening, but where performance and the body are more obviously important, like opera, or the recitals of instrumental virtuosi during Romanticism, where visual aspects were so relevant as auditory ones.[33] In addition, music historians have approached and discussed the different forms and contexts of listening that preceded or followed the classical era, like that typical of early 18th-century opera and private concerts audiences, which some

[31] See James H. Johnson, *Listening in Paris: A Cultural History*, Berkeley, University of California Press, 1995, which explains the changes in attitudes of Parisian opera audiences between 1750 and 1850; and "Le savant et le général. Les goûts musicaux en France au XVIIIe siècle", *Actes de la recherche en sciences sociales*, no. 181–182, 2010/1, pp. 18–33.

[32] See William Weber, *Music and the Middle Class: The Social Structure of Concert Life in London, Paris and Vienna between 1830 and 1848*, Aldershot, Ashgate, 2004 (2nd edition); Mary Sue Morrow, *Concert Life in Haydn's Vienna: Aspects of a Developing Musical and Social Institution*, Hillsdale, NY, Pendragon Press, 1989; and also by Weber, *The Great Transformation of Musical Taste: Concert Programming from Haydn to Brahms*, New York, Cambridge University Press, 2008.

[33] See Johnson, *Listening in Paris: A Cultural History*, and Dana Gooley, *The Virtuoso Liszt*, Cambridge, Cambridge University Press, 2004, and Dana Gooley, *The Virtuoso Liszt*, Cambridge, Cambridge University Press, 1994, esp. chapter 1 ("Liszt, Thalbert, and the Parisian Publics"), pp. 18–77, and Lawrence Kramer, *Musical Meaning: Toward a Critical History*, Berkeley, University of California Press, 2002, chapter 4 ("Franz Liszt and the Virtuoso Public Sphere: Sight and Sound in the Rise of Mass Entertainment"), pp. 68–99.

have anachronistically characterized as distracted or disengaged.[34] The research is still at the beginning, but so far we have achieved a better knowledge of the evolution of music listening throughout history. From what we know so far, we can deduce that concert listening cannot be ascribed to the whole history of so-called "high-art" music, not even to the more restricted field of musical classicism.

As a matter of fact, concert listening is not only a form of etiquette, a set of norms for behaviour in public that have developed historically. There is also a prescriptive side to it, since it both implies and makes sense of a net of values, which constitute the ideology of absolute music.[35] This ideology consists in a series of assumptions including these four: musical works are aesthetically autonomous; the history of music is the history of great composers and their works; music may be identified with musical works and specifically with scores; and listening is primarily conceived as a intellectual engagement with music, a quest for meaning. I describe these notions as ideological because they seem to conceal the conditions that make them possible.[36] These conditions include material and practical aspects, like total silence, appropriate illumination, a certain discipline of listeners' bodies, the very physiology of hearing, etc., but also encompass the conceptual schemes and social circumstances meant to guarantee the perception and appreciation of music in the concert hall. By contrast, attentive listening at the concert hall is conceived as almost a natural response to the musical works. Indeed, as Durant has pointed out, when compared with listening

[34] See William Weber, "Did People Listen in the 18th Century?", *Early Music*, vol. 25, n. 4, 25th Anniversary Issue: "Listening Practice", November 1997, pp. 678–691.

[35] Bonds prefers to consider absolute music "a regulative construct", which is a milder version of my argument; see Bonds, *Absolute Music* , p. 6.

[36] For a reflection on the validity of the concept of "ideology" in contemporary music theory and education, see Lucy Green, "Why 'Ideology' is Still Relevant for Critical Thinking in Music Education", *Action, Criticism & Theory for Music Education*, vol. 2, n. 2, December 2003, http://act.maydaygroup.org/articles/Green2_2.pdf [last access: October 2015], p. 5.

to recorded or broadcast music, concert listening is frequently considered "a 'natural' or 'neutral' way of hearing music", and "the measure of proper attention".[37]

As Richard Middleton has remarked, the assumptions of the ideology of absolute music are "the result of a reciprocal relationship between musical practice and what Foucault calls discursive formation, the hierarchy of values and legitimations in the one reflecting and producing that in the other, the whole complex intimately connected with social class structure".[38] According to Foucault, discursive formation or "epistemes" refer to "the epistemological field […] in which knowledge, envisaged apart from all criteria having reference to its rational value or to its objective forms, grounds its positivity and thereby manifests a history (…) of its conditions of possibility". [39] In my opinion, it would also be useful to invoke the Foucauldian concept of *dispositif*, usually translated as "apparatus", which is meant to encompass not only discourses, but also practices, institutions, regulations, etc.[40] It could be argued that the discourses of concert listening and the ideology of aesthetic autonomy, as well as the auditoriums, the way in which their acoustic has evolved, the repertoires that are played in them, the aesthetics and attitudes of audiences, etc., all these elements put together constitute an "apparatus of attention".

[37] Durant, *Conditions of Music*, p. 32.

[38] Richard Middleton, *Studying Popular Music*, Milton Keynes, Open University Press, 1990, p. 107.

[39] See the preface to Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*, London and New York, Routledge, 2002, pp. xxiii–xxiv.

[40] On the difference between episteme (*epistémè*) and apparatus (*dispositif*), see "Le jeu de Michel Foucault", in *Dits et écrits, vol. III,* edited by Daniel Defert and François Ewald with the assistance of Jacques Lagrange, Paris, Gallimard, 1994, pp. 298–329 (pp. 298–302); published in English as "The Confession of the Flesh", in Michel Foucault, *Power/Knowledge: Selected Interviews and Other Writings 1972–1977*, edited by Colin Gordon, translated by Colin Gordon et al., Brighton, The Harvester Press, 1980, pp. 194–228.

From listening through reading to listening to records

As I have mentioned before, one of the main assumptions that constitute the ideology of concert listening is the traditional identification of music with works, and with a particular kind of written documents: scores.[41] While this may seem just a factual reference to the network of technologies and discourses that have accompanied music's dissemination—in this case, notation and printing—, it is actually much more than that. As Lydia Goehr argued in *The Imaginary Museum of Musical Works* (1992), the association of music with musical works—what she has called the "work-concept"—appeared in European musical life around 1800, when the notion of "fidelity to the work" (*Werktreue*) became the quality standard of musical performances.[42] In this way musical performances came to be conceived as tightly dependent on the score and particularly on its most authentic incarnation: the critically established original score (*Urtext*). It was a process associated with other changes in the professional status of musicians and their relationship to audiences, and reinforced later by the positivistic ideals that shaped the establishment of musicology as an academic discipline in the last quarter of the 19th century.[43] While some musicologists have questioned the concepts and chronology proposed by Goehr,[44] it is unquestionable that most musicologists

[41] A perusal of some contemporary English dictionaries confirms that identification. For instance, the second meaning of *music* in the *Oxford English Dictionary* reads: "2. The written or printed signs representing vocal or instrumental sound", and then: "2.1 The score or scores of a musical composition or compositions", see See Oxford Dictionaries Online, entry "music", http://oxforddictionaries.com/view/entry/m_en_gb0543390#m_en_gb0543390 *[last access: October 2015].* See also the third meaning of *music* in the *Webster's Encyclopedic Unabridged Dictionary of the English Language*: "3. musical work or compositions for singing or playing", and the fourth and fifth meanings: "4. the written or printed score of a musical composition. 5. such scores collectively", *Webster's Encyclopedic Unabridged Dictionary of the English Language*, p. 943.

[42] Goehr, *The Imaginary Museum of Musical Works*.

[43] See Kevin C. Karnes, *Music, Criticism, and the Challenge of History: Shaping Modern Musical Thought in Late Nineteenth-Century Vienna*, New York, Oxford University Press, 2008.

[44] On the controversy about Goehr's arguments in *The Imaginary Museum of Musical Works* see Michael Talbot (ed.),*The Musical Work: Reality or Invention?*, Liverpool, Liverpool University Press, 2000. Rob C. Wegman has also written about written documents discussing musical understanding based on authorship and the notion of work as early as the late 15th century; see Rob C. Wegman, "'Musical Understanding' in the 15th Century", *Early Music*, vol. 30, no. 1, February 2002, pp. 46–60 and 63–66.

regard music analysis (of scores) as their main professional skill: for them music history is equivalent to the history of (Western classical) music works, and knowledge of music amounts to knowledge of (Western classical) musical scores.

However, the importance of writing to the ideology of absolute music and concert listening goes beyond notation, scores and musical literacy. As Botstein has argued, the expansion of concert audiences at the end of the 19th century was accompanied by a vast array of literature, including music criticism, histories of music for the general public, concert programme notes, listening guides, and even guidebooks to specific repertories, which helped shape listeners' experiences at the concert hall.[45] In this way "the linguistic form of describing and reacting to musical experience was influenced by expectations about music themselves first formulated in terms of language."[46] This process became increasingly important at a time in which—following Botstein—levels of musical literacy, which in the 19th century was normally based on piano playing, were starting to recede, whereas listening was replacing playing as the most common form of musical activity.[47]

Closely associated with the notion of the musical work is the idea that music may be a form of thought. As Mark Evan Bonds has showed, this idea emerged in Western classical tradition at the end of the 18th century, with the Romantic conceptualization of the symphony and the idealist aesthetics that changed the way in which it was listened to.[48] Yet, the identification of music with thought, and thus of listening with the production of mental representations—images, symbols, often

[45] See Leon Botstein, "Listening through Reading: Musical Literacy and the Concert Audience", *19th-Century Music*, vol. 16, no. 2: "Music in Its Social Context", Autumn 1992, pp. 129–145; on listening guides see Rémy Campos and Nicolas Donin, "La musicographie à l'oeuvre: écriture du guide d'écoute et autorité de l'analyste à la fin du XIXe siècle", *Acta musicologica*, LXXVII/2, 2005, pp. 151–204.

[46] Botstein, "Listening through Reading", p. 130.

[47] Ibid., p. 137.

[48] Mark Evan Bonds, *Music as Thought: Listening to the Symphony in the Age of Beethoven*, Princeton, Princeton University Press, 2006.

articulated as a kind of language—extended beyond the Romantic period. In more recent times it has been championed by various philosophical and aesthetical traditions, among which the new aesthetic idealism (Benedetto Croce),[49] symbolic philosophy (Susanne K. Langer),[50] and also some versions of phenomenology. For instance, among phenomenologists, Roman Ingarden has affirmed that, being and "ideal system of auditory aspects", the musical work "remains like an ideal boundary at which the composer's intentional conjectures of creative acts and the listener's acts of perception aim".[51] Similarly, Thomas Clifton has declared that "only the most rampant empiricist will equate the sounds with the music", as sounds would be only the medium through which musical meaning materializes.[52] As we generally understand it, listening to music (and listening in general) involves some kind of mental process, where "mental" is intended in a wide sense, as the opposite to "bodily". Thus the practice of listening is often conceived as if it was independent from any of the physical actions hypothetically performed by the listener while listening.

While concert listening and the ideology of absolute music are unmistakeable products of the 19th century, the invention of the phonograph and the gramophone, at the end of that century, the diffusion of the radio, and the expansion of the phonograph during the 1920s and 1930s also contributed to the popularization of classical music, reinforcing the model of concert listening in different ways.[53] As Sophie Maisonneuve

[49] See Benedetto Croce, *Aesthetic as Science of Expression and General Linguistic*, translated by Douglas Ainslie with a new introduction by John McCormick, New Brunswick, Transaction Publishers, 1995, pp. 82–83.

[50] Although Langer developed a theory of music as symbolic language of the emotions, she never went so far as to deny the acoustic character of music; see Susanne K. Langer, *Philosophy in a New Key: A study in the symbolism of reason, rite and art*, New York, The New American Library, 1942 (2nd printing, 1949).

[51] Roman Ingarden, *The Work of Music and the Problem of Its Identity*, translated by Adam Czerniawski, edited by Jean G. Harreh, Berkeley-Los Angeles, University of California Press, 1986, p. 20.

[52] Thomas Clifton, *Music as Heard: A Study in Applied Phenomenology*, New Haven-London, Yale University Press, 1983, p. 39.

[53] The bibliographical references on the impact of recording on music are too numerous to mention them here. But some of the most interesting titles published since the 1980s are (in chronological order): Evan Eisenberg, *The Recording Angel: The Experience of Music from Aristotle to Zappa*, New York, Penguin, 1987; Michael Chanan,

and other scholars have studied, it was a long process involving relationships among different agents, objects, places, sociabilities, technologies, etc., and associated with various moments: from recording, to marketing and distribution of records, to the various circumstances of consumption, etc.[54] Since before the 1930s new public spaces for music were designed with a new acoustic ideal in mind: a "modern, dry, absorbent, and 'clean'" sound, almost without reverberation, which drew on the new possibilities of electroacoustics. As Emily Thompson has argued, the 1930s saw the emergence of a new approach to architectural acoustics, associated with a new acoustic ideal: the crisp, controlled sound that was typical of acoustic and psychoacoustic laboratories, which in the 1930s could be heard even in spaces that were not wired for sound. Besides, the proliferation of electroacoustic technologies—electrical systems of public address, electrical phonographs, microphones, etc.— made people more conscious of sound, and also brought about new ways of listening and relating to music generally.[55]

Repeated Takes: A History of Recording and Its Effects on Music, London, Verso, 1995; Timothy Day, *A Century of Recorded Music: Listening to Musical History*, New Haven, CT, Yale University Press, 2000; William H. Kenney, *Recorded Music in American Life: The Phonograph and Popular Memory, 1890–1945*, New York, Oxford University Press, 2003; Mark Katz, *Capturing Sound: How Technology Has Changed Music*, Berkeley, University of California Press, 2004; Colin Symes, *Setting the Record Straight: A Material History of Classical Recording*, Middletown, Wesleyan University Press, 2004; Tim J. Anderson, *Making Easy Listening: Material Culture and Postwar American Recording*, Minneapolis, University of Minnesota Press, 2006; Eric Clarke, "The Impact of Recording on Listening", *Twentieth-Century Music*, 41, 2007, pp. 47–70; Timothy D. Taylor, Mark Katz and Tony Grajeda (eds), *Music, Sound, and Technology in America: A Documentary History of Early Phonograph, Cinema, and* Radio, Durham, NC, Duke University Press, 2013.; and Paul Théberge, Kyle Devine and Tom Everrett (eds), *Living Stereo: Histories and Cultures of Multichannel Sound*, New York-London, Bloomsbury Academic, 2015.

[54] By Sophie Maisonneuve see: "La constitution d'une culture et d'une écoute musicale nouvelles. Le disque et ses sociabilités comme agents de changement culturel dans les années 1920 et 1930 en Grande-Bretagne", *Revue de Musicologie*, 88-1, 2002, pp. 43-66; "Per una socio-storia dell'ascolto. Situazione, metodi, prospettive", *Studi culturali*, anno 1, giugno 2004, pp. 191–214; "De la machine parlante au disque. Une innovation technique, commerciale et culturelle", *Vingtième siècle. Revue d'histoire*, 32, October-December 2006, pp. 17–31; and "'La Voix de son Maître': entre corps et technique, l'avènement d'une écoute musical nouvelle au XXe ciècle", *Communications*, vol. 81, 2007, pp. 47–59. On the role of records in the cultivation of taste for classical music in the United States during the 1920s, see Katz, *Capturing Sound: How Technology Has Changed Music*, chapter 2 ("Making America more musical: The Phonograph and 'good music'"), pp. 48-71. On American radio's role, see Shawn Vancour, "Popularizing the Classics: Radio's Role in the American Music Appreciation Movement, 1922–34", *Media, Culture & Society*, vol. 31(2), 2009, pp. 289–307.

[55] Emily Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933*, Cambridge, MA, MIT Press, 2004, esp. chapter 6 ("Electroacoustics of Modern Sound, 1900–1933), pp. 229–293, on pp. 233–234; see also Botstein, "The Eye of the Needle", p. 6.

Later on, in the 1950s and 1960s the popularization of hi-fi equipment not only contributed to a very creative period in popular music, in Europe and the United States, but also intensified the relationship between recording technologies and the ideals associated with absolute music and the concert hall, to which the ambiguous notion of "fidelity" was added. While this was not an obvious relationship, and did not come without some adjustments, it ultimately contributed to intensify the aura of musical performances, now conceived as recorded versions. It also reshaped and refined the notion of concert listening, which in this context turned out to be plainly a model, now definitely devoid of any connection with manners. Many audiophiles—principally, men—tried to replicate the concert hall setting at home: their silent, solitary encounter with recordings—often, entire collections—happened in an imaginary space that could occasionally be associated with the real space of the concert hall (through certain elements of the record production), but which generally "came to mirror the ideal preconditions for musical contemplation or listening on the part of the hearer."[56] The source invisibility that is characteristic of the phonograph apparently reinforced received notions of absolute music as self-contained and contextless, whereas the possibility of repeated listening contributed to the stability of the classical music canon.[57] Still, the ideology of absolute music also acquired new characteristics in the era of recording: since recorded versions replaced concerts, performers and conductors

[56] Botstein, "The Eye of the Needle", p. 6. On the genesis of fidelity, see Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction*, Durham, Duke University Press, 2003, pp. 215-286; and also Franco Fabbri, "Concepts of Fidelity", in Jens Gerrit Papenburg and Holger Schulze (eds), *Sound as Popular Culture: A Research Companion*, Cambridge, MA, MIT Press, 2016 (forthcoming). On hi-fi and masculinity see Keir Keightley, "'Turn It Down', She Shrieked: Gender, Domestic Space, and High Fidelity, 1948–59", *Popular Music*, vol. 15, no. 2, May 1996, pp. 149–177.

[57] Arved Ashby, *Absolute Music, Mechanical Reproduction*, Berkeley, University of California Press, 2010.

became more important (also for marketing purposes), and some even achieved stardom status.[58]

On the other hand, already since the 1920s the phonograph had become a pedagogic tool for the "democratization of musical taste" and the access of new audiences to classical music.[59] This was accompanied by a numerous initiatives for the education of new listeners through publications, radio and television programmes, the launching of record collections aimed at the general public, and the introduction of records in the schools. The so-called "music appreciation" movement, with roots in Europe and the United States,[60] was fuelled and propagated in the 1950s and 1960s by brilliant musical personalities like Aaron Copland or Leonard Bernstein, and became instrumental in the consolidation of common views on music listening.[61] As David Boyden summarized the matter: "In short, music should be listened to attentively, it should be listened to as a whole, and it should be listened to on its own terms",[62] that is practising "a kind of listening that recognizes the basic conventions of music and also the various forms and styles of expression evolved by composers in the past".[63] A

[58] See for instance Joseph Horowitz, *Understanding Toscanini: How He Became an American Culture-God and Helped Create a New Audience for Old Music*, New York, Alfred A. Knopf, 1987.

[59] Day, *A Century of Recorded Music: Listening to Musical History*, p. 58.

[60] On the European roots of "music appreciation", see the historical text by Percy A. Scholes, *The Listener's Guide to Music, with a Concert-Goer's Glossary*, London-New York, H. Milford, Oxford University Press, 1925 (1st ed. 1919). In the United States the movement can be traced back to early 20th century ideals of social reform (on this see Gavin James Campbell, "'A Higher Mission Than Merely to Please the Ear': Music and Social Reform in America (1900-1925)", *The Musical Quarterly*, 84 (2), 2000, pp. 259-286, and Julia J. Chybowski, Developing American Taste: A Cultural History of the Early Twentieth-Century Music Appreciation Movement, Ph.D. dissertation, University of Wisconsin-Madison, 2008).

[61] To name just four significant examples of this kind of literature: Roger Sessions, *The Musical Experience of Composer, Performer and Listener*, Princeton, Princeton University Press, 1971 (1st ed. 1950); Aaron Copland, *What to Listen for in Music*, with a foreword and epilogue by Alan Rich, New York, Signet Classics, 2002 (1st ed. 1957); Leonard Bernstein, *The Joy of Music*, with a foreword by Tim Page, Pompton Plains, NJ, and Cambridge, Amadeus Press, 2004 (1st. ed. 1959); David D. Boyden, *An Introduction to Music*, London, Faber and Faber Limited, 1971 (1st ed. 1959); and Charles R. Hoffer, *A Concise Introduction to Music Listening*, Belmont, Wadsworth Publishing Company, 1992 (5th ed.) (1st ed. 1974). Claudio Casini's *L'arte di ascoltare la musica* Milano, Bompiani, 2005 (1st ed. 1991) would be a relatively recent European example of the wide influence of the music appreciation movement.

[62] Boyden, *An Introduction to Music*, p. 6.

[63] Ibid., p. 7.

general characteristic of music appreciation literature was (is) its emphasis on the contrast between "proper" ways of listening—listening "on a sheerly musical plane", in Copland's words[64]—and "lower" ways of listening, variously characterized as "sensuous" (Copland), "basic physical response to music" (Boyden), "to absorb the physical sensation of the sounds" (Charles Hoffer), or even listening "on an expressive plane" (Copland).[65] However, far from being "ear training" or "aural training" guides, as one may expect, music appreciation manuals are normally introductions to the musical elements, forms and styles typical of different periods, genres, and composers.[66]

The orientation and methods of music appreciation also received criticism, for instance from Virgil Thompson, who coined the scornful term "appreciation racket" to refer to the countless publicists devoted to the popularization of classical music. Theodor W. Adorno also denounced music appreciation as a form of false knowledge that precluded the listener from achieving a real understanding of musical language.[67] While music appreciation advocates did not disdain the occasional employment of extramusical elements to raise attention to music, encouraging thus a form of reactive attention, the ideal of listening promoted by Adorno was closer to music theory and the practice of music analysis. Thus, the "structural hearing" practiced by the "expert", i.e. the highest type of musical conduct described in the first chapter of *Einleitung in die*

[64] Copland, *What to Listen for in Music*, p. 14.

[65] Ibid, pp. 8–9; Boyden, *An Introduction to Music*, p. 4; and Hoffer, *A Concise Introduction to Music Listening*, p. 7; and Copland, *What to Listen for in Music*, p. 13.

[66] Very acute remarks on the traditional tension between "ear training" and "music appreciation" can be found in Scholes, *Music Appreciation: Its History and Technics*, pp. 164-173.

[67] See Virgil Thompson, *The State of Music*, New York, William Morrow and Company, 1939. See also Thedor W. Adorno,"Analytical Study of the NBC 'Music Appreciation Hour'", *The Musical Quarterly*, Vol. 78, no. 2, Summer, 1994, pp. 325-377. Adorno's study was most probably written during his involvement in the Princeton Radio Research Project, between 1938 and 1940, and was found among the papers of Paul Lazarsfeld, who led the Project, in the archives at Columbia University; see Theodor W. Adorno, *Essays on Music*, selected, with introduction, commentary and notes by Richard Leppert, translations by Susan H. Gillespie and others, Berkeley, University of California Press, 2002, p. 214 (note 3). The materials of the study on the NBC "Music Appreciation Hour" were later elaborated in the first section ("Die gewürdigte Musik", translatable as 'The appreciated music') of the collection *Der getreue Korrepetitor* (1962), now in *Gesammelte Schriften*, *15 (Komposition für den Film. Der getreue Korrepetitor)*, ed. Rolf Tiedemann, Frankfurt, Suhrkamp, 1984, pp. 157–368.

Musiksoziologie (1962, in English as *Introduction to the Sociology of Music*, 1976), is elsewhere explicitly associated by Adorno with musical analysis,[68] and the name of Heinrich Schenker, father of Schenkerian analysis, is immediately invoked.[69] Indeed, far from being the habitude of a good bourgeois at the concert hall, the "entirely adequate listening" that Adorno praises; that of "the fully conscious listener who tends to miss nothing and at the same time, at each moment, accounts to himself for what he has heard", seems to be rather a professional skill, as the author himself acknowledges.[70]

Listening to music, today

Although the aesthetic values on which concert listening is based are still considered valid by many, they are far from being a hegemonic model today. As Arved Ashby has put it, "[a]bsolute music remains very much alive as an aesthetic model and cultural force, but as an exclusive aural paradigm it is dead and gone."[71] Many musicologists acknowledge that concert listening has been illegitimately used to understand and judge music and music events of any kind, and that it has contributed to emphasize particular aspects of musical experiences. Thus, music scholars have generally favoured the study of cognitive and non-corporeal aspects, paying less attention to the emotional and bodily experiences of audiences, and focussing rather on individual experiences than on

[68] See Theodor W. Adorno, *Introduction to the Sociology of Music*, translated by E.B. Ashton, New York, The Seabury Press, 1976. pp. 4–6; and also by him, "On the Problem of Musical Analysis (1969)", in *Essays on Music*, pp. 162–180, on pp. 164–165. Other references to structural listening are found in "The Radio Symphony (1941)", in *Essays on Music*, pp. 251–270, on pp. 255–256, and in *Der getreue Korrepetitor* (1962), pp. 184–185.

[69] Precisely Schenkerian analysis was introduced in the United States by one of his followers, Austrian Felix Salzer, who in 1952 published *Structural Hearing*, a presentation of the main concepts and procedures elaborated by Schenker; see Felix Salzer, *Structural Hearing: Tonal Coherence in Music*, with a foreword by Leopold Mannes, New York, Dover, 1962, 2 vols. For a more practical introduction to Schenkerian analysis see for instance: Heinrich Schenker, *L'écriture libre*, trans. Nicolas Meeùs, 2a ed., revised and adapted by Oswald Jonas, Liège, Mardaga, 1993 (2 vols).

[70] Adorno, *Introduction to the Sociology of Music*, pp. 4–5.

[71] Ashby, *Absolute Music, Mechanical Reproduction*, p. 24.

collective ones. In Ruth Finnegan's terms, music scholars have "privileged music's cognitive and non-bodily features, highlighting composition, written scores, and the rationality of classic music theory: *these* aspects, not the primeval emotions, were the appropriate subject for scholarly analysis".[72]

As Judith Becker has pointed out, this bias toward rationality was stimulated since the mid-20th century by the emergence of music cognition in the field of the new cognitive sciences, and by the consequent application of information-processing models to the comprehension of listening.[73] In this context, even when music scholars have taken emotions into account, they have treated them as "rarefied (transcendent or spiritual) forms that are related to 'higher' abstract and aesthetic properties of works", rather than as everyday or full-blooded emotions.[74] The combination of the concert-hall and the cognitive models has favoured "a particular image of musical listeners: silent, still listeners, paying close attention to a piece of music about which they communicate the type of emotion evoked by the piece to an attendant researcher".[75] Of course it does not mean that the subject of emotion has been absent from music studies—indeed, it has been discussed by a large list of music theorists, from ancient to contemporary times.[76] But it certainly has not been studied so thoroughly as it deserves, particularly in regard to the experiences of listeners.

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[72] Ruth Finnegan, "Music, Experience, and the Anthropology of Emotion", in Martin Clayton, Trevor Herbert, and Richard Middleton (eds), *The Cultural Study of Music: A Critical Introduction*, edited by New York-London, Routledge, 2003, pp. 181–192, on pp. 181–182.

[73] See Judith Becker, *Deep Listeners: Music, Emotion and Trancing*, Bloomington, Indiana University Press, 2004, p. 5. Two important titles on music cognition are: Diana Deutsch (ed.), *The Psychology of Music*, San Diego, Academic Press, 1982; and W. Jay Dowling and Dane Harwood, *Music Cognition*, Orlando, Academic Press, 1986.

[74] Patrik N. Juslin and John A. Sloboda, "Music and Emotion: Introduction", in Patrik N. Juslin and John A. Sloboda (eds), *Music and Emotion: Theory and Research*, pp. 3–20, on p. 5. Juslin and Sloboda's collection offers a general overview of the current state of interdisciplinary research on music and emotion.

[75] Becker, *Deep Listeners: Music, Emotion and Trancing*, p. 135. See also her "Anthropological Perspectives on Music and Emotion", in Juslin and Sloboda (eds), *Music and Emotion: Theory and Research*, pp. 135–160.

[76] For a panoramic view of theories of emotion in music, see Nicholas Cook and Nicola Dibben, "Musicological approaches to emotion", ibid., pp. 45–70.

Besides, the predominance of a mental concept of listening in music studies does not reflect the role of music in the everyday lives of individuals. As Nicholas Cook has observed, in spite of the intellectual complexities attributed to the activity of listening to music, almost everybody seems to be able to enjoy it.[77] In brief, as a reflexive practice aimed at the establishment of facts or theories "musicological listening" is quite different from "musical listening", whose main purpose is normally aesthetic gratification.[78] Other musicologists have also argued for a reconsideration of received notions of music listening, pointing at their dependence on the exemplary object of traditional musicology: the "high-art" music of the Western classical tradition. Rose Rosengard Subotnik has criticized the Adornian concept of "structural listening", finding fault with its dependence on musical scores and the way it excludes and suppresses all kind of possible responses non necessarily related to musical structure, e.g. "metaphorical and affective responses based on cultural association, personal experience, and imaginative play". As Subotnik has remarked, attention to musical structure commonly entails inattention to sound and style-–more specifically, to qualities such as timbre or the spatiality of sound-–whereas the ability to follow thematic developments is not always compatible with the kind of passionate involvement that so many music lovers long for.[79]

While at the end of the last century it was still possible that a music scholar—following on the steps of Adorno, who condemned jazz and popular music for the kind

[77] Nicholas Cook, *Music, Imagination, Culture*, Oxford, Oxford University Press, 1990, p. 185.

[78] Ibid., pp. 152–160 and p. 167.

[79] See chapter 3 ("Toward a Deconstruction of Structural Listening: A Critique of Schoenberg, Adorno, and Stravinsky") of Rose Rosengard Subotnik, *Deconstructive Variations: Music and Reason in Western Society*, Minneapolis, University of Minnesota Press, 1996, pp. 148–176. For further developments of these arguments see Andrew Dell'Antonio (ed.), *Beyond Structural Listening: Postmodern Modes of Hearing*, Berkeley, University of California Press, 2004. More recently, empirical research into the behaviour of audiences during concerts has also started to convey a more realistic view of their experiences, challenging received views; see Stephanie Pitts, "What Makes and Audience? Investigating the Roles and Experiences of Listeners at a Chamber Music Festival", *Music & Letters*, vol. 86, no. 2, May 2005, pp. 257–269.

of "atomized" and "fetishistic" listening that they supposedly encouraged—[80]wondered about "the amount of 'real' listening that generally takes place in pop concerts", the situation has changed greatly in the last decades.[81] Music scholars have explored the varieties of listening to popular music,[82] and to specific popular music genres.[83] While popular music is often associated with forms of physical engagement (typically dance) that go beyond the notion of listening,[84] and in spite of the aforementioned attempts to portray popular music listening as distracted or disengaged, the situations of extremely focused listening, most commonly to recordings,[85] are far from rare among popular music fans. Indeed, many of them are as keen to listen to records or attend live performances as to discuss those experiences, what may also include ideas on the more adequate modes of listening to certain kinds of music. Yet, material aspects like the importance of rhythm in many popular music genres, the complex sound textures created in the recording studio, the audiovisual imaginary that has become such a central part of the popular music experience, as well as the variety of contexts where listening takes place nowadays, prompt us to think of music listening in new ways.

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[80] See Theodor W. Adorno (with the assistance of George Simpson), "On Popular Music (1941)", in Simon Frith and Andrew Goodwin (eds), *On Record: Rock, Pop and the Written Word*, London, Routledge, 1990, pp. 301–314, now included in *Essays on Music*, pp. 437–469; and "On the Fetish-Character in Music and the Regression of Listening (1938), also in *Essays on Music*, pp. 288–317.

[81] Anthony E. Kemp, *The Musical Temperament: Psychology and Personality of Musicians*, Oxford, Oxford University Press, 1996, p. 134.

[82] See Keith Negus, *Popular Music in Theory: An Introduction*, Cambridge, Polity Press, 1996; Simon Frith, *Performing Rites: Evaluating Popular Music*, Oxford, Oxford University Press, 1996; *Rock, the Primary Text: Developing a Musicology of Rock*, Aldershot, Ashgate, 2001 (1st ed. 1993); and Theodore Gracyk, *Listening to Popular Music: Or, How I Learned to Stop Worrying and Love Led Zeppelin*, Ann Arbor, University of Michigan Press, 2007.

[83] See for instance Franco Fabbri "What Kind Of Music?", *Popular Music*, no. 2, 1982, pp. 131–144; also by him "How Genres Are Born, Change, Die: Conventions, Communities and Diachronic Processes", in Stan Hawkins (ed.), *Critical Musicological Reflections*, Aldershot, Ashgate, 2012, pp. 179–191; Harris M. Berger, *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*, Hanover, NH-London, Wesleyan University Press, 1999; and Julian Henriques, *Sonic Bodies: Reggae Sound Systems, Performance Techniques, and Ways of Knowing*, New York, Continuum, 2011.

[84] See Peter Wicke, "Sound-Technologien und Körper-Metamorphosen. Das Populäre in der Musik des 20.Jahrhunderts", in Peter Wicke (ed.), *Handbuch der Musik im 20.Jahrhundert, Band 8: Rock-und Popmusik*, Laaber, Laaber-Verlag, 2001, pp. 11–60.

[85] See for instance David Novak, "2.5x6 Metres of Space: Japanese Music Coffeehouses and Experimental Practices of Listening", *Popular Music*, vol. 27/1, 2008, pp. 15–34.

On the other hand, the expansion of auditory media, which began in mid-20th century, has become particularly intense since the 1990s, after the invention and adoption as a standard of a new digital audio compression format, the mp3. Digitalization and the development of portable audio technologies have not only increased the presence of music in all kinds of public and private spaces, but have also created a range of relatively new listening situations, in which the music either is there as a background, or "happens" along other things. Anahid Kassabian has referred to the occasions in which the music is "there" while something else is going on with the term "ubiquitous listening".[86] This term includes, among others: the commercial use of background music to create emotional states in potential consumers or to keep some of them away from certain spaces, the presence of music to accompany specific activities like exercising or driving, the whole gamut of circumstances in which music can be listened to through portable players, or the everyday interaction with audiovisual materials.[87] In most of these contexts, the implicit listeners (if they may be described as listeners at all) can hardly be identified with any of the avatars of the concert listener, are sometimes captive, and often pay only intermittent attention to the music.[88]

[86] See Anahid Kassabian, "Ubiquitous Listening", in David Hesmondhalgh and Keith Negus (eds), *Popular Music Studies*, London, Arnold, 2002, pp. 131–142, and *Ubiquitous Listening: Affect, Attention, and Distributed Subjectivity*, Berkeley, University of California Press, 2013. See also Marta García Quiñones, Anahid Kassabian and Elena Boschi (eds), *Ubiquitous Musics: The Everyday Sounds That We Don't Always Notice*, Aldershot, Ashgate, 2013.

[87] See especially Tia DeNora, *Music in Everyday Life*, Cambridge, Cambridge University Press, 2000; see also Ola Stockfelt, "Adequate Modes of Listening" in David Schwarz, Anahid Kassabian and Lawrence Siegel (eds), *Keeping Score: Music, Disciplinarity, Culture*, Charlottesville, University Press of Virginia, 1997, pp. 129–146; Michael Bull, *Sounding Out the City: Personal Stereos and the Management of Everyday Life*, Oxford, Berg Publishers, 2000; and also by him *Sound Moves: iPod Culture and Urban Experience*, The International Library of Sociology, London, Routledge, 2007; Adrian C. North and David Hargreaves, David J., "Music and Consumer Behaviour", in Susan Hallam, Ian Cross and Michael Thaut (eds), *The Oxford Handbook of Music Psychology*, Oxford, Oxford University Press, 2009, pp. 481–490; Jonathan Sterne, "The Nonaggressive Music Deterrent", in García Quiñones, Kassabian and Boschi, *Ubiquitous Musics*, pp. 121–137

[88] Actually, as Jonathan Sterne has argued, conditions of low-fi or intermittent listening seem to be inscribed in the very procedures of perceptual coding on which digital compression formats are based; see Jonathan Sterne, *MP3: The Meaning of a Format*, Durham, NC-London, Duke University Press, 2012.

In sum, the contemporary conditions of listening tend to place music on the same level as other acoustic phenomena, blurring thus the differences between speech, music and other sounds. The way in which music is entrenched in everyday life challenges both its status as object, and our condition of listeners, prompting us to ask—with John Cage—whether music would ultimately be just a way of listening.[89]

Sound studies and the sensory turn in music studies: aims and method of this work

In my opinion, the circumstances that I have just described explain to a great extent the current interest, among scholars of different disciplines and backgrounds, in sound as an academic subject. An interest that has acquired visibility with the emergence of the field of sound studies during the first decades of this century. As declared by one of the most notable voices in the field, "sound studies' challenge is to think across sounds, to consider sonic phenomena in relationship to one another—*as types of sonic phenomena rather than as things-in-themselves*—whether they be music, voices, listening, media, buildings, performances, or another path into sonic life".[90] Audition (hearing, listening) has been one of the key topics of the field since the beginning—indeed, just a few years ago what we now call "sound studies" was most often called "auditory culture" or "auditory culture studies".[91] Through interest in audition the field of sound studies appears as contiguous to that of sensory studies, and thus to the so-called "sensory turn" that has influenced humanities and social sciences since the 1980s. Illuminating the contiguities between sound studies and the sensory turn is precisely the focus of the first

[89] See John Cage, *Silence: Lectures and Writings by John Cage*, Hanover, NH, Wesleyan University Press–University Press of New England, 1961; and also Kyle Gann, *No Such Thing as Silence: John Cage's 4'33''*, New Haven, CT-London, Yale University Press, 2010.

[90] See his introduction to Jonathan Sterne (ed.), *The Sound Studies Reader*, New York-London, Routledge, 2012, p. 3.

[91] See for instance Michael Bull and Les Back (eds), *The Auditory Culture Reader*, Oxford–New York, Berg Publishers, 2003; and also Veit Erlmann (ed.), *Hearing Cultures: Essays on Sound, Listening and Modernity*, Oxford-New York, Berg Publishers, 2004, whose title also refers to audition.

two chapters of this thesis, where I narrate the historical development of the notion of "cultural construction of the senses", the emergence of the anthropology of the senses, and the different influences and controversies that have shaped the field. Since the core of this research (chapters 4, 5 and 6) is historical, in the third chapter I have traced the history of the history of the senses and emotions. The "sensory turn" constitutes thus the first thematic thread of the thesis—a thread that runs also along the following chapters, taking the form of reflections on specific historical configurations of the discourse on the senses. Particular focus is placed on the notions of sensation and perception, which have often justified the distinction between hearing and listening, and which are presented in their historicity.

The relationship between some professional listening techniques (varieties of what the author calls "audile technique") and the first technologies of sound reproduction was the theme of Sterne's *The Audible Past* (2003), one of the pioneering and most influential titles of the field. In that book Sterne—most probably inspired by Jonathan Crary's *Techniques of the Observer*[92]—traced the connection between physiological theories of the senses, the archaeology of audio technology, and social configurations of auditory perception. While *The Audible Past* did not deal with music, Penelope Gouk's *Music, Science and Natural Magic in Seventeenth-Century England* (1999) and Veit Erlmann's *Reason and Resonance* (2010) did. Besides, anatomy and physiology featured prominently in both books, though Gouk examined also the work and writings of natural philosophers dealing with music, while Erlmann aimed for the vindication of the philosophical relevance of hearing.[93] Taking inspiration from Gouk,

[92] Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Cambridge, MIT Press, 1990.

[93] Veit Erlmann, *Reason and Resonance: A History of Modern Aurality*, New York, Zone Books, 2010.

Sterne and Erlmann, the history of the anatomical discovery and understanding of the physiology of the ear constitutes the second thread of this research.

The third thematic thread is related to the work of an important group of sound studies scholars that, like Sterne, have a background in the history of science or in studies of science and technology, and who are researching sound at the intersection of those disciplines. This is attested by the work of the aforementioned Thompson, by a quite recent collection, *The Oxford Handbook of Sound Studies* (2012), edited by Trevor Pinch and Karen Bijsterveld, and by other notable titles in the field.[94] Though unfortunately I have had to leave the social dimension of science out, in this third thread I have focused mainly on narrating the relationship between acoustics and music, and have occasionally touched upon questions of musical acoustics and harmonic theory. Whenever possible I have also dealt with instruments—musical instruments, acoustic instruments, and instruments that can be used both for playing and for studying sound and audition—, since they represent a point of convergence of those two different discourses in practice.

Finally, the four thematic thread of this thesis is music, particularly the historical discourses on music listening, following a direction similar to Martin Kaltenecker's *L'Oreille divisée. Les discours sur l'écoute musicale au XVIIIe et XIXe siècles* (2010), though this book does cover scientific or medical discourses on music or hearing.[95] As I have argued elsewhere,[96] so far sound studies scholars have only rarely dealt with instrumental and vocal music, or with music history, though this circumstance may

[94] Thompson, *The Soundscape of Modernity*; Trevor Pinch and Karen Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, Oxford, Oxford University Press, 2012; and also, for instance, Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany*, Cambridge, MA, and London, MIT Press, 2006.

[95] Martin Kaltenecker, *L'Oreille divisée. Les discours sur l'écoute musicale au XVIIIe et XIXe siècles*, Paris, Éditions MF, 2010.

[96] Marta García Quiñones, "Sound Studies vs. (Popular) Music Studies", in Papenburg and Schulze (eds), *Sound as Popular Culture*, forthcoming.

change in the near future. Instead, the cultural study of music, which understands and represents music in connection to other cultural notions and practices, has been active since the 1980s.[97] My thesis ultimately relies on the fact that, for all the efforts spent on defining music listening as an aesthetic and intellectual practice, separate from "sheer hearing", it is also obvious that listening in general cannot be conceived independently from hearing. In other words, theories of audition, that is theories that consider hearing mainly as one of the senses, necessarily provide a context for theories of listening.[98] Thus, I will try to explain the genesis of music listening models, including concert listening (as a normative listening model), within the hypothetical framework of a science or sciences of hearing. While I will not deal much with music as such, I do not dismiss in any way the potential of music (of particular styles, genres, single works) to shape the expectations audiences and change their behaviour and perception.

Whereas the first three chapters—a critical inventory of theories and notions—are mainly set in the last decades (roughly, since the 1950s), with some historical flash-backs when necessary, in the other three chapters I pursue the four thematic threads in a time span that starts in ancient times, and zooms in on modern times, from the 15th to the second half of the 19th century.[99] I take the publication year of Hermann von Helmholtz's *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* (1863), which appeared only nine years later than Eduard Hanslick's *Vom Musikalisch-Schönen* (1854, *On Musically Beautiful,* or *The beautiful in music*) to mark a very significant moment for the disciplines involved, where the contradictions

[97] See for instance Martin Clayton, Richard Middleton and Trevor Hervert, *The Cultural Study of Music*, London, Routledge, 2003.

[98] Kaltenecker also recognizes this fact in the introduction to his *L'Oreille divisée*, p. 8.

[99] Since common historical periods do not correspond to the periods of music history, which normally refer to music styles (Baroque, Neoclassicism, Classicism, etc.), I have mostly employed chronological references (year, decades, centuries, or the position of big historical events) to locate facts, ideas or people in time.

between the foundation of music in physics and the ambition of constructing music as aesthetically autonomous became more evident than ever before.[100]

Being based on a great amount of bibliography—mainly monographs, collections, readers, but also historical sources, often consulted online (see Bibliography at the end)—the method that I have followed is critical synthesis. Its innovation value cannot consist in the discovery of new documents, neither in close reading (though there is close reading here and there), nor in the elaboration of sophisticated hypotheses, but in the effort of putting together subjects, objects, contexts, approaches, etc. that are not usually treated together, with the purpose to illuminate some of the continuities and discontinuities that may be observed in the histories of hearing and listening.

[100] Hermann von Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, translated by Alexander J. Ellis, London, Longmans, Green & Co., 1895; and Eduard Hanslick, *The Beautiful in Music*, translated by Gustav Cohen; edited, with an introduction by Morris Weitz, New York, Liberal Arts Press, 1957.

CHAPTER 1

Thinking about Hearing and Listening after the "Sensory Turn" I

1.1 Notion of the senses

A "sense" is conventionally defined as "a faculty by which the body perceives an external stimulus", [1] even if it is widely accepted that it can also apply to the perception of internal stimuli.[2] The classical five-sense set includes sight, smell, hearing, taste and touch, though the sense of movement (kinaesthesis), the inner perception of body position and balance (proprioception), and some other sensations have occasionally been classified as proper senses throughout history, [3] and are normally part of contemporary inventories of the senses. As I will argue later in more detail, these inventories are based on the scientific concept of sense that is current among physiologists and psychologists, which does not completely overlap with the common notion of the senses that can be deduced from everyday conversations

Generally speaking, the notion of the senses involves a double reference: to the world and to the human body. On the one hand, the senses are mainly associated with "external stimuli" and therefore with the world. For example, while we can hear sounds and specific sound qualities, we mostly think of what we hear in terms of sounding

[1] *Oxford Dictionaries Online*, http://oxforddictionaries.com [last access: June 2015].

[2] The reference to internal stimuli is included, for instance, in the entry "sense" of Andrew Colman (ed.), *A Dictionary of Psycholo*gy, Oxford, Oxford University Press, 2008. External and internal stimuli are the corresponding objects of *exteroreceptors* and *interoreceptors*, which will be mentioned later in this chapter.

[3] On the historical antecedents of proprioception see Jean Starobinski, "Brève histoire de la conscience du corps", in Robert Ellrodt (ed.), *Genèse de la conscience moderne*, Paris, PUF, 1983, pp. 215–232 (though Starobinski prefers the term *cénésthésie*, translatable as *kinaesthesia*). On the history of scientific endeavours to understand proprioception, see Denis Forest, "Le concept de proprioception dans l'histoire de la sensibilité interne", *Revue d'histoire des sciences*, vol. 57, no 1, 2004, pp. 5–31. Daniel Heller-Roazen's *The Inner Touch: Archaeology of a Sensation* (New York, Zone Books, 2009) deals with major philosophical texts on the bodily sensation of being alive, though he traces the sensation back to the Aristotelian concept of *sensus communis*. On the kinaesthetic sense, see Alain Berthoz, *Le sens du mouvement*, Paris, Odile Jacob, 1997, and more recently: Zeynep Çelik, "Kinaesthesia" in Caroline A. Jones (ed.), *Sensorium: Embodied Experience, Technology, and Contemporary Art*, Cambridge, MIT Press, 2006, pp. 169–172. See also Howes (ed.), *The Sixth Sense Reader*.

objects and things that happen around. Links to natural elements, to particular objects, or to some qualities attributed to those objects have been part of mythical and theoretical elaborations about the senses since ancient times,[4] though philosophers have recurrently questioned the reliability of the senses in giving us access to the world.

On the other hand, our notion of the senses implies that something comes into contact with the body, causing a sensation and sometimes triggering action. [5] The senses are normally associated with specific body organs, or parts of them;[6] for instance, hearing is associated primarily with the ears, even if the belief that it also involves the nerves, and ultimately the brain (or what used to be called "the soul") is old—also, the perception of very low frequencies may sometimes be accompanied by tactile vibratory sensations. The body imposes some limitations on our sensations—limitations that are commonly recognized by comparison with the sensorial capacities of other animals[7] and with the response of certain human-made technologies. Just as there are portions of the electromagnetic spectrum that are invisible to us, and odours and tastes that we are not able to distinguish, there are also sounds that are either too high or too low to be heard by us.

Besides referring to the world and the body, our notion of the senses also involves a connection to mental and emotional processes, an inner dimension that links the senses to knowledge, memory, feelings and emotions, etc. These connections resonate in the secondary meanings of the word "sense" in English, as "a feeling", an

[4] Many ancient textual traditions have underlined this fact: the ancient Indian teachings of the *Ayurveda* (BCE 350 – BCE 600) apparently considered the senses as something like "meeting points […] of the qualities or objects assigned to them (skin-sensation; nostrils-smells; tongue-tastes; eye-shapes; ear-sounds)", whereas correspondences between the senses and natural elements seem to have been also characteristic of ancient Chinese natural philosophy; see Robert Jütte, *A History of the Senses*, translated by James Lynn, Oxford, Polity Press, 2005, pp. 25–31.

[5] See *Oxford Dictionaries Online* (http://oxforddictionaries.com), which defines "sensation" as "a physical feeling or perception resulting from something that happens to or comes into contact with the body" [last access: June 2015].

[6] Jütte, *A History of the Senses*, p. 20.

[7] On the extraordinary sensorial capacities of some animals, see Howard C. Hughes, *Sensory Exotica: A World Beyond Human Experience*, Cambridge, MA, MIT Press, 1999.

"intuitive awareness", a "sane and realistic attitude", etc., even if, as I will argue in this chapter, these connections are not inscribed in the meaning and etymology of any word, but depend on the different conceptual networks and fields in which that word has been and is included, and on larger theoretical frameworks that have historically shaped how the senses are conceived.

Indeed, the way in which the bodily dimension of the senses has been conceived has changed enormously in history. For instance, medieval Aristotelian commentators like Avicenna and scholastic philosophers referred not only to the external senses, but also to the internal or inner ones. Though there were different inventories, the inner senses usually included estimation, memory, fantasy, imagination and common sense—all of them faculties that are not currently considered senses of any kind.[8] Besides, as I will argue in forthcoming chapters, 18th-century philosophical research on the senses underlined rather than distinguished the continuities between the senses and the emotions triggered by them, in notions like sentiment or sensibility.

Whereas traditional inventories of the senses were based on correspondences between sensations and externally visible parts of the body, current scientific inventories are normally based on experiments attesting the links among reported sensations, specific cell types and the activity of particular brain areas. This has led to an enlargement of the concept and inventory of the senses, where the importance of "interoceptors", that is those senses that allow us to feel our inner organs, and "proprioceptors" or "mechanoreceptors", which inform us of our body position and posture in the space, is raising, whereas the traditional five-set of "exteroceptors", which provide information about the external environment, is being decomposed into a

[8] On the inner senses see Daniel Heller-Roazen, "Common Sense: Greek, Arabic, Latin", in Stephen G. Nichols, Andreas Kablitz and Alison Calhoun (eds), *Rethinking the Medieval Senses*, Baltimore, The Johns Hopkins University Press, 2009, pp. 30–50; and Simon Kemp and Garth J.O. Fletcher, "The Medieval Theory of the Inner Senses", *American Journal of Psychology*, vol. 106, no. 4, 1993, pp. 559–576.

series of more specific senses. Sensory receptors can also be classified according to the stimuli to which they react: mechanoreceptors (hearing; the sense of touch, including skin deformation, motion, stretch and vibration; the perception of muscle length, velocity and force, or joint angle; and various visceral perceptions), chemoreceptors (olfaction, gustation, itch, pain, and other visceral sensations), photoreceptors (vision), or thermoreceptors (skin warming and cooling, blood temperature).[9]

According to neuroscientist Bruce Durie, today most scientists would admit the existence of up to twenty-one senses, including a minimum of nine exteroceptors: hearing, smell, touch, plus two senses of vision (the sense of light and the sense of colour), and at least four senses of taste (corresponding to different tastes: sweet, salt, sour and bitter, with the umami taste in doubt), the sense of pain, three mechanoreceptive senses (proprioception, kinaesthesia and balance), two senses of temperature (heat and cold), and six different interoceptors (among which, the sensation of blood pressure, or lung inflation).[10] In other words: sensations that had traditionally been considered mere variations of one of the five classical senses (for example, the sense of light, or the sense of colour) are identified today as proper senses, while "new" senses, internal and external, are added to the list. Actually, physiological research into sensory receptors is now looking into the genetic source of individual variations in perception, which seems to be related to the proteins present in receptors.[11]

Even if the current scientific notion of the senses has been extended to cover more bodily organs and processes, and has also become more specific, it is narrow in

[9] See chapter 21 ("Sensory Coding") by Esther P. Gardner and Kenneth O. Johnson, in Kandel et al. (eds), *Principles of Neural Science*, pp. 449–474, on pp. 458–460.

[10] Bruce Durie, "Doors to perception", *New Scientist*, issue 2484, 29 January 2005, pp. 34–36. According to Durie, more radical scientists would raise the total figure up to thirty-three senses. This inventory can be compared with the one elaborated by Hinton, Howes and Kirmayer, based on other authors, which includes only eleven senses, in "Toward a Medical Anthropology of Sensations: Definitions and Research Agenda", p. 144.

[11] For an introduction to the question see Richard Hollingham, "In the Realm of Your Senses", *New Scientist*, vol. 181, issue 2432, 31 January 2004, pp. 40–43.

other respects. In particular, it does not seem to account for the perceived connection between the senses and feelings. As I will discuss hereafter, this is due to the historical attitude of privileging the cognitive dimension of the senses, that is the connection of sensation with judgment and knowledge, represented by the pair sensation-perception.

1.1.1 Sensation vs perception

The notion of the senses belongs in a particular philosophical and scientific tradition, and therefore presupposes certain ideas about how the human psyche is structured and how it can be known. As geographer Paul Rodaway has stressed, "the very act of focusing on the senses is full of presuppositions and constitutes an abstraction. It presumes that distinctive senses can be identified", and that their particular roles in human experience "can be discussed meaningfully individually and separate from the emotional dimensions of experience",[12] as well as from other dimensions of experience, like reason and action.

As the definition that opens this chapter shows ("a faculty by which the body perceives an external stimulus"), in the Western philosophical tradition the senses are considered a separate cognitive and experiential domain ("a faculty"), and the process that happens through them is normally called "perception". Also, the aforementioned definition seems to indicate that the senses are instruments to an end (perception)—an instrumentality that resonates with the frequent use of conceptual metaphors explaining the senses in terms of particular technologies, as we will see in this and forthcoming chapters. In that definition the word "stimulus" stands for any object or event in the world that the subject may perceive. Yet, describing objects and/or events as "stimuli"

[12] Paul Rodaway, *Sensuous Geographies: Body, Sense and Place*, London, Routledge, 1994, p. 5. Steven Connor has coined the expressions "'autonomisation' of the senses" and "sequestration of the senses (from the larger realms of action and cognition)" to refer to the same processes described by Rodaway; see Steven Connor, "Intersensoriality", a talk given at the conference on The Senses, Thames Valley University, 6th February 2004, http://stevenconnor.com/intersensoriality.html, n. p. [last access: October 2014].

has at least two implications: first, it presupposes that the human body is a system that is separated from the environment; second, it means that either the whole or specific parts of it may be able to react to those "stimuli", as "stimuli" necessarily require that somebody or something be excited by them.[13]

In our cultural context the concept of the "senses" belongs in a constellation of notions including "perception" and "stimulus", as well as "sensation", "reason", and many others, which are related to one another in complex and historically changing ways. While these notions are part of ordinary vocabulary, they are also involved in philosophical and scientific discourses on the senses, including the past and present literature on their anatomy, physiology and psychology that is usually regarded as the main source of knowledge about them. In particular, at least since the end of the 19th century the conceptual pair "sensation vs perception", where sensation is understood as "pure physiology" and perception is defined as a complex of psychological operations, has characterized the Western approach to the question of the senses. Thus, according to the Macmillan *Dictionary of the History of Science*, in the context of philosophical, physiological and psychological research sensations are commonly understood as "simple perceptions" corresponding to "simple stimulation like sinusoid air or electromagnetic waves",[14] though they may also be identified with "hypothetical entities", that is "basic mental events".[15] "Perception" would refer to processes (which can be judged correct or incorrect) "by which an individual becomes aware of, and able

[13] *Oxford Dictionaries Online* (http://oxforddictionaries.com) defines "stimulus", in the first place, as "a thing or event that evokes a specific functional reaction in an organ or tissue". On the historical origins of the notion of "stimulus" see Kurt Danziger, "Origins of the Schema of Stimulated Motion: Towards a Pre-history of Modern Psychology", *History of Science*, vol. 21, n. 2, June 1983, pp. 183–210; and see also chapter 6 of this work.

[14] See the entry "sensation" in the *Dictionary of the History of Science*, edited by William F. Bynum, E. Janet Browne, Roy Porter, Princeton, Princeton University Press, 2014 (reprint; originally published in London, Macmillan, 1981), pp. 382–383, on p. 383.

[15] Ibid., p. 382.

to respond to, events or objects in the world".[16] While sensations are conceived as elementary units, perceptions are thought to be the result of the association of sensations.

As I will argue in more detail in chapter 6, far from being a psychological fact the distinction between sensation and perception bears witness to conceptual shifts that took place in Europe in the second half of the 19th century, and which involved the reshaping of the notion of sensation in the language of experimental physiology. This reshaping took place in a cultural climate where science and philosophy were progressively detaching themselves from moral (and religious) concerns—what became particularly visible after the propagation of Darwin's theory of evolution (*On the Origin of the Species* was published in 1859)—, and where, as Thomas Dixon has explained, a new secularized approach to human nature resulted in the refashioning of "passions", "affections" and "sentiments" as the more morally neutral "emotions".[17] In parallel, new "properly scientific" disciplines, like anthropology and experimental psychology, developed.

Yet, most importantly, as I have just mentioned, the sensation-perception pair still shapes our understanding of the senses: even today, both in undergraduate course syllabi and handbooks of psychology, chapters dealing with the senses are typically entitled "sensation and perception".[18] This happens in spite of the emergence, since the

[16] See the entry "perception", ibid., p. 316.

[17] Thomas Dixon, *From Passions to Emotions: The Creation of a Secular Psychological Category*, Cambridge, Cambridge University Press, 2003.

[18] Just to name a couple of recent examples of psychology handbooks: David G. Myers' *Exploring Psychology*, New York, Worth Publishers, 2009 (8th ed.) covers "Sensation and Perception" in chapter 6, while Michael Gazzaniga, Todd Heatherton and Diane Halpern (eds), *Psychological Science*, New York, W.W. Norton & co., 2011, devotes chapter 4 to "Sensation and Perception". For a history of the fortunes of "sensation" and "perception" in psychology, see Edwin G. Boring, *Sensation and Perception in the History of Experimental Psychology*, New York, Appleton-Century-Crofts, 1942, and also Stanley Coren, "Sensation and Perception", in Donald K. Freedheim and Irving B. Weiner (eds): *Handbook of Psychology, vol. 1: History of Psychology*, Hoboken, NJ, John Wiley & Sons, 2003, pp. 85–108; for a philosophical account see D.W. Hamlyn, *Sensation and Perception: A History of the Philosophy of Perception*, London, Routledge & Kegan Paul, 1961. The classic reference book on the psychology of sensation and perception, including contributions from psychology and physiology, is E. Bruce Goldstein, *Sensation*

1970s, of alternative psychological theories of the senses that have challenged that distinction, like the ecological theory elaborated by James Gibson, who abandoned the pair sensation-perception and affirmed that perception was not based on having sensations, but on detecting information,[19] or later on, the enactivist theory developed by Francisco Varela, Evan Thompson and Eleanor Rosch, who explain perception as a guided action based on recurrent "sensorimotor patterns", and thus (like Gibson) conceive perception as a way of interacting with the environment.[20]

1.1.2 Hearing vs. listening

In the case of hearing the distinction between sensation and perception seems to have also provided a script for interpreting the opposition between "to hear" and "to listen".[21] Thus, many scholars that have reflected on music listening have explained the opposition between hearing and listening in terms that closely resemble the pair sensation-perception. For instance, in his essay "Écoute" (1976, written with Roland Havas, published as "Listening" in English) French philosopher Roland Barthes declared "[h]earing is a physiological phenomenon; listening is a psychological act. It is possible to describe the physical conditions of hearing (its mechanisms) by recourse to acoustics and to the physiology of the ear; but listening cannot be defined only by its object or, one might say, by its goal."[22] In 1984 Canadian composer Barry Truax

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and Perception (8th edition), Belmont, CA, Wadsworth-Cendage Learning, 2010. Richard L. Gregory and Andrew M. Colman (eds), *Sensation and Perception*, Harlow, Longman, 1995, is a good introduction to the subject, though it is obviously not up-to-date.

[19] See the introduction to his major work, James J. Gibson, *The Senses Considered as Perceptual Systems*, Boston, Houghton Mifflin, 1966, pp. 1–6.

[20] Francisco J. Varela, Evan Thompson and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge, MA, MIT Press, 1991.

[21] In contrast to my argument, in *Sensuous Geographies: Body, Sense and Place* (see for instance p. 97) Paul Rodaway adheres to Gibson's ecological model of the senses while uncritically maintaining the hearing-listening distinction.

[22] Roland Barthes, "Listening", in *The Responsibility of Forms*, translated by Richard Howard, Berkeley-Los Angeles, University of California Press, 1991, pp. 245–260, on p. 245.

provided a similar though more precise approach to the question, defining hearing as "a sensitivity to both the detail of physical vibration within an environment and its physical orientation as revealed through its modification of those vibrations", and listening as "the ability to *interpret* information about the environment and one's interaction with it, based on the detail contained within those physical vibrations".[23] In other words, whereas the physiological and mechanical aspects—that is, the "mere apprehension" of sounds—are often attributed to hearing, many scholars associate listening with the subjective and mental (that is, the psychological) aspects of audition, and describe the act of listening as a cognitive (and emotional) engagement with music. In addition, audition often described as a two-step process, where hearing would be a requisite for listening.[24]

To a certain extent, these considerations amplify a contrast that is already present in everyday language: that between the meaning of the English verbs "to hear" and "to listen", and between equivalent terms in other European languages. As a result, the difference between hearing and listening—as theorized by Barthes and Truax, among others—appears as a "natural" one. The Oxford English Dictionary defines *hear* as "to perceive, or have the sensation of, sound; to possess or exercise the faculty of audition, of which the specific organ is the ear", and *listen* as "to give attention with the ear to some sound or utterance; to make an effort to hear something; to 'give ear'".[25] In other words, while hearing is presented mainly as a faculty, an ability exercised passively by the ear, listening is described as a selective task engaging human attention.

[23] Barry Truax, *Acoustic Communication*, Wesport, Ablex Publishing, 1984, pp. 15–16 (emphasis in the original).

[24] See for instance Kennedy, "Listen", in *Keywords of Media Theory*, edited by W. J. T. Mitchell, Eduardo de Almeida and Rebecca Reynolds, The Chicago School of Media Theory, University of Chicago, 2004, https://lucian.uchicago.edu/blogs/mediatheory/keywords/listen/ [last access: October 201r].

[25] See *Oxford English Dictionary on CD-ROM*, Oxford, Oxford University Press, 2004. Actually, the definition of *listen* that I have reported here is the second meaning in the dictionary –the first meaning being an archaic form (*listen* as a transitive verb).

Similar distinctions may be found, with some qualifications, in other European languages, e.g. in Spanish between *oír* and *escuchar*; in Catalan, *sentir* (or less frequently, *oir*) and *escoltar*; in French, *entendre* (or *ouïr*) and *écouter*;[26] in Italian, *sentire* (less frequently, *udire*) and *ascoltare*; in German, *hören* and *zuhören* or *horchen*; in Portuguese, *ouvir* and *escutar*, where the first verbs are more or less equivalent to *hear*, and the second ones, to *listen*. Obviously, "to hear", "to listen" and "to sound" are not the only English verbs that refer to the perception of sound; other English auditory verbs are "to hearken", "to heed", "to eavesdrop", or the more technical ones "to auscultate" or "to tune in", to name just a few ones. However, "to hear" and "to listen" are certainly the most frequent ones, and those whose opposition has come to structure the semantic field of audition.[27]

Semantic differences in the field of audition have been studied by linguists with interesting results. In the 1980s Swedish linguist Ake Viberg studied verbs of perception cross-culturally and classified them into three groups, which would apply to the five sensory modalities: "experience verbs", which refer to "a state or inchoative achievement that is not controlled"; "activity verbs", where "activity" means "an unbounded process that is consciously controlled by a human agent"; and finally "copulative verbs, "whose subjects are the stimuli of the perception", [28]which Iraide

[26] The case of Cat. *sentir* and It. *sentire* is particular, as they originally mean "feeling", in a general sense. French verb *entendre* (meaning "hear") will be discussed below.

[27] On this see also Franco Fabbri, "Taboo Listening (or, What Kind of Attention?)", in Marta García Quiñones, Anahid Kassabian and Elena Boschi (eds), *Ubiquitous Musics: The Everyday Sounds That We Don't Always Notice*, Aldeshot, Ashgate, 2013, pp. 161–173, esp. pp. 162–163. However, Fabbri also notices some asymmetries within European languages, particularly the fact that in German (the musicological language par excellence) the verbs meaning "to hear" and "to listen" share the same root, "*hören*". On the semantic field of hearing in German see Oswald Panagl, "Linguistische Bemerkungen zum Sinnbezirk des Hörens", in Wolfgang Gratzer (ed.), *Perspektiven einer Geschichte abendländischen Musikhörens*, Laaber, Laaber-Verlag, 1997, pp. 33–44.

[28] See Ake Viberg, "The Verbs of Perception: A Typological Study" in Brian Butterwoth, Bernard Comrie and Östen Dahl (eds), *Explanations for Language Universals*, Berlin, Mouton, 1984, pp. 123–162, esp. p. 123.

Ibarretxe-Antuñano has called "percept verbs".[29] In the case of hearing, "to hear" would be the experience verb in English; "to listen", the activity verb; and "to sound" the copulative or percept one. Linguist Eve Sweetser has studied the semantic field of hearing verbs, which she regards as that of interpersonal communication, and has distinguished three aspects that would be implied in it: physical reception ("hear"), internal receptivity ("listen, heed"), and obedience.[30] She has also identified some of these aspects in verbs derived from **k'leu-s-,* the Indo-European root meaning "hear" or "listen",[31] e.g. the Greek verb *klúo*, Modern Irish *cloisim*, Welsh *clywed*, but also the English verb *listen* and Russian *slusat'*, meaning "heed, listen",[32] as well as Danish verb *lystre* and Russian *slusat's'a*, meaning "obey".[33] Ibarretxe-Antuñano has analysed and compared the semantic field of hearing in English, Spanish and Basque, and has distinguished at least four "extended meanings" that—she affirms—are valid cross-culturally (i.e., they are part of the semantic field of hearing verbs in all three languages), and which are partially coincidental with Sweetser's mapping: "to heed, to

[29] Iraide Ibarretxe-Antuñano, Polysemy and Metaphor in Perception Verbs: A Cross-Linguistic Study, Ph.D. dissertation (University of Edinburgh, 1999), accessible online: http://www.unizar.es/linguisticageneral/articulos/Ibarretxe-PhD-Thesis-99.pdf [last access: October 2015], pp. 42–46, on p. 44.

[30] Eve Sweetser, "Semantic structure and semantic change: English perception-verbs in an Indo-European context", in *From Etymology to Pragmatics. Metaphorical and Cultural Aspects of Semantic Structure*, Cambridge-New York-Melbourne, Cambridge University Press, 1990, pp. 23–48, on p. 38 and 41–45. Actually, Sweeter argues (p. 43) that hearing is connected to communicative aspets of understanding, as she believes that proper intellection would be universally associated with vision. However, this claim has been questionned by fieldwork on the semantic field of hearing verbs in some non-Western languages; see in particular, Nicholas Evans and David Wilkins, , "In the Mind's Ear: The Semantic Extensions of Perception Verbs in Australian Languages", *Language*, vol. 76, no. 3, September 2000, pp. 546–592.

[31] It is important to bear in mind that in explaining the meaning of foreign roots or verbs using English words I do not want to imply that there be a perfect equivalence between both languages. As many linguists have discussed, semantic fields may be (and often are) structured differently in different languages, that is the reason why translations are complex operations that go beyond a simple replacement of foreign words with vernacular ones. On this see for instance Louis Hjelmslev, *Prolegomena to a Theory of Language*, translated by Francis J. Whitfield, Madison, The University of Wisconsin Press, 1963, pp. 47–60.

[32] Sweetser, "Semantic structure and semantic change: English perception-verbs in an Indo-European context", p. 34.

[33] Ibid., p. 35.

pay attention", "to understand" (both relatable to internal receptivity), "to be told" (which alludes to the social dimension of physical reception), and "to obey".[34]

Yet, as Sweetser has pointed out, while in Indo European languages verbs of "hearing", that is verbs related to physical reception, often come to mean internal receptivity ("listen, heed"), and occasionally also "obedience", the opposite movement is equally possible, like in the case of the French verb *entendre*, from Latin *intendere* ("give attention to, understand"), which has now the primary meaning of "hear".[35] On the other hand, the aspects of physical reception and internal receptivity are not always clearly defined: for instance, in contemporary English "hear" can actually mean "understand" in expressions like "I hear you",[36] and it seems to be also very close to "listen" when it is used in the court, in sentences like "the judge hears a witness" or "she hears cases".[37] Evidence of similar semantic overlaps is also found in Spanish, where Jorge Fernández Jaén has made the case for a tripartite division of meaning: *oír 1* (pure perception), which may eventually become *oír 2* (sustained action), and *listen* (agentive verb), dismissing so the notion that there be a clean-cut opposition between *oír* and *escuchar*.[38] As Sweetser also asserts "internal reception of ideas, in the sense of understanding what is heard, is certainly often connected with the vocabulary of physical hearing."[39] Also, by invoking the different uses of the Greek verb *klúo* ("hear") in the *Iliad*, as well as the various connotations of the Hebrew root meaning "hear" in

[34] Ibarretxe-Antuñano, Polysemy and Metaphor in Perception Verbs, pp. 64–67

[35] Sweetser, "Semantic structure and semantic change: English perception-verbs in an Indo-European context", p. 35.

[36] Ibid., p. 41.

[37] This example was brought to my attention by Professor Anahid Kassabian, during a conversation in Liverpool, in Autumn 2007. Professor Kassabian commented on the fact that in English the verb *hear* was part of some expressions, like "to hear cases", or "to hear someone out", whose meaning seemed in principle more akin to *listen*.

[38] Jorge Fernández Jaén, "Verbos de percepción sensorial en español: una clasificación cognitiva", *Interlingüística*, vol. 16 (1), 2005, pp. 391–405, accessible online: http://dialnet.unirioja.es/servlet/articulo?codigo=2514236 [last access: March 2014].

[39] Sweetser, "Semantic structure and semantic change", p. 41.

the Old Testament, Sweetser makes the case for a connection "between physical hearing and obeying or heeding—between physical and internal receptivity or reception—", which—she goes so far as to suggest—"may well, in fact, be universal, rather than merely Indo-European".[40]

If we compare these semantic arguments with the definitions of hearing and listening mentioned above in relation to music, we could observe that there is a certain level of coincidence between what I have called the "hearing/listening divide" and the general distinction (referred to all perception verbs) between "experience verbs" and "activity verbs", and between that divide and the two aspects, namely "physical reception" and "internal receptivity", noticed by Sweetser with reference to hearing verbs. However, those who have studied the semantic field of hearing in different languages appreciate a certain degree of permeability between those categories, which in fact in some cases, depending on the language, may just be different meanings of a single root or verb. Therefore, while the opposition hearing-listening certainly may be related to the difference between "to hear" and "to listen" in English (and to similar pairs in other languages), linguistic research shows that common usage is much more fluid than the definition of hearing as sensation and listening as psychological process may suggest. In other words, heed and understanding are natural dimensions of the intersubjective communication that hearing as physical reception entails.

Ultimately, the use of "hear" or "listening" seems to depend also on the context where the action takes place. For instance, authorities tend to "hear" and not "listen" to their subordinates, as in the court expressions mentioned above, probably in order to establish a hierarchy, and to stress the independence of the upper level. "Hear" or "listen" may also be attached to certain audio technologies or media, which then are

[40] Ibid., p. 42.

"heard" or "listened to" regardless of what actually happens, e.g. radio is normally "listened to" and not just "heard" in English.[41] In sum, while the verbs "to hear" and "to listen" differ in meaning and apply to different contexts and objects, thinking of them as two different actions—one (hearing) "just" physical, the other one (listening) primarily intellectual—, or as two steps of a single process, is anything but natural. As I will try to demonstrate in the course of this research, the "hearing/listening divide" is rather a consequence of how the disciplines of hearing and listening have evolved in modern times.

1.1.3 A cultural approach to contemporary notions of the senses: three models

In order to understand how our notions of the senses have crystallized and evolved through time it may be useful to consider also the models and conceptual metaphors that have shaped and shape our understanding of them. According to George Lakoff and Mark Johnson "conceptual metaphors" are basic metaphors that do not only explain an idea belonging to a certain conceptual domain in terms of another conceptual domain, as all metaphors do, but also structure our thought.[42] While, as Lakoff and Johnson have claimed, many conceptual metaphors are "embodied", that is they refer to our own bodily experience, some of the models of the senses that I will describe in this section are based on conceptual metaphors of a different kind, where the senses are mapped to particular technologies.

It is often assumed that models and conceptual metaphors are characteristic of folk discourses, while non-existent or limited in expert discourses, and that the line that

[41] See Kennedy, "Listen".

[42] On conceptual metaphors see Lakoff and Johnson, *Metaphors We Live by*; on metaphors in the history of psychology see David E. Leary (ed.), *Metaphors in the History of Psychology*, Cambridge, Cambridge University Press, 1990; see also chapter 9 ("Models and Metaphors") of William Foley, *Anthropological Linguistics: An Introduction*, Oxford-Malden, MA, Blackwell, 1997, pp. 179–191.

separates folk from expert discourses must be relatively easy to draw.[43] However, scientific theories, in spite of being expert discourses, very often rely on imaginary projections that explain natural processes in terms of everyday experiences, be they bodily, technological, or of other kind. These projections are not only useful to illustrate those theories, but normally shape their elaboration and condition their future applications. In particular, 20th-century psychological research into the senses has been shaped by three successive though partially overlapping models, associated with different conceptual metaphors, which are still very much alive today.[44]

The first one is the electric (or electrochemical) model. Following the discovery, at the beginning of the 20th century, that neural information is transmitted by neural "action potentials", that is by electric (or chemical) pulses of variable intensity, the whole nervous system was conceived as an electrochemical circuit.[45] The senses were thus modelled on specific processes or technological objects, which provided a blueprint for understanding their functioning. More specifically, they were identified with those technological objects aimed at transforming energy of one kind (pressure, brightness) into electrical energy (or vice versa), which are called "transducers",[46] for example, microphones or loudspeakers. This identification endured through time: for instance, in a 1981 article Gregory observed that "we regard the sense organs (eyes, ears, touch receptors, and so on) as transducers, essentially as photocells, microphones,

[43] For instance, at the beginning of the chapter about "Models and Metaphors" in *Anthropological Linguistics*, Foley states that "[w]e may think of these [models for construing experience] as folk theories about the world, carried in our everyday, ordinary language, in constrast to scientific theories" (p. 179). However, at the end of the same chapter he admits that metaphors and conceptual models may show up "in the theories, folk and even scientific, we might propose to describe such [highly abstract] domains" (p. 191).

[44] On the ambiguous role of models in psychology see Rom Harré and Grant Gillet, *The Discursive Mind*, Thousand Oaks, CA, SAGE, 1994, pp. 61–64.

[45] On the difference between electrical and chemical synapse transmission, see chapter 8 ("Overview of Synaptic Transmission") by Steven A. Siegelbaum and Eric R. Kandel, in Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegelbaum and A. J. Hudspeth (eds), *Principles of Neural Science*, 5th ed, New York, McGraw-Hill, 2012, pp. 177–188.

[46] More generally, transduction is the transformation of one form of energy into another form of energy; see Goldstein, *Sensation and Perception (8th edition)*, p. 7.

and strain gauges", though he claimed that between those technologies and the functioning of the senses there was not similarity, but identity.[47] As I will argue in forthcoming chapters, the electrical model has been pervasive in hearing research since the formation of electroacoustics, during the first decades of the 20th century, and is still in use today.

With the emergence of cognitivism, in the 1950s,[48] the identification of the senses with electrical technologies overlapped with the information-theory model, which was based on the formulation of nervous activity in terms of logical (computational) operations,[49] as well as on some formal mathematical theories developed by Claude Shannon and Norbert Wiener.[50] Even if the information-processing model focused largely on the mind and cognitive processes rather than on the senses,[51] it also came to influence the way in which perception was conceived. Thus, following the scheme of information processing provided by Shannon, consisting in five elements: an information source, a transmitter, the channel, the receiver, and the destination,[52] the senses were characterized as "channels" for the processing of

[47] Richard L. Gregory, "Perceptions as Hypotheses" (1981), in Alva Noë and Evan Thompson (eds), *Vision and Mind. Selected Readings in the Philosophy of Perception*, Cambridge, MA, MIT Press, 2002, pp. 111–133, on p. 112.

[48] For a history of cognitivism, see Howard Gardner, *The Mind's New Science: A History of the Cognitive Revolution*, New York, Basic Books, 1985, esp. chapters 2 and 3; and also Bernard J. Baars, *The Cognitive Revolution in Psychology*, New York-London, The Guilford Press, 1986, which includes interviews with many protagonists of that period. For a specific treatment of the transition between behaviourism and cognitivism see George Mandler, "Origins of the Cognitive (R)evolution", *Journal of the History of the Behavioral Sciences*, vol. 38, no. 4, 2002, pp. 339–353.

[49] According to Howard Gardner, this hypothesis was first demonstrated by Warren McCulloch and Walter Pitts in the paper "A Logical Calculus of the Ideas Immanent in Nervous Activity", *Bulletin of Mathematical Biophysics*, vol. 5, 1943, pp. 115–133; see Gardner, *The Mind's New Science*, pp. 18–19.

[50] See Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication*, Urbana, University of Illinois Press, 1949; and Norbert Wiener, *Cybernetics: or Control and Communication in the Animal and the Machine*, Cambridge, MA, MIT Press, 1948. Yet, it is generally acknowledged that Shannon and Wiever had different concerns in mind: while Shannon focused on formulating a mathematical theory of communication and was not much interested in extending it beyond that, Wiener,who was truly a visionary, aimed at applying his reflections on the interaction between animal and machine also to economics and social systems.

[51] See Shannon and Weaver, *The Mathematical Theory of Communication*, p. 95, where Warren Weaver defined communication as "all the procedures by which one mind may affect another".

[52] Ibid., p. 98.

information—a process that could eventually be perturbed by noise, and which relied on redundancy to secure communication.[53]

Within this framework perception apparently consisted in detecting encoded data (i.e. the message produced by the information source, which the transmitter transformed into a signal) and decoding it (turning it into a message, which the receiver then sent to destination), even if it was not clear what the code would exactly be. More specifically, drawing on the notion of redundancy defined by Shannon, Fred Attneave stated that "a major function of the perceptual machinery is to strip away some of the redundancy of stimulation, to describe or encode incoming information in a form more economical than that in which it impinges on the receptors".[54] This view of perception led to important developments in the field of psychoacoustics.

The vocabulary of information processing was pervasive well until the 1980s, and it was even employed to convey theoretical approaches to the senses that are quite distant from cognitivism, like Gestalt theories, Gibson's ecological psychology, or the constructivist theories of perception sustained, among others, by Richard Gregory. For instance, the article by Gregory that I mentioned above described perception as a two-step process involving the conversion of energy into signals (measured in physical units) by the sense organs acting as transducers, and the decoding of these signals. Actually, this vocabulary has remained so influential to date that it seems virtually impossible to talk about the senses without invoking terms like "transmission", "reception", "channel", "signal", etc. This applies also to current physiological research on the senses, where an acceptable definition of "sense" would be "a system that consists of a group of sensory cell types that responds to a specific physical phenomenon, and that corresponds to a particular group of regions within the brain

[53] Ibid., p. 43.

[54] Fred Attneave, "Informational Aspects of Visual Perception", *Psychological Review*, vol. 61, no. 3, 1954, p. 189.

where the signals are received and interpreted"[55]—a choice of words ("system", "signals", "received and interpreted") that obviously refers to the information-processing model.

However, current physiological research on the senses is based on a third model, which is the one that conceives the senses as mainly products of brain activity—I will call it the "brain model". As I have mentioned above, the senses are defined today by the links among reported sensations, specific cell types (receptors and neurotransmitters) and the activity of particular brain areas. Thus, while neurophysiologists have shown a steady interest in the physiology and chemistry of neurons and the mechanism of neurotransmission, which are quite well known, the main focus of physiological research is now the description and interpretation of the functioning of the brain. At least since the 1980s, when magnetic resonance imaging (MRI) was applied to clinical practice for the first time, and even more since the 1990s, when non-invasive techniques (functional magnetic resonance imagining, fMRI) for the monitoring of brain activity were developed, it has become possible to see real-time changes in blood flow in the brain, which are normally interpreted as indexes of neuronal activity.[56] Conceivably, the monitoring of brain activity, complemented by other research methodologies, will sometime reveal the patterns of sensory coding on which the conversion of stimuli into electrical signals, and of electrical signals into sensations is based. So far it seems clear that sensory information is processed in parallel in multiple areas of the cerebral cortex, depending on the specificity of the

[55] See the entry "sense" in Wikipedia, http://en.wikipedia.org/wiki/Sense [last access: October 2014].

[56] See Marcus E. Raichle, "Behind the Scenes of Functional Brain Imaging: A Historical and Physiological Perspective", *Proceedings of the National Academy Sciences*, vol. 95, February 1998, pp. 765–772. In a nutshell, neurophysiologists know that firing neurons need more oxygen (and hence more oxygenated hemoglobin) than non-firing ones. Therefore, they deduce that the brain zones that are more irrigated by blood are those where neuronal activity must be higher. See also chapter 20 ("Functional Imaging of Cognition") by Scott A. Small and David J. Heeger, in Kandel et al. (eds), *Principles of Neural Science*, pp. 426–442.

information, and that this processing also concerns other areas of the brain involved in cognition, memory, and motor planning control. [57]

As I have tried to show, historically the senses have been explained by different conceptual metaphors, which have normally been connected to technologies, practices or objects that are invested with particular signification at a certain time, and which have been adopted as models. Yet, the notion of the senses does not only change through history, but it is also culturally specific: it is not shared universally.

1.2 On the "sensory turn": the senses as culturally constructed

As Devon Hinton, David Howes and Laurence Kirmayer have observed, "[a]lthough we would expect some universality for basic sensory phenomena (the basic color lexicon, smells of certain noxious or desirable substances), the notion of what is a simple, distinct sensation worthy of a specific name (…) may vary across cultures."[58] Some non-European languages have equivalents of the collective name "the senses", but many other languages lack them. In other words, the senses are not universally recognized as a distinct field or concept. Besides, even those communities that identify the senses as a distinct field do not always list them in the same way. As it is now widely acknowledged, the traditional Western taxonomy sanctioned by Aristotle, consisting in a set of five senses: sight, hearing, taste, smell and touch,[59] is just one of the possible

[57] For a basic introduction to the physiology of perception see chapter 2 of Goldstein, *Sensation and Perception (8th edition)*, pp. 23–41; for a more detailed one see chapter 21 ("Sensory Coding") by Esther P. Gardner and Kenneth O. Johnson in Kandel et al. (eds), *Principles of Neural Science*, 449–474.

[58] See Devon E. Hinton, David Howes and Laurence Kirmayer, "Toward a Medical Anthropology of Sensations: Definitions and Research Agenda", *Transcultural Psychiatry*, vol. 45, no. 2, 2008, pp. 142–162, on p. 143.

[59] The two treatises where Aristotle deals with the five senses are *De Anima* (*On the Soul*), II.5–12, and the first of the short treatises conventionally gathered under the Latin title *Parva Naturalia*: *De Sensu et sensibili* (*Sense and Sensibilia*); see *The Complete Works of Aristotle, vol. 1*, the revised Oxford translation, edited by Jonathan Barnes, Princeton, NJ, Princeton University Press, 1984, pp. 663–675 and 693–713. However, as Louise Vinge has observed, Aristotle "authorized" the five-sense series, but contrary to what is often assumed, he did not introduce it, as it had been accepted long before his time; see Louise Vinge, "The Five Senses in Classical Science and Ethics", in David Howes (ed.), *The Sixth Sense Reader*, London, Berg Publishers, 2009, pp. 107–188, on p. 107.

catalogues of the senses, albeit a very popular one.[60] Some cultures distinguish more or less than five senses; even in Western history, where the five-sense series has been the norm, we can also find occasional references to systems including less or more than five senses.[61] As I will explain later in more detail, different cultures may apply different values to the senses, and may relate them to different objects, practices, places or emotions.

The relationship between the senses and other, distinct human "faculties" or structures of the self like the intellect, emotions or the motor system, may also vary enormously across cultures. I am thinking here of terms like Anlo-Ewe *seselelame* (from Ghana, West Africa) studied by US anthropologist Kathryn Linn Geurts, which seems to encompass a great variety of states, from sensual perception to what we would rather call emotional engagement;[62] or the Hausa *ji* from Northern Central Nigeria, which according to Canadian theologist Ian Ritchie designates all the non-visual senses, but "also means to 'feel' things in an intuitive or emotional sense (…) and to 'know' things in a cognitive or intellectual sense".[63] In contrast, while we also have terms, for instance "sensibility", which may refer both to sensation and feelings, at least since the

[60] According to Jütte, "the division of the sensorium into five (and not six, seven or eight) has undoubtedly proved to be the most influential and most frequently applied method of assigning cognitive functions to individual parts or organs of the body"; see Jütte, *A History of the Senses*, p. 20. Later in that book he adds that number five (for the senses) can also be found in early Indian and Chinese cultures, "where this figure had symbolic meaning" (p. 54).

[61] For instance, in studying Classical and Early Christian sources, and particularly Philo of Alexandria, Louise Vinge found mentions of seven senses, with the addition of speech and the genital organs to the standard series; see Louise Vinge, "The Five Senses in Classical Science and Ethics", p. 115, and also Constance Classen, *Worlds of Sense: Exploring the Senses in History and Across Cultures*, London-New York, Routledge, 1993, pp. 2–5. Indeed, the recent anthology *The Sixth Sense Reader*, edited by Howes, where Vinge's essay is included, reunites key texts on the many historical and cross-cultural attempts to explain sensorial experiences that go beyond the traditional five senses.

[62] Kathryn Linn Geurts, "Consciousness as 'Feeling in the Body'. A West African Theory of Embodiment, Emotion and the Making of the Mind", in David Howes (ed.), *Empire of the Senses: The Sensual Culture Reader*, Oxford, Berg Publishers, 2005, pp. 164–178, on p. 167; see also by Geurts, *Culture and the Senses: Bodily Ways of Knowing in an African Community*, Berkeley, University of California Press, 2002.

[63] Ian Ritchie, "Fusion of the Faculties: A Study of the Language of the Senses in Hausaland", in David Howes (ed.), *The Varieties of Sensory Experience: A Sourcebook in the Anthropology of the Senses*, Toronto, University of Toronto Press, 1991, pp. 192–202, on p. 194.

second half of the 19th century, theories of the senses have mostly tended to delimit their meaning, treating them rather as a part of cognitive processes.[64]

Another set of cultural assumptions regards the way in which the senses may be invested with particular values, making one or some of them "dominant" over the others—though, as I will show in the course of this research, this "domination" can mean such different things as prevalence in conversation of terms related to it/them, probability that these terms cover other sensory modalities, relative importance of the cultural practices associated with it/them, or relationship to sensory normativity, among others. Thus, our traditional set of five senses has often been divided into two subsets of variable elements: the "higher senses" (vision, hearing and sometimes also touch) and the "lower senses" (smell, taste, touch), also called "proximity senses", although the historical origin of this fuzzy distinction is unclear.[65] This classification implies not only that objects, practices and actions related to the higher senses have usually been more appreciated, but also that these senses have been attributed to higher classes, and have even provided the standard according to which other races and human societies have been judged in past times.[66]

[64] In chapter 5 I will deal with the importance of the term "sensibility" for 18th-century the philosophy and aesthetics, and generally with the historical evolution of the relationship between the senses and emotions.

[65] Significantly, Constance Classen, in her article "The Senses", in Peter Stearns (ed.), *Encyclopedia of European Social History from 1350 to 2000, vol. IV*, New York, Charles Scribner & Sons, 2001, pp. 355–364, on p. 355, does not provide any reference to back up the "higher senses" vs "lower senses" distinction: she just considers it part of common knowledge. Yet, a classical (though not quite similar) antecedent is Aristotle's mention of two sets of senses: on the one hand, touch and taste, which all animals possess, and on the other hand, vision, hearing and smell, which operate through external media and are only found in animals that are able to move; see Aristotle, *De Sensu et sensibili* (*Sense and Sensibilia*) 436b 13–19, in *The Complete Works of Aristotle, vol. 1*, the revised Oxford translation, edited by Jonathan Barnes, Princeton, NJ, Princeton University Press, 1984, pp. 693–694. Chapter 3 of Jütte's *A History of the Senses*, which is devoted to "Classifications: The Hierarchy of the Senses", seems to accept the 'classical' hierarchy of the senses (sight, hearing, smell, taste and touch) as both a cultural construction and "a product of the phylogenetic development of the human species (upright physical posture, species-specific increase in the performance of the brain) and the technological changes that have taken place in the course of the process of civilization" (p. 61).

[66] See Nélia Dias, *La Mesure des sens: les anthropologues et le corps humain au XIX siècle*, Mayenne, Aubier, 2004; and David Howes, *Sensual Relations: Engaging the Senses in Culture & Social Theory*, Ann Arbor, University of Michigan Press, 2003, pp. 4–6.

As it has been repeatedly argued in the last decades, in our cultural context many disciplines have traditionally favoured an ocularcentric approach, ultimately based on the metaphoric identification of vision with cognition that is inherent in many European languages (or, at least, in the most spoken among them).[67] Also, in spite of the many physiological and psychological differences among the senses, general ideas about their functioning have often been based on an analysis of the process of vision, and many general models of perception have been built using terms and notions associated with vision and the eye. Yet, other sensory modalities have been equally, or even more essential for models of perception in particular periods; for instance, many ancient and modern authors have conceived the senses as forms of mechanical contact, i.e. as varieties of touch.

As some scholars have remarked, probably due to the bodily basis of the senses, as well our inability to perceive and think independently from them, most people tend—in the words of cultural historian Constance Classen—"to think of perception as a physical rather than a cultural act",[68] and of the senses as mere tools to apprehend nature or reality. However, the senses involve not only our bodies, but also our emotional and cognitive dimensions—imagination, memory, judgement, reason, etc.—, as well as the language that we employ to talk about them. Sensations cannot be interpreted—indeed, they cannot even exist—as bare, autonomous natural facts, but are inextricably tied both to personal stories and to the social and cultural contexts where those stories develop. As Hinton, Howes and Kirmayer have observed: "Sensory meaning is never simply a question of physiology; it is always mediated by culture, in

[67] On the hegemony of vision see the introduction to David Michael Levin (ed.), *Modernity and the Hegemony of Vision*, Berkeley and Los Angeles, University of California Press, 1993, pp. 1–29, where Levin delineates the history of visualism in modern Western philosophical thought, and *passim*. Actually, as I will explain in chapter 2, some cognitive linguists have even argued for the universality of metaphors linking knowledge and vision.

[68] Classen, *Worlds of Sense*, p. 1.

the sense of the ways of life, language, ritual practices, beliefs, and aesthetics of a group, community, or society."[69] Conversely, cultural practices necessarily involve a certain level of sensoriality, since they are performed, received and transmitted through the senses.

These tenets form the core of a theoretical approach and research field that emerged in the 1980s: the "anthropology of the senses",[70] which is also known by other names, like "sensory ethnography",[71] or "sensuous scholarship", though, as I will discuss in next chapters, these names entail differences in approach.[72] Whereas the anthropology of the senses looks into the senses precisely through the prism of cultural diversity, on the other hand, from its very name it presupposes a notion ("the senses") that, as I have already mentioned, is at least culturally charged, if not plainly ethnocentric. The anthropology of the senses, as well as the increasing proliferation of studies on the history of the senses, or of particular senses, is part of what some scholars have called a "sensory turn" or "sensual turn",[73] or even a "sensual revolution"[74] in the humanities and social sciences—a "turn" that, not surprisingly, has been accompanied (or followed) by other "turns", namely the "corporeal turn", the "performative turn", or the "affective turn". The "sensory turn" can be observed since the end of the 1980s across such different fields as sociology, anthropology, geography, psychology,

[69] Hinton, Howes and Kirmayer, "Toward a Medical Anthropology of Sensations", p. 143.

[70] For a historical outline of the anthropological research on the senses, see Constance Classen, "Foundations for an Anthropology of the Senses", *International Social Science Journal*, n. 153, 1997, pp. 401–412, and also by her "The Senses", 2001; see also chapters 1 and 2 of Howes, *Sensual Relations*; and also David Howes, "The Expanding Field of Sensory Studies", version 1.0, August 2013, http://www.sensorystudies.org/sensorial-investigations/the-expanding-field-of-sensory-studies/ [last access: October 2015]. Thomas Porcello, Louise Meintjes, Ana Maria Ochoa and David W. Samuels have provided an excellent summary of the development of the field in "The Reorganization of the Sensory World", *Annual Review of Anthropology*, vol. 39, 2010, pp. 51–66.

[71] Sarah Pink, *Doing Sensory Ethnography*, Los Angeles-London-New Delhi-Singapore-Washington DC, SAGE, 2009.

[72] Paul Stoller, *Sensuous Scholarship*, Philadelphia, University of Pennsylvania Press, 1997.

[73] See chapter 2 ("Coming to Our Senses: The Sensual Turn in Anthropological Understanding") of Howes, *Sensual* Relations, pp. 29–58.

[74] Michael Bull et al., "Introducing Sensory Studies", *The Senses and Society*, vol. 1, no. 1, 2006, pp. 5–7, on p. 5.

philosophy, the history of science and technology, art history (visual studies), and also music and sound studies.[75] Central to the "sensory turn" is the notion of the "cultural construction of the senses", which has been adopted widely, and provides the theoretical framework wherein the senses (including hearing) are mainly studied nowadays by humanities and social sciences scholars.

With regard to philosophical, physiological and psychological discourses on the senses, which (as I mentioned above) have traditionally shaped the understanding of the subject, the "sensory turn" may be considered an extension of the field. Thus, after the "sensory turn" many situations and contexts have been analysed through the sensorial prism for the first time, what has underlined the centrality of sensorial practices to the understanding of culture. However, the cultural approach to the senses has often been polemically presented as opposed (or complementary) to scientific (psychological, neurobiological) approaches to the senses, using arguments such as this: "The perceptual is *cultural* and *political*, and not simply (as psychologists and neurobiologists would have it) a matter of cognitive processes or neurobiological mechanisms located in the individual subject".[76] As some scholars have convincingly argued, psychological research tends to limit itself to Western subjects, which are treated routinely as universal subjects, whereas social and cultural aspects of sensorial practices are regularly left out of experimental research.[77] Thus, David Howes has

[75] Bibliographical references of the "sensory turn" in anthropology, sociology, philosophy, psychology, art history, etc. may be found in: David Howes, *Sensual Relation*s, p. 235; Pink, *Doing Sensory Ethnography*, p. 1; Porcello, Meintjes, Ochoa and Samuels, "The Reorganization of the Sensory World", pp. 61–65; Phillip Vannini, Dennis Waskul and Simon Gottschalk, *The Senses in Self, Society and Culture: A Sociology of the Senses*, New York-London, Routledge, 2012, pp. 1–22; and David Howes and Constance Classen, *Ways of Sensing: Understanding the Senses in Society*, Milton Park, UK, and New York, Routledge, 2014, p. 13.

[76] See again the introductory text to the fist issue of the journal *The Senses and Society*: Bull et al., "Introducing Sensory Studies", p. 5.

[77] David Howes, "Hearing Scents, Tasting Sights: Toward a Cross- Cultural Multimodal Theory of Aesthetics", in Francesca Bacci and David Melcher (eds), *Art and the Senses*, New York, Oxford University Press, 2011, pp. 161–182. On the almost exclusive testing of subjects from WEIRD (Western, Educated, Industrialized, Rich, and Democratic) societies by behavioural scientists, who routinely make broad claims based on those tests, see Joseph Henrich, Steven J. Heine and Ara Norenzayan, "The Weirdest People in the World?", *RatSWD Working Paper Series*, no. 139,

placed the disciplines dealing with the senses along an imaginary line, a "continuum of perception", "with the idea of perception as a neurobiological process at one end and the notion of perception as a cultural process at the other".[78] Elsewhere he has also written about the "psychologization of perception" to refer to the psychobiological approach to the senses that sensorial anthropologists should apparently resist.[79] Some human scientists draw a contrast between their research methods and contexts and those of natural scientists, that is between fieldwork and laboratory research, objecting that, as Howes has also remarked, in the psychological laboratory social codes "are suspended, replaced by experimental protocols".[80] Nevertheless, this view of the experimental method is at odds with the prevalent view of science as "socially constructed": as I have tried to show at the beginning of this chapter, scientific theories are normally developed within conceptual models that have at least a cultural side to them. Besides, in this century there is an increasing awareness among academics that the convergence of cultural and scientific views, whenever possible, might be reciprocally enriching.

While the notion of the senses as "culturally constructed" is widely accepted today among humanities and social sciences scholars, it may also appear as self-evident or even trite—an impression reinforced by the extent to which the very meaning of "culture" has been stretched and diluted in contemporary human and social sciences.[81]

German Data Forum (RatSWD), April 2010, http://hci.ucsd.edu/102b/readings/WeirdestPeople.pdf; [last access: July 2015].

[78] See his Introduction to Howes (ed.), *The Sixth Sense Reader*, pp. 1–54, on p. 14. However, it is not quite clear what kind of variable this "continuum of perception" would represent. Howes (p. 15) also employs the terms "bottom-up" and "top-down", typical of cognitive psychology, to characterize neurobiological and cultural approaches to the senses respectively. These denominations are particularly confusing, since "top-down" normally refers to higher cognitive processes (processes initiated and controlled by the brain), whereas brain activity is one of the main research subjects in the neurobiology of perception, which Howes denominates "bottom-up".

[79] David Howes, "The Social Life of the Senses", *Ars Vivendi Journal*, no. 3, February 2013, pp. 4–23, on p. 10, accessible online: http://www.ritsumei-arsvi.org/uploads/publications_en/20/2013AVJ_no3_Howes.pdf [last access: January 2015].

[80] Ibid., pp. 8–9.

[81] On this question in connection with cultural anthropology, see Adam Kuper, *Culture: The Anthropologists' Account*, Cambridge, MA, Harvard University Press, 1999.

In order to counterbalance that impression, now I would like to briefly reconstruct the historical context, between the end of the 19th century and the beginning of the 20th century, in which social and cultural anthropology were constituted and the field was established as the main ethnographic work site. As I will argue, the notion of the "cultural construction of the senses" ultimately makes sense in reference to that context. Prior to that moment, anthropology and psychology were not so clearly delimited, and the psychological laboratory was also the place where anthropological experiments were conducted. In bringing back that period, I want to recover the controversial meaning that was initially attached to cultural anthropology, and which can still be perceived in current debates about the orientation of sensory research, and in the long-standing polemics about the so-called "nature-nurture divide".

1.2.1 Studying the senses: from "scientific racism" to cultural anthropology

Although, as I have already mentioned, the anthropology of the senses is a relatively recent research field, the notion that the senses are "culturally constructed" can be traced in much earlier reflections, like Karl Marx's famous statement, in mid-19th century, that "the forming of the five senses is a labour of the entire history of the world down to the present".[82] Marx's statement contrasts sharply with the way in which the scholars of the time dealt with the body and the senses. During the second half of the 19th century, and almost until World War II, the conceptual framework that is now known as "scientific racism" (or "evolutionism") dominated European human sciences:[83] as Anthony Synnott has explained, mid-19th-century European and American anthropologists devoted their energies to measuring the parts of the human

[82] Karl Marx, *Economic and Philosophic Manuscripts of 1844*, edited with an introduction by Dirk J. Struik, translated by Martin Milligan, New York, International Publishers, 1964, p. 141.

[83] On scientific racism, particularly in the history of psychology, see Graham Richards, *'Race', Racism and Psychology: Towards a Reflexive History*, London, Routledge, 1997, esp. chapter 2 (pp. 13–40).

body and comparing the measures of the various groups and populations in order to establish racial hierarchies.[84] Contrary to current common sense, scientific racism—associated with imperialism, the new evolutionary theories, and the very popular theories of social Darwinism promoted notably by Herbert Spencer—declared the priority of biology over culture. Even if scholars would occasionally take into account environmental or cultural factors, their more or less explicit acceptance of "scientific racism" imposed a vision of racial hierarchy (and white supremacy) as the primal explanation for otherness, and of biological and genetic characteristics as the reason for human diversity. Within that framework the senses, considered as "lower" level functions, were seen as an attribute of "lower" races or "primitive people", who purportedly outdid the white race in sensory acuity and the ability to imitate.[85] Cranial measures and the study of the brain provided the basis for the ranking of the senses, and served to justify racial axiologies and social stratification.[86]

On the other hand, in mid-19th century physics was regarded as the paradigm of successful science, and the physics laboratory was the exemplary site for research. Fieldwork, understood as the intensive study of a population in the field, which in the next century would come to be regarded as the most acceptable model for anthropological research, "was seen—in Simon Schaffer's words—"as an imperfect form of life which aspired to the status of physics".[87] Indeed, some of the names of the day in ethnology, like the English William Halse Rivers Rivers or the German-American Franz Boas, "were initially trained in a highly specific form of laboratory

[84] Anthony Synnott, *The Body Social. Symbolism, Self and Society*, London-New York, Routledge, 1993, pp. 241–244.

[85] See for instance Herbert Spencer's essay "The Comparative Psychology of Man", *Man*, vol. 1, no. 1, January 1876, pp. 7–20; see also Richards, *'Race', Racism and Psychology*, pp. 20–22.

[86] With reference to the French context, see Dias, *La Mesure des sens.*

[87] Simon Schaffer, *From Physics to Anthropology and Back Again*, Cambridge, Prickly Pear Press, 1994, p. 10.

science".[88] The relationship between laboratory life and experimentation in the field was much more fluid and ambiguous than it is conceived today: early practitioners of fieldwork "were themselves involved in making the conventions of laboratory science at least as actively as they were helping develop the practices of field work".[89] Actually, as Schaffer has maintained, the systematic ethnographic surveys that were devised by 19th-century ethnographers as a new procedure to gather data about "primitive" populations, and which are commonly considered the first stage in the development of fieldwork methods,[90] originated from the need to transfer the discipline of laboratory practices—and the mistrust of the researcher's senses that had developed in that context— to the field. These surveys—for instance, the *Notes and Queries on Anthropology*, whose first edition was published in 1870 by the British Association for the Advancement of Science, or the *Questionnaire de sociologie et ethnographie*, created in 1883 by some members of the Société d'anthropologie de Paris—were a guarantee that researchers, who had been trained in the rules of the laboratory, followed those rules also in the field—what in many cases was proven to be impossible.[91]

Two ethnographical enterprises conducted at the end of the century are exemplary of the complex relationship between laboratory and fieldwork, of the passage from the paradigm of physical anthropology and "scientific racism" to cultural anthropology, and of the way in which the study of the senses was involved in those: the Cambridge Torres Straits Expedition (1889), led by British anthropologist and ethnologist Alfred C. Haddon, in which a small team of researchers under the direction of W.H.R. Rivers studied the senses of some native populations of the Torres Strait

[88] Ibid., p. 7.

[89] Ibid., p. 18.

[90] On the difference between systematic ethnographic surveys and intensive studies, see the entry "Ethnography" in Robert H. Winthrop, *Dictionary of Concepts in Cultural Anthropology*, Westport, CT, Greenwood Press, 1991, pp. 98–101.

[91] Schaffer, *From Physics to Anthropology and Back Again*, pp. 18–33.

Islands archipelago, which today belongs to Australia;[92] and the 1904 Louisiana Purchase Exposition,[93] where psychologist Robert S. Woodworth, an assistant professor at Columbia University, installed a psychological laboratory to assess the capacities of different individuals of the "primitive" groups that were exhibited there. Both investigations included experiments in hearing.[94]

At the 1904 Louisiana Purchase Exhibition the hearing tests were conducted by Frank G. Bruner, who was a graduate student of Woodworth at the time and helped him collect different series of psychometric data. According to Bruner's doctoral dissertation, *The Hearing of Primitive Peoples*, published in New York in 1908,[95] hearing tests were administered to some white visitors and to a series of individuals of contrasting origins (North and South American Indians of various communities, Filipinos, Ainus and African Pigmies), all of which were "stationed" at the 1904 Louisiana Purchase Exposition and whom Bruner considered mere representatives of their attributed "families" or "races". The tests measured the upper limit of audibility and the auditory acuity of the subjects, and were conducted in a psychological laboratory that had been installed on the premises of the exhibition, and which was also

[92] On the Cambridge Torres Strait Expedition see Henrika Kuklick, *The Savage Within: The Social History of British Anthropology, 1885–1945*, Cambridge, Cambridge University Press, 1991, pp. 133–149; see also chapter 3 of Richards, *'Race', Racism and Psychology*, pp. 41–64; and also his short article "Loss of Innocence in the Torres Straits", *The Psychologist*, vol. 23, part 12, December 2010, pp. 982–983, accessible online: http://www.thepsychologist.org.uk/archive/archive_home.cfm/volumeID_23-editionID_195-ArticleID_1764 [last access: May 2013]

[93] On this historical event see Nancy J. Parezo and Don D. Fowler, *Anthropology Goes to the Fair. The 1904 Louisiana Purchase Exposition*, Lincoln and London, University of Nebraska Press, 2007.

[94] Though I have chosen to illustrate this point with British and North American examples, I would like to underline that the influence of scientific racism on Spanish psychology and anthropology has been strong, lasting practically until the 1960s. For instance, Javier Bandrés and Rafael Llavona have studied how psychometrics was applied during the Civil War to Republican prisoners in search for a psychophysical explanation for their "marxist degeneration", and how this set of techniques was later employed to "prove" the intellectual inferiority of Equatorian Guinean black populations; see Javier Bandrés and Rafael Llavona, "La Psicología en los Campos de Concentración de Franco", *Psicothema*, vol. 8, no. 1, 1996, pp. 1–11; "Psicología y Colonialismo en España (I): la Inteligencia del Negro Guineano", *Psychologia Latina*, vol. 1, no. 2, 2010, pp. 144–153; and "Psicología y Colonialismo en España (II): en busca del Cociente Intelectual del Negro", *Psychologia Latina*, vol. 1, no. 2, 2010, pp. 154–162.

[95] Frank G. Bruner, *The Hearing of Primitive Peoples. An Experimental Study of the Auditory Acuity and the Upper Limit of Hearing of Whites, Indians, Filipinos, Ainu and African Pigmies*, New York, The Science Press, 1908 (reprinted for the series "Reprints from the collections of the University of Michigan Library").

accessible to general visitors. As Bruner explained, these experiments aimed at discovering "constitutional differences rather than anything that may be directly influenced by a social veneer", a fundamental assumption of the project being that the culture to which these individuals belonged "would affect their sensory reactions only very remotely".[96]

In order to organize the collection of psychometric data in the Lousiana Exhibition, Robert S. Woodworth seems to have consulted W.H.R. Rivers, who had headed the 1889 Cambridge Torres Straits Expedition.[97] In spite of many technical problems, the researchers of the Cambridge Torres Straits Expedition had managed to install a psychological laboratory on the field. Their laboratory was also equipped with psychoacoustic instruments, which British psychologist Charles S. Myers employed to test the hearing of the inhabitants of Murray Island—the results and conclusions of the tests are collected in the second volume of the *Reports of the Cambridge Anthropological Expedition to Torres Straits*, published in 1901 under the direction of Haddon.[98] Myers conducted typical aptitude tests,[99] testing upper-tone limits, auditory acuity and differences in tone. However, he showed more than a scant understanding of the influence of environmental and cultural factors on hearing skills. Thus, he observed that in principle the "pursuits and habits of the people [of the Murray Island] were not such as would be expected to develop any of those [hearing] faculties in high degree".[100] He also made interesting observations on the relationship between hearing

[96] Bruner, *The Hearing of Primitive Peoples*, p. 5.

[97] See Parezo and Fowler, *Anthropology Goes to the Fair*, pp. 311–315.

[98] Charles S. Myers, "Hearing", in *Reports of the Cambridge Anthropological Expedition to Torres Straits*, *vol. II: Physiology and Psychology*, edited by Alfred C. Haddon, Cambridge, Cambridge University Press, 1901, pp. 141–168.

[99] Kuklick, *The Savage Within: The Social History of British Anthropology, 1885–1945*, pp. 142–143.

[100] Myers, "Hearing", p. 141.

loss and the natives' common practice of diving for pearl-shell,[101] and on the trickiness of testing differences in tone pitch on individuals that had not received any musical training.[102]

British historian of psychology, Graham Richards, has observed that most of the investigations conducted by the members of the Cambridge Torres Straits Expedition, including those by Myers, were neither guided nor inspired by the theories of "scientific racism", but generally gave that conceptual framework for granted.[103] Also, David Howes has remarked that the expedition was well equipped to measure the senses of native populations, but virtually ignored their social and symbolic meaning.[104] On a less dismissive note, historian of anthropology Henrika Kuklick has understood the Cambridge Torres Straits Expedition as paradigmatic of a time in which psychological laboratory tests, far from being considered incompatible with fieldwork, were valued as an important aspect to it.[105] Kuklick has also claimed that the Torres Straits psychological experiments "demonstrated the unreliability of laboratory research conducted in ignorance of subjects' social situations", since the researchers had the opportunity to compare the tests' results with observations of behaviour in the field, and so came to understand the difference between natural capacities and the development of sensory skills.[106] Taking into consideration the criticism of the expedition's results made some years later by one of the pioneers of experimental psychology in the United

[101] Ibid., p. 152.

[102] Ibid., p. 155.

[103] See chapter 3 of Richards, *'Race', Racism and Psychology*, and his "Loss of Innocence in the Torres Straits".

[104] Howes, *Sensual Relations*, pp. 4–6. However, as Howes mentions later on p. 10, Alfred C. Haddon was not a strong advocate of racial differences, and he occasionally stressed the influence of the environment on the development of the senses.

[105] See Haddon's position on this, as referred in Kuklick, *The Savage Within*, pp. 137–139.

[106] Ibid., pp. 142–149.

States, English Edward B. Titchener,[107] Simon Schaffer has argued that the episode reveals "[t]he puzzle of turning from lab to lab, and between lab and field"[108]—a process in which new elements like the interest, attention, capacity for understanding, and vocabulary of the (non-trained) subjects had to be taken into account.

Franz Boas was also among the scholars consulted by Woodworth about the psychonometric tests that he and Bruner conducted at the 1904 Louisiana Exposition.[109] During the 1893 Chicago World's Columbian Exposition Boas, who was assistant to the lead curator and head of the anthropology department, Frederic W. Putman, administered mental tests to the visitors using the tools (chronographs, kymographs, etc.) that were current in laboratories at the time. Yet, a few years before—the same year in which the Cambridge Torres Strait Expedition took place, 1889—Boas had published an essay, "On Alternating Sounds", where he reflected on his field experiences among the Haida, Tinglit and Kwakiutl (Northwest Coast Indians that he had just visited in 1888, during his second field trip) and among the Eskimo of British Columbia (whom he had studied during his first field trip, in 1883).[110] He investigated some cases of "soundblidness" and "mishearing" of different phonemes that had been described both among locals and linguists, and concluded that they could be considered neither a result of perceptual limitations, nor a proof of some kind of linguistic inferiority—instead, they were a bias (in Boas' words, "a wrong apperception")

[107] Edward B. Titchener, "On Ethnological Tests of Sensation and Perception with Special Reference to Tests of Color Vision and Tactile Discrimination Described in the Reports of the Cambridge Anthropological Expedition to Torres Straits", *Proceedings of the American Philosophical Society*, vol. 55, no. 3, 1916, pp. 204–236.

[108] Schaffer, *From Physics to Anthropology and Back Again*, p. 38.

[109] See Parezo and Fowler, *Anthropology Goes to the Fair*, p. 311.

[110] On the importance of this essay, see chapter 7 ("From Physics to Ethnology") of George W. Stocking Jr., *Race, Culture, and Evolution: Essays in the History of Anthropology*, New York-London, The Free Press-Collier-Macmillan, 1968, pp. Boas' fieldnotes of his research amont the Kwakiutl were edited by Helen Codere some years later and published under the title of *Kwakiutl Ethnography*, Chicago, Chicago University Press, 1966.

originated in the phonemic system of their native languages.[111] This realization would eventually lead to the formulation of the so-called "Sapir-Whorf hypothesis", which basically states that the way in which a language structures the world affects the way in which its speakers conceptualize it.

Boas's investigation represented a serious step towards the comprehension of the senses in relationship not only to physiology and genetics, but also to cultural practices, objects and contexts, as he inferred from it that "a new sensation is apperceived by means of similar sensations that form part of our knowledge".[112] Besides, Boas considered not only the linguistic "limitations" of the tested subjects, but also those of the researchers: therefore, as Schaffer has pointed out, he "shifted the evidential context of field transcriptions from the native subject to the *transcriber*".[113] In doing so, as George Stocking observed, he was also applying his experiences in physics and physiological laboratories,[114] where controlling and "calibrating" the accuracy of the trained researchers, who usually acted also as experimental subjects, was an essential part of test procedures.

The limitations of researchers that Boas' essay uncovers would provide a strong argument for the adoption of the phonograph, which was then still a novelty, by folklorists working in the field. Though the author did not mention the device in "On Alternating Sounds", it is known that he both used it and encouraged its use among his

[111] Franz Boas, "On Alternating Sounds", *The American Anthropologist*, vol. A2, no. 1, January 1889, pp. 47–54. Boas refers literally to the "phonetic" system (p. 52), as he was not aware of Saussure's distinction between "phonetic" and "phonemic", which the Swiss linguist introduced in his *Mémoire sur le système primitif des voyelles dans les langues indo-européennes* (Leipzig, Teubner, 1879), and he did not conceive that the sounds of a language could form a pattern or system; see B. Elan Dresher, "The Phoneme", in Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume and Keren Rice (eds), *The Blackwell Companion to Phonology, vol. 1*, Malden, MA and Oxford, Wiley-Blackwell, 2011, pp. 241–266, on p. 241, and also Regna Darnell, "Franz Boas", in Gunter Senft, Jan-Ola Östman, Jef Verschueren (eds), *Culture and Language Use*, Amsterdam, John Benjamins Publishing Co., 2009, pp. 41–49, on p. 47.

[112] Boas, "On Alternating Sounds", p. 50.

[113] Schaffer, *From Physics to Anthropology and Back Again*, p. 41.

[114] Stocking, *Race, Culture, and Evolution*, p. 159.

students, in spite of some theoretical reservations, and of the heaviness and complexity of the machine. Besides, as Erika Brady has pointed out, "[t]he use of the phonograph automatically framed information as a presentation or performance", and so it seemed best suited to record materials that were performances or expressive forms, which, on the other hand, were precisely the materials that Boasian collectors were looking after.[115] (As I will discuss below, some decades later the introduction of new recording technologies into the field will contribute instead to the appreciation of both environmental and performative sounds, opening thus new paths for the understanding of the perceptive abilities and aesthetic values of native communities.)

In sum, the conclusions reached by the various ethnographic surveys conducted towards the end of the 19th century, and particularly by the Cambridge Torres Strait Expedition, seemed to exclude the evolutionary hypothesis that "primitive" races had better sensory abilities, pointing instead to environmental and cultural factors. However, the question of how these factors should be investigated remained open, especially considering the many difficulties encountered in transferring the controlled environment of the psychological laboratory to the field, where subjects were untrained, sometimes even uninterested, and did not always understand the mechanics and vocabulary of psychological experiments. The debate about racial differences in sensory acuity and about the psychological measurement of the senses continued for a while mainly among psychologists. It even resurfaced on both sides of the Atlantic in the 1920s and 1930s,[116] thanks to the craze of psychological testing that had started during World War I—a

[115] Erika Brady, *A Spiral Way: How the Phonograph Changed Ethnography*, Jackson, University Press of Mississippi, 1991, p. 70, and see all chapter 3 ("Collectors and the Phonograph: 'Save, Save the Lore!'"), pp. 52–88.

[116] See for instance Florence Goodenough, "The Measurement of Mental Functions in Primitive Groups", *American Anthropologist*, vol. 38, no. 1, January-March 1936, pp. 1–11, and Frederick C. Bartlett, "Psychological Methods and Anthropological Problems", *Africa*, vol. 10, 1937, pp. 401–420, available online at the Frederick Bartlett Archive: http://www.bartlett.psychol.cam.ac.uk/PsychologicalMethodsAnthro.htm [last access: September 2014]. See also the introductory chapter of Carmen Viqueira, *Percepción y cultura: un enfoque ecológico*, México DF, Centro de Investigaciones y Estudios Superiores en Antropología Social, 2008, pp. 27–38, esp. pp. 30–36 (Viqueira's study had originally been published in 1977).

difficult moment in which cultural anthropology, and particularly Boas' work, were seriously questioned.[117] Nevertheless, the "cultural approach" to anthropology developed steadily during the first decades of the 20th century, eventually gaining a hegemonic institutional position and excluding "scientific racism"—a process that Stocking has described as a true change of paradigm in the Kuhnian sense.[118]

Within the new framework, the senses were increasingly regarded as entryways to "other" conceptions of the world—conceptions that cultural anthropologists tried to describe as relatively stable and logical arrangements of traits, i.e. "patterns", in the anthropological vocabulary that was in vogue at the time.[119] Thus, North American anthropologist Ruth Benedict, who had studied with Boas, published in 1935 *Patterns of Culture* (1935), where she explored three foreign cultures (the Zuni, the Dobu, and the Kwakiutl) through the emotions and ideas that tied them together, and which was key to the popularization of the anthropological concept of culture.[120] During World War II Benedict formed together with student and friend Margaret Mead and a number of colleagues the Columbia University Research in Contemporary Cultures, which conducted under the auspices of the U.S. Office of Naval Research a survey about the cultural patterns of foreign cultures, particularly enemy countries—an effort that continued after the war in a series of projects developed between 1947 and 1953. Mead and Rhoda Métraux edited part of the materials and observations gathered in the course of research, which were published in 1953 under the title *The Study of Culture at a Distance*. The survey focused on a series of European and Asian Societies that were

[117] See chapter 11 ("The Scientific Reaction Against Cultural Anthropology, 1917–1920") in Stocking, *Race, Culture, and Evolution*, pp. 270–307.

[118] Stocking, *Race, Culture, and Evolution*, pp. 302–303.

[119] See the entry "Pattern" in Winthrop, *Dictionary of Concepts in Cultural Anthropology*, pp. 207–210.

[120] Ruth Benedict, *Patterns of Culture*, with a new foreword by Mary Catherine Bateson and a preface by Margaret Mead, Boston, Houghton Mifflin, 1989; see Stocking, *Race, Culture, and Evolution*, pp. 306–307, and also Synnott, *The Body Social*, pp. 145–147.

inaccessible to direct observation during or after the war, as a consequence of post-war geopolitical tensions—it included, for instance, a chapter on "Russian sensory images". Not only the focus, but also the methodology was a novelty at the time: among the materials collected there was public imagery, films and popular culture (games, slang, etc.), as well as interviews and tests of immigrant populations living in the United States.[121] However, as Mead explained in the first part of the book, the participant researchers were required to go beyond that source material: they should use their imagination to delineate a certain culture, reconstructing thus the immediate sensory participation that is characteristic of fieldwork.[122]

After the war "scientific racism" was completely discredited[123] and fieldwork was recognized as a staple of anthropological research. Many anthropologists became fully aware of the value of their perceptive capacities in the field, where—as David Howes has put it—they "had their senses awakened by the new sounds, smells, and savors of the non-Western societies in which they usually undertook their fieldwork".[124] More importantly, soon the field was going to become a recording set for various electronic devices (tape audio recorders, camcorders), which in separating images and sounds from their context probably reinforced the notion that anthropological work was fundamentally an exercise of the (technologically mediated) senses. According to Howes: "It had to be acknowledged that we make sense of the world not just through language, not just by talking about it, but through all our senses, and their extensions in

[121] See William O. Beeman, "Introduction: Margaret Mead, Cultural Studies" to Margaret Mead and Rhoda Métraux (eds), *The Study of Culture at a Distance*, edited by William O. Beeman, New York-London, Berghahn Books, 2000, pp. xi–xxx.

[122] Margaret Mead, "The Study of Culture at a Distance", in Mead and Métraux (eds), *The Study of Culture at a Distance*, pp. 3–58, on pp. 11–13. On Mean and Métraux's role as precursors of the anthropology of the senses see Howes, *Sensual Relations*, pp. 10–14.

[123] As George Stocking has pointed out, some historical events should also be counted among the causes of its discredit, e.g. in the United States, the fight with the Nazis or the struggle of the Civil Rights Movement; see Stocking, *Race, Culture, and Evolution*, p. 307.

[124] David Howes, "Can These Dry Bones Live? An Anthropological Approach to the History of the Senses", *The Journal of American History*, vol. 95, no. 2, 2008, pp. 442–451, on p. 443.

the form of diverse media".[125] Indeed, the presence of new media in the field would lead to the creation of the first university programmes on visual anthropology and visual communication at the end of the 1950s. However, in the following decades not only anthropologists, but also scholars of other disciplines would turn their attention towards new and older technologies (like writing and the printing press), trying to figure out how the senses had and were going to be reconfigured by them.

1.2.2 Canadian lessons I: sense ratios and communication technologies

A decisive impulse to the development of sensory studies came from two North American literary scholars and media theorists: Canadian Marshall McLuhan, and his student Walter J. Ong, a US Jesuit priest. Although neither of the two defined it clearly, McLuhan and Ong employed the expression "sense ratios", which tried to capture cross-cultural and historical differences on the value and meaning of the senses.[126] "Sense ratios" was in fact akin to other terms proposed around the same years, like "sensory profiles", coined by US anthropologist Edmund Carpenter, McLuhan's lifetime friend and collaborator, to refer to the ways in which different peoples cultivate sensorial skills and to the fact that relationships among the senses may vary in different cultures,[127] and "sensotype", that is "the pattern of relative importance of the different senses, by which

[125] Howes, "The Expanding Field of Sensory Studies".

[126] On *sense ratios* see by Marshall McLuhan, *The Gutenberg Galaxy: The Making of Typographic Man*, Toronto, University of Toronto Press, 1962 and *Understanding Media: The Extensions of Man*, introduction by Lewis H. Lapham, Cambridge, MA, MIT Press, 1994 (originally published in London by Routledge and Kegan Paul, 1964); by Walter J. Ong, see *The Presence of the Word: Some Prolegomena for Cultural and Religious History*, New Haven, CT, Yale University Press, 1967; "World as View and World as Event", *American Anthropologist*, New Series, vol. 71, n. 4, 1969, pp. 634–647, and *Orality and Literacy: The Technologizing of the Word*, London and New York, Methuen, 1982. Among more recent contributions about *sense* ratios, see David Howes, "Sensorial Anthropology", in Howes (ed.), *The Varieties of Sensory Experience*, pp. 167–191 (esp. pp. 168–169), as well as John Leavitt and Lynn M. Hart's critical essay, "Critique de la 'raison' sensorielle. L'élaboration esthétique des sens dans une société himalayenne", *Anthropologie et Sociétés*, vol. 14, no. 2, 1990, pp. 77–98.

[127] Edmund Carpenter, *Oh, What a Blow That Phantom Gave Me!*, New York-Chicago-San Francisco, Holt, Rinehart and Winston, 1972, pp. 20–23; on Carpenter's life and achievements see Harald E.L. Prins and John Bishop, "Edmund Carpenter: Explorations in Media & Anthropology", *Visual Anthropology Review*, vol. 17, no. 2, 2001–2002, pp. 110–140. (Both *sense ratios* and *sensory profiles* are mentioned in Howes, "Sensorial Anthropology", which offers a good introduction to this issue.)

a children learns to perceive the world and in which pattern he develops his abilities", suggested by US psychologist Mallory Wober, who was in fact aware of McLuhan's "sense ratios".[128]

"Sense ratios" involve at least two different, albeit closely related aspects: firstly, the relationships between and the hierarchies of the senses recognized by a certain human group at a certain moment in time, their axiology, and how they compare to the hierarchies of the senses in other human groups; secondly, a theory of the reconfigurations of those relationships through time, mainly under the influence of different media, which both McLuhan and Ong conceived as extensions of the senses—[129] in other words, a theory of cultural change. Regarding the first aspect of sense ratios, Ong remarked that "cultures vary greatly in their exploitation of the various senses and in the way in which they relate their conceptual apparatus to the various senses". Thus, for him sense ratios are implied in the organization of the "sensorium", which he described as "the entire sensory apparatus as an operational complex".[130] According to McLuhan, "sensorium" derives from the Aristotelian notion of "common sense", which he understood as "the peculiar human power of translating one kind of experience of one sense into all the senses", and "the image of a unified ratio among the senses".[131] Both Ong and McLuhan traced a sharp divide between oral and literate cultures, that is

[128] Mallory Wober, "Sensotypes", *The Journal of Social Psychology*, no. 70, 1966, pp. 181–189, included as "The Sensotype Hypothesis" in Howes (ed.), *The Varieties of Sensory Experience*, pp. 31–42, on p. 33. Wober seems to have coined the term in the 1960s.

[129] See McLuhan, *The Gutenberg Galaxy*; *Understanding Media*; Marshall McLuhan and Quentin Fiore, *The Medium is the Massage: An Inventory of Effects*, New York, Bantam Books, 1967; and Ong, *The Presence of the Word*. Incidentally, one of the books on which McLuhan drew for writing *The Gutenberg Galaxy* was *L'Apparition du livre* by Lucien Febvre and Henri-Jean Martin (with the collaboration of Anne Basanoff and others, Paris, Albin Michel, 1958), translated as *The Coming of the Book: The Impact of Printing, 1450–1800* (trans. David Gerard, ed. Geoffrey Nowell-Smith and David Wootton, London, New Left Books, 1976). Febvre's pioneering role in the emergence of a history of the senses in Europe will be discussed in chapter 3.

[130] Ong, *The Presence of the Word*, pp. 3 and 6.

[131] McLuhan, *Understanding Media*, p. 60; on McLuhan's views of the sensorium see also his "Inside the Five Sense Sensorium", in Howes (ed.), *Empire of the Senses*, pp. 43–52. As a philosophical term, "sensorium" was also used by Newton and Leibniz, among others.

between cultures structured by the ear and cultures structured by vision and writing[132]—a divide that ultimately depended on another distinction traced by McLuhan; that between "visual space" and "acoustic or auditory space".

During the 1950s McLuhan befriended and was influenced by Carpenter, who had done fieldwork among the Eskimo and was interested in exploring the impact of new media, which he considered as new environments, on ethnographic practice and native cultures. Between 1953 and 1959 they published together a pioneering media research journal, *Explorations: Studies in Culture and Communication*, where their essay on the notion of acoustic space appeared in 1955. McLuhan and Carpenter employed the term "acoustic space" to refer to the predominantly oral world in which the Eskimo and other cultures lived.[133] In those cultures, they asserted, "the eye is subservient to the ear". In contrast with the three-dimensional world of vision, which every European and North American child learns to see through the practice of binocular fusion, and where each object has a specific location, acoustic or auditory space, as defined by Carpenter and McLuhan, "has no point of favored focus. It's a sphere without fixed boundaries, space made by the thing itself, not space containing the thing", since the ear can ideally pick up sounds coming from any direction. [134]

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[132] See Ong, "World as View and World as Event"; see also McLuhan, *The Gutenberg Galaxy*; McLuhan and Fiore, *The Medium is the Massage*, pp. 48 and 111.

[133] However, "acoustic space" or "auditory space" was a notion that McLuhan (and Carpenter) borrowed from another member of the Toronto communications seminar who was also invoved in *Explorations*: his close friend, psychologist Carl (Carleton) Williams, who apparently used it to describe an experiment by psychologist E.A. Bott; see Edmund Carpenter, "That Not-So-Silent Sea", included in appendix in Theall, *The Virtual Marshall McLuhan*, pp. 236–261 on p. 241; on the sources of acoustic space see also Richard Cavell, *McLuhan in Space: A Cultural Geography*, Toronto, University of Toronto Press, 2002, pp. 20–23.

[134] "Acoustic Space" by Edmund Carpenter and Marshall McLuhan was later included in the anthology *Explorations in Communication*, edited by Edmund Carpenter and Marshall McLuhan, Boston, Beacon Press, 1960, pp. 65–70, and is now part of the edited collection by Marshall McLuhan, *Media Research: Technology, Art, Communication*, edited with commentary by Michel A. Moos, Amsterdam, G+B Arts International, 1997, pp. 39–44 (quotes are on pp. 39 and 41). Edmund Carpenter defined auditory space in similar terms in *Eskimo Realities*, New York, Holt, Rinehart and Winston, 1973, pp. 35–37. For a later elaboration of acoustic space, see chapter 3 ("Visual and Acoustic Space") of Marshall McLuhan and Bruce R. Powers, *The Global Village: Transformations in World Life and Media in the 21st Century*, New York-Oxford, Oxford University Press, 1989, pp. 35–47.

As for the second aspect of sense ratios, McLuhan and Ong are credited with bringing to the spotlight the relationship between the senses and the various forms of cultural transmission. Indeed, information and communication technologies and the psychological transformations brought about by them were at the core of intellectual and public debates at the time, as attested for instance by the popularity of cybernetics.[135] However, for developing his thoughts on the matter McLuhan also drew on the work of two colleagues at the University of Toronto: British classicist Eric A. Havelock and Canadian economist Harold Innis.[136] Building on pioneering work by Milman Parry and his student Albert Lord on the composition of Homeric verse and Serbian epic poetry, which provided the basis for the formulation of the "Parry-Lord thesis",[137]Havelock focused on the passage from orality to writing in ancient Greek literature.[138] Innis' reflections on the (temporal or spatial) "biases" of different communication systems, and on their role in the constitution of large-scale political organizations also became a huge inspiration to the younger McLuhan, particularly to his major work, *The Gutenberg Galaxy* (1962).[139]

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[135] Donald Theall, who was McLuhan's first Ph.D. student, has underlined his positive reaction to Norbert Wiener's cybernetics, which would have been an influence on his treatment of communication, his view of the senses in relationship to media, and even the futuristic tone that predominates in his writings; see Donald F. Theall, *The Virtual Marshall McLuhan*, Montreal, McGill-Queen's University, 2001, p. 30.

[136] Havelock and Innis, together with Carpenter and McLuhan (some times also with literary critic Northrop Frye) are often grouped under the name "Toronto School of Communication", since they all taught at the University of Toronto. On the contemporary relevance of this school see Derrick de Kerckhove, "McLuhan and the 'Toronto School of Communication'", *Canadian Journal of Communication*, special issue, 1989, pp. 73–79, though the author does not include Edmund Carpenter among its members.

[137] See Milman Parry, *The Making of Homeric Verse: The Collected Papers of Milman Parry*, edited by Adam Parry, Oxford, Clarendon Press, 1971, and Albert B. Lord, *The Singer of Tales,* Cambridge, MA, Harvard University Press, 1960; see also Ong, *Orality and Literacy*, pp. 5–30.

[138] See Eric A. Havelock, *The Muse Learns to Write: Reflections on Orality and Literacy from Antiquity to the Present*, New Haven, CT-London, Yale University Press, 1986, esp. chapter 3, where the author marks 1963 as the year in which several works on the "orality problem" were published and the subject cristalyzed. Besides McLuhan's *The Gutenberg Galaxy* and Havelock's own *Preface to Plato* (Cambridge, MA, Harvard University Press, 1963), those works were Claude Lévi-Strauss's *La Pensée sauvage* (published in 1962, actually), the article "The Consequences of Literacy" by Jack Goody and Ian Watt (originally published in *Comparative Studies in Society and History*, vol. 5, no. 3, April 1963, pp. 304–345), and biologist Ernst Mayr's *Animal Species and Evolution* (Cambridge, MA, Harvard University Press, 1963).

[139] See his foreword to Harold Innis, *Empire and Communication*, revised by Mary Q. Innis, foreword by Marshall McLuhan, Toronto, University of Toronto Press, 1972, p. ix. (*Empire and Communication* was originally published in

In *The Gutenberg Galaxy* McLuhan distinguished basically three historical periods: orality, the typographic and mechanical era, and the electronic age. McLuhan's theories on orality can be traced back to the theories of Parry and Lord,[140] but also to the investigations that ethnopsychiatrist J.C. Carothers conducted in Africa on the importance of literacy and visuality, as opposed to the orality that predominated among non-literate people.[141] In contrast to Innis, who considered orality mainly in relationship to time, the notion of acoustic space allowed McLuhan to think about it in spatial terms, and—as I have discussed above—to underline its connection to the ear.[142] Instead, the typographic era, which was preceded by the invention of the alphabet and the culture of manuscripts, was associated with the invention and spread of the printing press—the first movable type printing press was invented by Johannes Gutenberg in Mainz, circa 1450—, the development of pictorial perspective, and the beginning of the so-called "Scientific Revolution". McLuhan underlined the link between the invention of the printing press and the purported hegemony of sight in modern Western culture, which apparently entailed the vanishing or obscuration of a pre-modern sensorial world where hearing and the other senses were more important. Besides, like Carpenter, McLuhan believed that the electronic age, associated with technologies like the telephone, the radio, the phonograph, or the television, was in many aspects akin to the experience of preliterate cultures, since "we encounter new shapes and structures of human

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1950 by Oxford University Press). Yet, both Edmund Carpenter and Richard Cavell have argued that McLuhan also distanced himself from Innis, in looking for different terms to address the questions that mattered to him; see Richard Cavell, *McLuhan in Space: A Cultural Geography*, Toronto, University of Toronto Press, 2002, p. 18, and also Carpenter, "That Not-So-Silent Sea".

[140] McLuhan, *The Gutenberg Galaxy*, pp. 1–4.

[141] J.C. Carothers, "Culture, Psychiatry, and the Written Word", *Psychiatry*, vol. 22, no. 4, November 1959, pp. 307–320, which is precisely the article mentioned by McLuhan in *The Gutenberg Galaxy*, pp. 18–23.

[142] On the centrality of space in McLuhan see Cavell, *McLuhan in Space*, esp. chapter 1 ("A Short History of Space"), pp. 3–30.

interdependence and of expression which are 'oral' in form even when the components of the situation may be non-verbal."[143]

Ong also stressed the opposition between auditory and visual experiences, which he associated with the passage from orality to literacy,[144] and in *Orality and Literacy* (1982) made an useful distinction between "primary orality" (in oral cultures), and "secondary orality", which can be found in literate cultures and depends on print for its functioning. [145] However, both McLuhan and Ong remained ambivalent on the relationship between orality and literacy, ear and eye, in the electronic age. Thus, in different contexts Ong pointed out that "electronic devices are not eliminating printed books but are actually producing more of them",[146] and that successive media "do not abolish one another but overline one another".[147] McLuhan also saw the emergence of new media as a process in which old media provided the content for new ones, and therefore they could be seen as complementary rather than opposite—in Gestalt terms, they functioned as figure and ground, or as environment and anti-environment.[148]Besides, in *Understanding Media* (1964) McLuhan complicated the matter by distinguishing between "hot" and "cold" media, where the first ones addressed one single sense, with high definition, and the second ones addressed various senses, though provided less information and required thus more participation from the audience.[149]

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[143] McLuhan, *The Gutenberg Galaxy*, p. 3; see also Carpenter, *Oh, What a Blow That Phantom Gave Me!*, p. 42, pp. 48–50, and passim.

[144] See especially Ong, "World as View and World as Event".

[145] See Ong, *Orality and Literacy*, pp. 10–11 and 132–135.

[146] Ibid., p. 133.

[147] Ong, *The Presence of the Word*, p. 9.

[148] See chapter 1 ("The Medium is the Message) of McLuhan, *Understanding Media*, pp. 7–21; and also McLuhan, "The Relation of Environment to Anti-Environment" (1966), in McLuhan, *Media Research: Technology, Art, Communication*, pp. 110–120.

[149] See chapter 2 ("Media Hot and Cold") of McLuhan, *Understanding Media*, pp. 22–32.

Unquestionably, McLuhan and Ong's reflections on the development of the sensorium have been productive for the development of the "sensory turn". As I will explain below, driven by the urgency to counterbalance the attention traditionally devoted by scholars to sight (or, sometimes, to sight and hearing), since the 1980s sensory anthropologists and historians have strived to "recover" the histories of "lesser senses" (smell, taste, touch), offering a more nuanced picture of the relationships among the senses. McLuhan and Ong's theories on the importance of writing—shared by their contemporaries Innis, Havelock and anthropologist Jack Goody, among others—[150] developed in the following decades to create new fields, like orality, or the anthropology and psychology of literacy. The critical discourse on the dominance of the visual also found a continuation in contemporary philosophy, notably in Martin Heidegger's reflections on the common origin of science and modernity in "Die Zeitalter des Weltbildes" (1938, in English as "The Age of the World Picture"),[151] and in Foucault's explanation of the disciplinary function of surveillance through the panopticon model in *Surveiller et punir* (1975, in English as *Discipline and Punish*).[152]

Nevertheless, McLuhan and Ong's generalizations about the contrast between ear and eye, and by implication, orality and literacy—in sum, what Jonathan Sterne has called an "audiovisual litany"—[153] have apparently shaped their reception, particularly

[150] In addition to the works cited in previous footnotes, it is worth mentioning Jack Goody's *The Domestication of the Savage Mind* (Cambridge, Cambridge University Press, 1977).

[151] See Martin Heidegger, "The Age of the World Picture", in *Off the Beaten Track*, edited and translated by Julian Young and Kenneth Haynes, Cambridge, Cambridge University Press, 2002, pp. 57–85; though the first English translation was the one by William Lovitt, in Martin Heidegger, *The Question Concerning Technology and Other Essays*, New York, Garland Publishing, 1977.

[152] See chapter on "Panopticism", in Michel Foucault, *Discipline and Punish: The Birth of the Prison*, translated by Alan Sheridan, New York, Vintage Books, 1995, pp. 195–228; though the first English edition of Alan Sheridan's translation was the one published in 1977 by Penguin, London, and the book had originally appeared in French as *Surveiller et punir*, Paris, Gallimard, 1975. On the criticism of the visual in contemporary philosophy see David Michael Levin (ed), *Modernity and the Hegemony of Vision*, Berkeley-Los Angeles-Oxford, University of California Press, 1993.

[153] See Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction*, Durham, Duke University Press, 2003, pp. 14–19.

among historians. Instead, neither the notion of a "hegemony of vision", nor the existence of an "orality/literacy divide" are currently considered a valid theoretical framework for establishing a periodization of the senses. As I will discuss in chapter 3, already at the end of the 1960s many historians in Europe and North America admitted that different cultures—typically, the culture of intellectual elites and popular classes—may coexist at a certain time, what indirectly questioned the possibility of declaring the hegemony of a specific sense or sense ratio during a certain period.[154] Also, as US historian Elizabeth Eisenstein pointed out in *The Printing Press as an Agent of Change* (1979), the passage to modernity and literacy, which has often been presented as a sudden shift, should be interpreted instead as a gradual transformation. She argued that the relationship between the printing press and pre-printing press orality, and also between the new technology and scribal culture, i.e. the culture of manuscripts, which were copied and transmitted by hand, was much more complex than Ong, in particular, had recognized.[155] In questioning the existence of clear-cut borders between orality and literacy, Eisenstein also threw doubt on the notion of a "triumph of sight" over the other senses.

On the other hand, regarding McLuhan's contribution to the history of the printing press in *The Gutenberg Galaxy*, Eisenstein pointed out that his "typographic man", "locked into a closed visual system", was just an abstract and stereotyped construction, "a print-and-paper creation", since one of the consequences of the spreading of books was precisely that "[t]he discrepancy between bookish theories about the behaviour of all bodies (…) and how things *do* behave in this world was

[154] The publication of the English translation of Mikhail Bakhtin, *Rabelais and His World* (translated by Hélène Iswolsky, Cambridge, MA, MIT Press, 1968) was an important piece of evidence for this position. The original Russian edition had been published in 1965, and a French translation (*L'oeuvre de François Rabelais et la culture populaire au Moyen Âge et sous la Renaissance*, translated by Andrée Robel, Paris, Gallimard) appeared in 1970 .

[155] See chapter 1 ("The Unacknowledged Revolution") of Elizabeth L. Eisenstein, *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe*, 2 vols, Cambridge, Cambridge University Press, 1979, pp. 3–42.

sharply perceived and forcefully articulated by so many early-modern authors that denunciation of book learning became itself a bookish cliché". Ultimately, she argued, books did not necessarily favour "learning by reading", but in many cases were instrumental in the reappreciation of "learning by doing"[156]—what would connect reading not only to sight, but also to the other senses. As anthropologists John Leavitt and Lynn Hart have observed, McLuhan and Ong tended to establish a univocal link between certain communication technologies and practices, and specific senses. In doing so, they not only reduced the multidimensionality of sensorial experiences to the five senses, but also incorrectly identified the complexity of semiotic systems with their primary mode of reception.[157]

More recently, Sterne has criticized the intellectual sources of Ong's conceptualization of the orality/literacy divide. As he has argued, Ong's arguments were based on the identification of oral consciousness with sonic consciousness, but they also depended on a theological debate that classed Hebrew culture as mainly oral, and Christian culture as predominantly visual. Thus, so Sterne contends, Ong was interested in elaborating a history of the senses in order to understand the human relationship to the divine from a Christian perspective. In fact, this is in accordance with the ethnocentric assumptions implied in the orality/literacy dyad, since it establishes a parallel between a certain understanding of our historical past and the present of other, non-Western cultures, which are portrayed as immature just because they do not write.[158] As Leigh Eric Schmidt has aptly summarized, the oral/visual divide resulting

[156] Eisenstein, *The Printing Press as an Agent of Change*, p. 151; other critical references to McLuhan can be found on pp. 16–17, 40–42, and 129.

[157] See Leavitt and Hart, "Critique de la 'raison' sensorielle", pp. 79–81.

[158] Jonathan Sterne, "The Theology of Orality", *Canadian Journal of Communication*, vol. 36, no. 2, 2012, pp. 207–225. On the paradoxes of time in anthropology, see Johannes Fabian, *Time and the Other: How Anthropology Makes its Object*, New York, Columbia University Press, 1983.

from the orality/literacy divide draws "on racialized constructions of Western rationality and ecstatic primitivism".[159]

Since the beginning of the 1980s scholars of different backgrounds have looked for new ways to understand the relationship between ear and eye, orality and literacy. Some psychologists have investigated into cultural processes that, like schooling, are often parallel to or associated with literacy, and have concluded that distinguishing the effects of schooling from those of literacy is often difficult.[160] As Jack Goody before her, orality scholar Ruth Finnegan has argued that "'orality and 'literacy' are not two separate and independent things; nor (…) are oral and written modes two mutually exclusive and opposed processes for representing and communicating information".[161] According to linguist William Foley, today literacy is increasingly portrayed among linguists and cognitive psychologists "as a set of distinct cultural practices, each requiring different cognitive skills as a result of its role in ongoing social interactions and institutionalized ways of engaging with the world".[162] In sum, the characteristics of orality and literacy, and the way in which the senses are implied in them, cannot be described in general terms, but should be studied in specific contexts.

[159] Leigh Eric Schmidt, *Hearing Things. Religion, Illusion, and the American Enlightenment*, Cambridge, Harvard University Press, 2000, pp. 21–22. The chapter including these pages, entitled "Hearing Loss", has been republished in Michael Bull and Les Back (eds.), *The Auditory Culture Reader*, Oxford-New York, Berg Publishers, pp. 41–59 (quotation is on p. 48).

[160] Sylvia Scribner and Michael Cole's *The Psychology of Literacy* (Cambridge, MA, Harvard University Press, 1981) is conventionally considered the most notable contribution to the investigation of the effects of literacy on a community (the Vai people of Western Liberia) who was schooled in a different language (English). See also chapter 2 ("Theories of Literacy and Mind from Lévy-Bruhl to Scribner and Cole") of David R. Olson, *The World on Paper: The Conceptual and Cognitive Implications of Writing and Reading*, Cambridge, Cambridge University Press, 1994, pp. 20–44.

[161] See Jack Goody, *The Interface Between the Written and the Oral*, Cambridge, Cambridge University Press, 1987; and Ruth Finnegan, *Literacy and Orality: Studies in the Technology of Communication*, Oxford-New York, Blackwell, 1988, p. 175.

[162] See chapter 21 ("Literacy") of Foley, *Anthropological Linguistics: An Introduction*, pp. 417–434, on p. 434.

1.2.3 Canadian lessons II: from "acoustic space" to "soundscape"

McLuhan's thesis that the electric age involved a return to some form of aurality provided a springboard for the reflections of a younger Canadian scholar and composer, R. Murray Schafer, who is recognized today as a pioneer of sound studies and deserves a section in this chapter as an advocate of the cultural approach to the sense of hearing. While Schafer has acknowledged the importance of McLuhan and Carpenter's notion of "acoustic space",[163] he is mostly known for the concept of "soundscape", which he introduced in the late 1960s, when he founded the World Soundscape Project at the Simon Fraser University, near Vancouver.[164] A highly successful term, "soundscape" has been and is still applied in many different contexts, both academic and artistic,[165] but Schafer was initially concerned with the way in which development was changing sonic environments in the Vancouver area and in many other places worldwide. In an effort to counter "noise pollution" —a term that, as Ari Kelman has pointed out, was part of the language of the environmental movement, which achieved momentum precisely in the 1960s and 1970s—[166] Schafer promoted an appreciation of those sounds that he considered more natural and worthy of attention.

Though Schafer had already mentioned the notion in previous publications,[167] in his classic 1977 book *The Tuning of the World* (republished later as *The Soundscape:*

[163] See his 1985 essay "Acoustic Space", in R. Murray Schafer, *Voices of Tyranny, Temples of Silence*, Indian River, ON, Arcana, 1993, pp. 29–44, which had appeared originally in David Seamon and Robert Mugerauer (eds), *Dwelling, Place and Environment: Toward a Phenomenology of Person and World*, Dordrecht, Martinus Nijhoff, 1985, pp. 87–98. However, in the essay Schafer criticized "acoustic space" for being "a transitional term, caught between two cultures" (p. 31).

[164] For more details on the establishment of the World Soundscape Project, see the Simon Fraser University website: http://www.sfu.ca/~truax/wsp.html [last access: July 2015].

[165] For a critical review of the the genealogy and reception of "soundscape" see Ari Y. Kelman, "Rethinking the Soundscape: A Critical Genealogy of a Key Term in Sound Studies", *Senses & Society*, vol. 5, no. 2, 2010, pp. 212–234.

[166] Kelman, "Rethinking the Soundscape", p. 216.

[167] According to Kelman, Schafer first defined soundscape in a pamphlet called "The New Soundscape: A Handbook for the Modern Music Teacher", published in 1969; see ibid., 215. However, Jonathan Sterne has found a previous reference, though it probably could not be considered a proper definition, in Schafer's book *Ear Cleaning*, published

Our Sonic Environment and the Tuning of the World) he defines soundscape as "any acoustic field of study. We may speak of a musical composition as a soundscape, or a radio program as a soundscape or an acoustic environment as a soundscape."[168] The term is clearly related to a visual notion, "landscape"—a relationship underlined by its translation in many European languages, e.g. Catalan *paisatge sonor*, Spanish *paisaje sonoro*, French, *paysage sonore,* Italian *paesaggio sonoro*, etc.—; according to the author "[w]e can isolate an acoustic environment as a field of study just as we can study the characteristics of a given landscape". Yet, as he readily admits, giving a convincing image of a soundscape "would involve extraordinary skill and patience: thousands of recordings would have to be made; tens of thousands of measurements would have to be taken; and a new means of description would have to be devised."[169]Therefore, as a field of study soundscapes seem to be both acoustic environments, that is real sound data perceived on site, and recordings of those sound data, organized by musicians or technicians as works that somewhat represent or refer to real data—a highly problematic duality, as Spanish sound artist José Iges has observed.[170]

British geographer Paul Rodaway has also remarked that Schafer's use of the term "soundscape" implies a tension: "On the one hand, and more often, he uses 'soundscape' to refer to a geographical space of particular sonic characteristics." Treating sonic environments as perceptual and aesthetic objects allows him to establish a narration of their successive transformations through history, beginning with the

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in 1967; see Jonathan Sterne, "The Stereophonic Spaces of Soundscape", in Paul Théberge, Kyle Devine and Tom Everrett (eds), *Living Stereo: Histories and Cultures of Multichannel Sound*, New York-London, Bloomsbury Academic, 2015, pp. 65–81, on p. 71.

[168] R. Murray Schafer**,** *The Soundscape: Our Sonic Environment and the Tuning of the World*, Rochester, Destiny Books, 1994 (2nd ed.), p. 7. The glossary included at the end of the book gives this definition of "soundscape" (pp. 274–275): "The sonic environment. Technically, any portion of the sonic environment regarded as a field for study. The term may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an environment."

[169] Ibid., pp. 7–8.

[170] José Iges, "Un approccio alla storia del paesaggio sonoro", *Musica/Realtà 65*, 2000, pp. 55–66, on p. 61.

"natural soundscape" and the sounds of living beings, and going through the "rural soundscape"—according to Schafer, a "hi-fi soundscape" where "discrete sounds can be heard clearly", since it possesses "a favorable signal-to-noise ratio"—, going through the "lo-fi" soundscapes of urbanization and the Industrial Revolution—an "overpopulation of sounds" where acoustic information cannot emerge clearly—, and ending in the Electric Revolution, where the invention of electroacoustical technologies for the reproduction and transmission of sound led to "schizophonia", that is to "the split between an original sound and its electroacoustical transmission or reproduction".[171] As I will explain in chapter 3, this narrative has inspired many subsequent attempts to discover and reconstruct the soundscapes of past times drawing on different types of data, even if—as Kelman has argued—they not always engage with Schafer's definition or intentions.[172]

On the other hand, soundscapes are also auditory experiences; in this sense, Rodaway argues, they are "less an object for contemplation and more a process of engagement with the environment".[173] As David Samuels, Louise Meintjes, Ana Maria Ochoa and Thomas Porcello have put it, "soundscape implicates listening as a cultural practice".[174] This second dimension is also dealt with by Schafer in *The Soundscape*, where he aims at determining "*in what significant ways individuals and societies of various historical eras listen differently*."[175] Thus, in discussing the possibility of applying visual concepts, like the Gestalt notions of figure and ground, to explain aural perception, he observes that whether a sound may be considered figure or ground does

[171] This narration covers the first two parts of Schafer, *The Soundscape*, pp. 15–99; "schizophonia" is defined on p. 90; quotations are on pp. 43 and 71.

[172] See Kelman, "Rethinking the Soundscape".

[173] Rodaway, *Sensuous Geographies: Body, Sense and Place*, pp. 86–87.

[174] David W. Samuels, Luise Meintjes, Ana Maria Ochoa and Thomas Porcello, "Soundscapes: Toward a Sounded Anthropology", *Annual Review of Anthropology*, no. 39, 2010, pp. 329–345, on p. 330; see also Kelman, "Rethinking the Soundscape", pp. 217–220.

[175] Schafer, *The Soundscape*, p. 151 (emphasis in the original).

not depend on its physical characteristics, but "has partly to do with acculturation (trained habits), partly with the individual's state of mind (mood, interest) and partly with the individual's relation to the field (native, outsider)". As he immediately explains, even the loud sounds of Industrial Revolution passed almost unnoticed until their social relevance was understood.[176] While this may seem surprising considering the centrality of the notion of soundscape in Schafer's texts, it is perfectly in line with his ethical and aesthetic concerns, and with his advocacy of what he calls "clean hearing", "clairaudience" or "ear cleaning", that is "[a] systematic program for training the ears to listen more discriminatingly to sounds, particularly those of the environment".[177] The practice of "ear cleaning" is for Schafer a necessary condition for the development of a new interdiscipline, "acoustic design", which would "conceive of the soundscape as a huge musical composition, ceaseless evolving about us", and thus would decide which sounds should be eliminated, and which should be preserved or introduced.[178]

In spite of the ambiguities of his approach,[179] Schafer's contributions, in particular the concept of soundscape, have been key in the development of an awareness of the importance of the senses generally, and especially hearing, and have helped build a discourse about the cultural dimension of perception, which Schafer conceives in continuous dialogue with artistic practice. Schafer's texts and research projects have left a mark in many disciplinary fields, from geography and urban studies, to sensory

[176] Ibid., p. 152.

[177] Ibid., p. 272; "clean hearing" and "clairaudience" are mentioned on pp. 11 and 10.

[178] Ibid., p. 271.

[179] French composer and historian of sound Michel Chion has also criticized the notion in his article "Critique du naturalisme sonore", in Michel Chion, *Le promeneur écoutant: essais d'acoulogie*, 1st ed. Paris, Plume, 1993, 2nd ed. revised and updated by the author, 2009, available online: http://michelchion.com/books/42-le-promeneur-ecoutant [last access: August 2015], pp. 88–92.

anthropology and sound studies.[180] Besides, both his theories and his musical works have also been enormously influential on contemporary music and sound art, not only on the musicians affiliated with the World Soundscape Project, some of which—regardless of Schafer's condemnation of schizophonia—were pioneers of electroacoustic composition, but also on other artists, who have worked with the concept of soundscape in different ways.[181] Schafer's intuition that sound environments and musical works should be studied together, since they are reciprocally influential, may strike us still today as nothing short of visionary.[182]

However, as Samuels, Meintjes, Ochoa and Porcello have argued, his historical narration, with its movement from "hi-fi" to "lo-fi" "masks the way in which the concept of soundscape is itself anchored in a form of listening that became possible only through the development of technological forms of mediation and recording".[183] More recently, Jonathan Sterne has examined the concept as "part of an electroacoustic moment in sound history: has traced occurrences of the term, and of other related terms (like "hi-fi" and "lo-fi") in Schafer's publications and in contemporary literature on audio technologies, concluding that "soundscape is very much a creature of mid-century sound media culture, first radio, then hi-fi (a term Schafer directly borrows), then stereo".[184] Yet, at least another successful notion coined by Schafer in *The Soundscape*, "soundwalk",[185] which is "the exploration of the soundscape of a given area using a

[180] See Samuels, Meintjes, Ochoa and Porcello, "Soundscapes: Toward a Sounded Anthropology" for a thorough and updated review of the scholarly resonance of this notion.

[181] On this particular aspect on his legacy, see Iges, "Un approccio alla storia del paesaggio sonoro"; by Barry Truax, an electroacoustic composer and a member of the World Soundscape Project, see *"*Soundscape Composition as Global Music: Electroacoustic Music as Soundscape*", Organised Sound,* 13(2), pp. 103–109, 2008, available online: http://www.sfu.ca/~truax/OS7.html [last access July 2015].

[182] See his essay "Music and the Soundscape", in Schafer, *Voices of Tyranny, Temples of Silence*, pp. 115–130.

[183] Samuels, Meintjes, Ochoa and Porcello, "Soundscapes: Toward a Sounded Anthropology", p. 331.

[184] Sterne, "The Stereophonic Spaces of Soundscape", p. 67. On that page Sterne also credits US anthropologist Stefan Helmreich with suggestion

[185] Schafer, *The Soundscape*, p. 213.

score as a guide", seems to have followed a contrary path. While Schafer describes it as if it did not involve any technical equipment, in later years it has become identified with successive portable recording technologies, from portable tape recorders to digital recorders.

1.2.4 Canadian lessons III: sensory models and models of the self

Maybe because of McLuhan's controversial public image as intellectual oracle and media star, his observations about the changing sensorium went relatively unnoticed by contemporary anthropologists, though the question of the senses itself was not abandoned. However, the contributions of two notable representatives of the discipline: French Claude Lévi-Strauss, and North-American Clifford Geertz, whom many regard as the most influential anthropologists of the 1960s and 1970s, have not received the attention they deserve.

In the 1960s and early 1970s Lévi-Strauss studied the relationship between sensorial experiences and thought categories of native populations, or rather the processes through which the perception of similarities and differences in sensation originated analogies, oppositions and other cognitive schemas. Thus, against the abstract taxonomies that are typical of Western science in *La Pensée sauvage* (1962, in English as *The Savage Mind*, 1966) he advocated a "science of the concrete",[186] and raised attention to the relationship between the senses and cultural symbols and representations, particularly in mythical thought. While texts like his famous "Fugue des cinq sens" ('Fugue of the Five Senses'), included in the first volume of *Mythologiques* (1964), may offer the image of a scholar treating the senses as basically

[186] See chapter 1 of Claude Lévi-Strauss, *La Pensée sauvage* (Paris, Plon, 1962), translated into English as *The Savage Mind* (London, Weidenfeld and Nicolson, 1966).

an analytical category[187]—"an intellectualist among the sensualists", according to the epithet devised by sensory scholar David Howes—,[188] the role of sensation and aesthetics in Lévi-Strauss' work is lately being reconsidered. Boris Wiseman has advocated a reappraisal of structuralist anthropology as a discipline built on "a theory of the imbrication of the sensuous-imaginative and the abstract conceptual"[189]—an imbrication that, on the other hand, does not include affect.[190] This intellectual project would go beyond Lévi-Strauss' aesthetic taste in art and music, which was considerably conservative, and also beyond his adoption of particular aesthetic forms as conceptual models—for instance, the appropriation of musical structures in his four-volume work, *Mythologiques* (1964-1971, published in English with the same general title, 1969-1981)—, pointing at what Wiseman has called an "ethno-aesthetics", that is "a decentred aesthetics informed by anthropology".[191]

In his key work *The Interpretation of Cultures* (1973) Geertz studied the Javanese notion of *rasa*, translatable as 'feeling' or 'meaning', and analysed how *wajang*, the Javanese puppet theatre, both dramatized emotional subjective experience and expressed a mythical worldview.[192] Besides, Geertz's discussion, in "From the Native's Point of View" (1974), of the "Western conception of the person", which he compared with ideas of selfhood in Java, Bali and Morocco, could arguably be

[187] See Claude Lévi-Strauss, *Le cru et le cuit: Mythologiques, t. I*, Paris, Plon, 1964, pp. 155–171 (in English: *The Raw and the Cooked: Mythologiques, vol. 1*, translated by John and Doreen Weightman, Chicago, University of Chicago Press, 1969, pp. 147–163), where the senses are, however, treated as an abstract analytical category.

[188] Howes, *Sensual Relations*, pp. 16.

[189] Boris Wiseman, "Structure and Sensation", in Boris Wiseman (ed.), *The Cambridge Companion to Lévi-Strauss* , Cambridge, Cambridge University Press, 2009, pp. 246–314, on p. 304.

[190] This point is argued by Wiseman through a comparison between Lévi-Strauss' theory of sensation and Jean-Jacques Rousseau's insights on the subject, to which the anthropologist often referred, and which underlined the connection between sensations and feelings; ibid., pp. 300–305.

[191] See the introduction to Boris Wiseman, *Lévi-Strauss, Anthropology and Aesthetics*, Cambridge, Cambridge University Press, 2007, pp. 1–32 (quoted definition is on p. 11).

[192] Clifford Geertz, *The Interpretation of Cultures: Selected Essays by Clifford Geertz*, New York, Basic Books, 1973, chapter 5 ("Ethos, World View, and the Analysis of Sacred Symbols", pp. 126–141, esp. 134–140.

considered a theoretical prerequisite for the development of an anthropology of the senses.[193] However, while his contribution to the anthropology of the emotions has been recognized,[194] Geertz is not usually counted among the inspirers of the "sensory turn"; on the contrary, he is more often labelled as a representative of the intellectual tradition against which the anthropology of the senses emerged. Thus, Howes has accused Geertz of introducing "textualism" by suggesting in his well known essay on Balinese cockfight (1972) that culture may be examined as "an assemblage of texts", and that the concept of a text could be extended "beyond written material, and even beyond verbal". [195] While condemning Geertz's interpretive anthropology, Howes has advocated, paradoxically, the reappreciation of the cultural anthropology of the 1950s and 1960s, specifically the "predominantly sensual" investigations of Margaret Mead and Rhoda Métraux—even if, as I have explained above, these investigations were not even conducted in the field but "at a distance".[196]

According to Howes, the anthropology of the senses developed at the end of the 1980s in opposition to the state of the discipline at the time—more specifically, against its focus on textuality and its strong visualist tradition.[197] However, whereas the conception of culture and anthropology as a series of acts of inscription may be said to

[193] Clifford Geertz, "'From the Native's Point of View: On the Nature of Anthropological Understanding", *Bulletin of the American Academy of Arts and Sciences*, vol. 28, no. 1, October 1974, pp. 26–45, on p. 31. (This essay was later included in Clifford Geertz, *Local Knowledge*, New York, Basic Books, 1983, pp. 55–72.)

[194] See for instance Michelle Z. Rosaldo, "Toward and Anthropology of Self and Feeling", in Richard Shweder and Robert A. Levine (eds), *Culture Theory: Essays on Mind, Self and Emotion*, Cambridge, Cambridge University Press, 1984, pp. 137–157, on pp. 140–141; see also chapter 2 of this work.

[195] David Howes, "Sense and Non-Sense in Contemporary Ethno/Graphic Practice and Theory", *Culture*, XI (1–2), 1991, pp. 65–76, on p. 69; and Clifford Geertz, "Deep Play: Notes on the Balinese Cockfight", *Daedalus*, vol. 101, no. 1, Winter 1972, pp. 1–37, on p. 26. This essay was included later in *The Interpretation of Cultures*, pp. 412–453, quotation is on pp. 448–449.

[196] Howes, "Sense and Non-Sense in Contemporary Ethno/Graphic Practice and Theory", p. 66. Obviously, the reference to Mead and Métraux's investigations "at a distance" is to their 1953 edited collection *The Study of Culture at a Distance.*

[197] See Howes, "Sense and Non-Sense in Contemporary Ethno/Graphic Practice and Theory", and also chapter 1 ("Taking Leave of Our Senses: A Survey of the Senses and Critique of the Textual Revolution in Ethnographic Theory") of Howes, *Sensual Relations*, pp. 3–28.

privilege sight, not leaving much space for other senses, the paradigm of textuality that developed after Geertz, and which later brought about so-called "postmodern anthropology", cannot simply be identified with visualism. Geertz's proposal for extending the concept of text "beyond written material, and even beyond verbal" makes clear that for him, as for James Clifford and other purported "textualists", the "text" was never just "a text", and therefore was not only visual. Actually, in the introduction to *Writing Culture* (1986), a collection edited by Clifford and George Marcus that was instrumental in the diffusion of postmodern anthropology, the former argued for an anthropological practice that would no longer prefigure cultures visually, and for "a cultural poetics that is an interplay of voices, of positioned utterances"—in other words, shifting away from the observing eye, ethnography may become discursive rather than visual. Not surprisingly, as Veit Erlmann has later recalled, it was Clifford who, in that same text, placed the question: "But what of the ethnographic ear?"[198]

Steven Feld's *Sound and Sentiment* (1982) and Paul Stoller's *The Taste of Ethnographic Things* (1989),[199] which are among the first ethnographies that attended explicitly to the senses, share a concern with making the voices of the studied communities heard. Thus, following on the steps of his master Jean Rouch's "shared anthropology" ("*anthropologie partagée*"), Stoller made the case for a "narrative ethnography" that portrays informants as recognizable individuals and gives readers "a *sense* of what it is like to live in other worlds, a taste of ethnographic things", what he

[198] James Clifford, "Introduction: Partial Truths", in James Clifford and George E. Marcus (eds), *Writing Culture: The Poetics and Politics of Ethnography*, Berkeley, University of California Press, 1986, pp. 1 26, on p. 12; see also Veit Erlmann, "But What of the Ethnographic Ear? Anthropology, Sound, and the Senses", in Veit Erlmann (ed.), *Hearing Cultures: Essays on Sound, Listening and Modernity*, Oxford–New York, Berg Publishers, 2004, pp. 1–20, on p. 1.

[199] Steven Feld, *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression,* Philadelphia, University of Pennsylvania Press, 1982 (2nd ed. 1990 by the same publisher, and 3rd ed. published in Durham-London, Duke University Press, 2012); Paul Stoller, *The Taste of Ethnographic Things: The Senses in Anthropology,* Philadelphia, University of Pennsylvania Press, 1989.

achieved mainly by describing the smells, flavours and sounds of Songhay villages.[200] In a similar vein, Feld focused particularly on symbolic and aesthetic uses of sound among the Kaluli, which he explained in the terms in which they were conceptualized by the community, that is through their myths, metaphors and notions (more on Feld in the next chapter).[201]

Both Feld and Stoller, together with other anthropologists like Alfred Gell, Anthony Seeger, or Howes, opened the way for ethnographic fieldwork that would consider also non-visual senses, and that rather than imposing a Western interpretation of perception upon the studied communities, would aim at understanding how they perceive the world.[202] Howes, in particular, taking inspiration also from the French Annales School (more on the history of the senses and French Annales School in chapter 3),[203] adopted a comparatist and theorizing perspective that would come to define the new disciplinary field in the 1990s. In 1988, together with two scholars of different disciplinary backgrounds also based at Concordia University, Canada: sociologist Anthony Synnott and cultural historian Costance Classen, Howes founded CONSERT, the Concordia Sensoria Research Team. Even if, according to Classen, the expression "cultural anthropology of the senses" had been coined by British science

[200] Stoller, *The Taste of Ethnographic Things*, p. 156.

[201] In later years, Feld even supplemented his research among the Kaluli by contrasting his observations and conclusions with the reactions that they triggered among the studied subjects—a research technique that he called "dialogic editing"; see the Postcript to the second edition (1990) of his *Sound and Sentiment*, pp. 239–268.

[202] Alfred Gell, "Magic, Perfume, Dream", in I.M. Lewis (ed.), *Symbols and Sentiments: Cross-Cultural Studies in Symbolism*, London, Academic, 1977; Anthony Seeger, *Nature and Society in Central Brazil: The Suya Indians of Mato Grosso*, Cambridge, MA, Harvard University Press, 1981; and David Howes, "On the Odour of the Soul: Spatial Representation and Olfactory Classification in Eastern Indonesia and Western Melanesia", *Bijdragen tot de Taal-, Land- en Volkenkunde*, no. 1, 1988, pp. 84–113.

[203] Howes refers several times to Lucien Febvre and to Alain Corbin's *Le miasme et la jonquille: L'odorat et l'imaginaire social XVIIIe–XIXe siècles* (Paris, Aubier Montaigne, 1982) in one of the first essays (if not the first) that he devoted to the "other" senses, "On the Odour of the Soul".

historian Roy Porter in 1986,[204] the Concordia group became the most vocal advocate of the new discipline,[205] and it has maintained this status up to the present.[206]

The Concordia scholars employ the notion of "sensory models" as a virtual synonym for "sense ratios", that is—in Classen's words—to "examine the meanings associated with various sensory faculties and sensations in different cultures".[207] However, they have expanded the concept in order to include not only the communication technologies associated with particular senses, but also the whole gamut of objects and practices that constitute a culture. As Howes has defined it, "[t]he anthropology of the senses is primarily concerned with how the patterning of sense experience varies from one culture to the next in accordance with the meaning and emphasis attached to each of the senses. It is also concerned with tracing the influence such variations have on forms of social organization, conceptions of self and cosmos, the regulation of the emotions, and other domains of cultural expression (…)".[208] Thus, various members of the Concordia group have dealt with the senses in connection with particular objects and practices, like body decoration, child rearing, architecture, food preparation and rituals, among many others, combining field research and theory.[209]

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[204] See his foreword to the English translation of Alain Corbin's *La miasme et la jonquille* (1982), issued as *The Foul and the Fragrant: Odor and the French Social Imagination,* Cambridge, MA, Harvard University Press, and Leamington Spa, UK, Berg Publishers, 1986, p. vii; see Classen, "Foundations for an Anthropology of the Senses", *International Social Science Journal*, n. 153, 1997, p. 406.

[205] Apparently, the first-ever panel on the anthropology of the senses was organized in 1989 at Carleton University, Canada, by the Canadian Anthropology Society/La Société canadienne d'anthropologie. The reference is mentioned in David Howe's introductory text to the Explorations in Sensory Anthropology Symposium, Canadian Anthropology Society, Montreal, June 3, 2010, programme available online: http://www.cas-sca.ca/images/stories/conference/CASCA_2010_-_PROG.pdf [last access: August 2014].

[206] In 2010 they founded the Centre for Sensory Studies, which hosts a whole network of culturally oriented sensory scholars; see the section "A Brief History" on the official website of the Centre: http://www.centreforsensorystudies.org/a-brief-history [last access: February 2015].

[207] Classen,"Foundations for an Anthropology of the Senses", p. 402.

[208] David Howes's Introduction ("To Summon All the Senses") to Howes (ed.), *The Varieties of Sensory Experience*, p. 3.

[209] The most recent example of this approach is Howes and Classen, *Ways of Sensing*, which deals with many different practices and fields involving the senses, e.g. art works and museums, healing practices, social ordering, the legal regulation of sensation, sensorial marketing and synaesthesia.

While some of the members (especially Classen) have studied language (sensory metaphors) and linguistic symbolism,[210] interest in the relationship between the cultural practices and the cognitive semantics of the senses seems to have faded among them.

Accepting the critique of Western ocularcentrism formulated by McLuhan and Ong, in the last decades the Concordia scholars have found examples of particular cultures and languages for which hearing seems to be equally or even more relevant than sight.[211] Other sensory anthropologists, like the aforementioned Feld, Gell and Seeger, have authored important ethnographic studies of hearing-centred communities—respectively, the Kaluli (or Bosavi) and the Umeda, both from Papua New Guinea, and the Amazonian Suyá.[212] Yet, as Michael Herzfeld has remarked, these scholars have not been involved in a general defence of "oral cultures" as opposed to "visual cultures", but have generally found explanations for the primacy of hearing "within the society in question in the form of indigenous theories of meaning".[213] Some of the Concordia scholars have also disapproved of the arguably excessive stress that McLuhan and Ong laid on the conflict between the ear and the eye, a narrative, which they consider too simplistic and not able to account for both sensory variation among cultures and intracultural variation.[214] By contrast, they have shown a strong interest in

[210] See for instance her "Words of Sense".

[211] See for instance Constance Classen, "Sweet Colors, Fragrant Songs: Sensory Models of the Andes and the Amazon", *American Ethnologist*, vol. 17, no. 4, November 1990, pp. 722–735. Classen's text summarizes field and theoretical research by, among others, Gerard Reichel-Dolmatoff (Desana) and Anthony Seeger (Suyá). However, Classen's reflections on Andean culture combine field research and historical records of Colonial time, assuming a temporal continuity that would never be taken for granted in studying Western cultures.

[212] See Feld, *Sound and Sentiment*; Alfred Gell, "The Language of the Forest: Landscape and Phonological Iconism in Umeda", in Eric Hirsch and Michael O'Hanlon (eds), *The Anthropology of Landscape. Perspectives on Place and Space*, Oxford, Clarendon Press, 1995, pp. 232–254; and see also Anthony Seeger, *Why Suyá Sing: A Musical Anthropology of an Amazonian People*, Urbana–Chicago, University of Illinois Press, 2004.

[213] Michael Herzfeld, "Senses", in his *Anthropology: Theoretical Practice in Culture and Society*, Malden, MA, and Oxford, Blackwell, 2001, pp. 240–253, on p. 249.

[214] See Howes, "Sensorial Anthropology", p. 171; and also Howes and Classen, *Ways of Sensing*, pp. 11–12.

going beyond that narrative, tackling other senses, e.g. smell, touch and even the "sixth sense",[215] as well as intersensoriality or multimodality.[216]

Indeed intersensoriality, which refers to interactions among the senses and our practice of relying on more than one sense to perceive the world and communicate, and multisensoriality (also known as "multimodality", "polymodality", or "sensorial blends"), that is perceptual processes involving different sensorial components, which may interact among them in various ways, have become key subjects not only for scholars of the Concordia group, but also for other sensory scholars, like British social scientist Ruth Finnegan and literary scholar Steven Connor.[217] The most common example of this kind of sensorial transferences has been synaesthesia, a neurological condition that causes the cross-stimulation of different types of visual recognition (its most frequent form is the cross-stimulation of colours and letters, called "colour-grapheme synaesthesia"), or of different senses (normally hearing and sight, only rarely other senses).[218] However, the realization that sometimes we cannot clearly attribute

[215] See for instance: Constance Classen, David Howes and Anthony Synnott, *Aroma: The Cultural History of Smell*, London and New York, Routledge, 1994; Constance Classen (ed.), *The Book of Touch*, Oxford and New York, Berg Publishers, 2005; Howes (ed.), *The Sixth Sense Reader,* 2009; and Constance Classen, *The Deepest Sense: A Cultural History of Touch*, Champaign, IL, University of Illinois Press, 2012.

[216] See David Howes, "Scent, Sound and Synaesthesia. Intersensoriality and Material Culture Theory", in Chris Tilley, Webb Keane, Susan Küchler, Mike Rowlands and Patricia Spyer (eds.): *Handbook of Material Culture*, London, Sage, 2006, pp. 161–172; also by him, "Hearing Scents, Tasting Sights: Toward a Cross- Cultural Multimodal Theory of Aesthetics", in Francesca Bacci and David Melcher (eds), *Art and the Senses*, New York, Oxford University Press, 2011, pp. 161–182.

[217] On intersensoriality see Steven Connor, "Edison's Teeth: Touching Hearing", in Veit Erlmann (ed.): *Hearing Cultures. Essays on Sound, Listening and Modernity*, Oxford-New York, Berg Publishers, 2004, pp. 153–172; and also by him, "Intersensoriality", a talk given at the conference on The Senses, Thames Valley University, 6th February 2004, http://stevenconnor.com/intersensoriality.html [last access: July 2015]. Ruth Finnegan refers instead to "multimodal" (meaning "multisensorial") interactions in chapter 8 ("A mix of arts") of Ruth Finnegan, *Communicating. The Multiple Modes of Human Interconnection*, London, Routledge, 2002, pp. 223–271.

[218] On synaesthesia see Caroline A. Jones, "Synaesthesia", in her edited collection *Sensorium: Embodied Experience, Technology, and Contemporary Art*, Cambridge, MIT Press, 2006, pp. 216–219; and Richard E. Cytowic and David M. Eagleman, *Wednesday Is Indigo Blue: Discovering the Brain of Synesthesia,* with an Afterword by Dmitri Nabokov, Cambridge, MA, MIT Press, 2009. Synaesthesia is sometimes associated with linguistic transferences of meaning among different senses: gustatory terms that become olfactory terms, visual adjectives applied to sounds, taste and touch colouring other sensorial modalities, etc.; see the examples investigated by Constance Classen with reference to the English language in "Words of sense", in her *Worlds of Sense*, pp. 50–75. However, it seems improper to speak of synaesthesia in cases like these, which are rather instances of sensorial experiences lying at the base of linguistic metaphors; see Cytowic and Eagleman, *Wednesday Is Indigo Blue*, pp. 13–15 (section "What Synesthesia

some sensations to one or another sense—the mingling of odours and tastes is a typical instance—is not a neurological condition, but part and parcel of our everyday usage of the senses, since interaction between the senses may also happen whenever we intend to devote our attention to one single sense.[219]

Nevertheless, the notion of "sensory model" has some limitations, as its advocates have also recognized. As Howes has pointed out, when scholars "talk about a society's 'sensory model', they are referring to its *dominant* sensory modes and values, not to a model that is equally shared by everyone in that society".[220] This obviously complicates the matter, as various sensory models may coexist in a given society at a certain time. Howes has also observed that models of perception, including our own, are historically contingent and they may change in history, what undermines the theoretical basis of cross-cultural comparison and the notion that particular sensory models correspond to certain cultures.[221] (I will develop these arguments further in chapter 3).

Besides, even if the anthropology of the senses offers—in Herzfeld's words—"a specifically social, as opposed to psychological, assessment of how the various senses are used",[222] sensory scholars should supplement their analyses of sensory models with an examination of how individual perceptions are shaped by and acquire meaning

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Isn't"). On synaesthesia and music see Oliver Sacks, *Musicophilia: Tale of Music and the Brain*, revised and enlarged edition, New York, Vintage, 2008, pp. 177–197.

[219] In the last decade this observation has been confirmed by neurobiological research employing non-invasive brain imagining. Thus, neuroscientists have discovered that specific sensorial stimuli very often affect parts of the brain that would normally be excited by other sensory stimuli: the senses seem to reinforce one another and, in case of impairment, they can even replace one another. They have deduced that the integration of information provided by different senses, called "sensorial integration", would not happen at later stages of the perceptual process; contrary to what was formerly believed, perceptual processes would be fully multisensorial from the beginnining. See for instance Asif A. Ghazanfar and Charles E. Schroeder, "Is Neocortex Essentially Multisensory?", *TRENDS in Cognitive Sciences*, vol. 10. no. 6, June 2006, pp. 278–285; see also Gemma Calvert, Charles Spence and Barry E. Stein (eds.), *The Handbook of Multisensory Processes*, Cambridge, MIT Press, 2004, and also the special issue of *Perception*, "Advances in Multisensory Perception", by Fiona Newell and Ladan Shams, vol. 36, 2007.

[220] Howes, "Can These Dry Bones Live?", pp. 449–450. Howes actually refers to "anthropologists", not "scholars", but I think that his point is perfectly valid to historians of the senses and generally to any scholar who uses the category of "sensory models".

[221] ibid., 450–451.

[222] Herzfeld, "Senses", p. 242.

through social categories. This entails that the meanings associated with each sense, or with the combination of various senses, should be studied by examining the actions, objects, technologies and situations in which they are involved. Apart from "sensory models", other categories may be useful in order to explain the complex way in which our senses create value and meaning in specific contexts. For instance, while working on a medical anthropology of sensations, Hinton, Howes and Kirmayer have recently argued for the adoption of the concepts of "sensation schemas" and "sensation scripts": sensation schemas would relate each sense to certain "ideas of causation, common metaphors and idioms, ethnophysiologically based models of process, and associated memories", and sensation scripts would link the sensation schemas activated in feeling a sensation to particular contexts and actions. Sensation scripts and schemas may also adapt dynamically in processes of interpretation.[223] In combining sensation schemas and sensations scripts Hinton, Howes and Kirmayer have tried to link the purely representational level, to which such notions as "sensory models" or "sense ratios" belong, to the variety of contexts in which sensorial experiences may be studied.

Today there is a growing consensus among anthropologists that the question of sensory values goes beyond cross-cultural comparison. It has also become evident that in order to understand the senses, scholars necessarily must go beyond a narrow definition of the sensory, to include feelings, memory, the whole body. These are aspects that have been addressed and developed in parallel to the anthropology of the senses, since the 1980s, and which have provided the tools for various criticisms of its research programme as formulated by the Concordia network. As I will explain in the

[223] Hinton, Howes and Kirmayer, "Toward a Medical Anthropology of Sensations", pp. 152–153. To emphasize the dynamic character of sensation meaning, these authors propose the term "sensation interpretant", of Peircean derivation, which "refers to that which allows a sensation to be interpreted at a given moment, that is, the mental imagery, schemas, memories, and ideas evoked by a sensation" (p. 152).

next chapter, many of these criticisms have to do with the opposition between representation and experience.

CHAPTER 2

Thinking about Hearing and Listening after the "Sensory Turn" II

2.1 Beyond the anthropology of the senses

In the previous chapter I proposed a critical reading of the historical development of the sensory turn as it has been narrated by David Howes and the other members of the Concordia group, who have so far been considered the main representatives of the anthropology of the senses. However, as I observed at the end of the chapter, the clear delimitation of the anthropology of the senses as a discipline contradicts the very status of the senses as an interface between the body, the mind and the world. In fact, though Constance Classen has acknowledged that sensory perception "is not simply one aspect of bodily experience, but the basis of bodily experience",[1] bodily experience does not seem to have occupied a central place in the discipline. Besides, the anthropology of the senses has not always accounted for the participation of other psychological faculties, like memory or imagination, in perception, or for the discursive and emotional dimensions of sensorial experiences. As I will explain in this section, other approaches to the senses, or to subjects intrinsically connected to them, have developed in parallel—sometimes, in opposition—to the work of the Concordia network on the anthropology of the senses, providing us with new tools for understanding the matter.

[1] Constance Classen, "Foundations for an Anthropology of the Senses", *International Social Science Journal*, n. 153, 1997, pp. 401–412, on p. 402.

2.1.1 The anthropology of the body, the phenomenology of perception and the notion of embodiment

Generally speaking, the emergence of the body as a topic in the social sciences responded to that call to break the veil of idealism made at the turn of the 20th century, with disparate voices, by Karl Marx, Friedrich Nietzsche and Sigmund Freud.[2] Yet, in a certain sense the body had been part of anthropological research since the beginning: physical descriptions and observations of bodily practices (dances, rituals, customs related to food, body decorations, etc.) were often part of field reports and theoretical essays. As Thomas Csordas has pointed out, from the 1920s on we can find ethnographic texts that offer particularly rich treatments of bodiliness with reference to specific contexts, like the studies of Maori's corporeal notions by US anthropologist Paul Radin, or the long-term research of French Maurice Leenhardt in a Melanesian island, New Caledonia.[3] Precisely Leenhardt's mentor, Marcel Mauss, authored in 1936 a pioneering essay, "Les techniques du corps" (1934/1936, first published in English in 1973 as "Techniques of the Body") on the "ways in which from society to society men know how to use their bodies", that is bodily dispositions related to particular activities and contexts.[4] Bodily behaviour and gesture had also been of interest to Franz Boas, and later became the focus of Gregory Bateson and Margaret Mead's photographic project,

[2] See Bryan S. Turner, *The Body and Society: Explorations in Social Theory*, London-Thousand Oaks, CA-New Dehli, SAGE, 1984.

[3] The publications mentioned by Thomas J. Csordas are Paul Radin's "The Ego and Human Personality", which is a chapter of his book *Primitive Man as Philosopher*, New York, Dover, 1927/1957, and Maurice Leenhardt's *Do Kamo: Person and Myth in a Melanesian World*, translated by Basia Miller Gulati, Chicago, University of Chicago Press, 1947/1979; see Thomas J. Csordas, "The Body's Career in Anthropology", in Henrietta L. Moore (ed.), *Anthropological Theory Today*, Cambridge, Polity Press, 1999, pp. 172–205, on pp. 172–175.

[4] Marcel Mauss, "Body Techniques", in *Sociology and Psychology: Essays*, translated by Ben Brewster, London, Routledge and Kegan Paul, 1979, pp. 95–123, on p. 97. The original French, "Les Techniques du corps", had been published in the *Journal de Psychologie*, XXXII, no. 3–4, 1936, from a paper presented to the Société de Psychologie on 17th May 1934, and it is now available in electronic edition in the series "Les classiques des sciences sociales", http://classiques.uqac.ca, Montréal, Université du Quebec, 2003 [last access: October 2015]. It was translated and published in English for the first time as "Techniques of the Body", in *Economy and Society*, vol. 2, no. 1, 1973, pp. 70–88.

Balinese Character (1942), which tried to convey the way in which Balinese culture was embodied in everyday actions.[5]

Later on, in the 1960s and 1970s, British anthropologist Mary Douglas drew on Mauss and other authors to reflect on what she called the "two bodies" (the individual body, the social one). She studied how social categories condition the experience of the body, and addressed the body as a "microcosmos of society" and as a natural symbol "that expresses the relation of parts of an organism to the whole".[6] Even if Douglas's observations—particularly, those included in *Purity and Danger* (1966), on the cultural categories of dirt and cleanliness and their association with the senses—[7]went beyond the notion of the body-as-symbol, in the 1980s her work was often regarded as paradigmatic of the semiotic approaches to the body that were predominant during the previous decades, when the body was mainly considered an object of observation and a conveyor of meaning, and its social dimension was stressed.

However, other contemporary scholars adopted a less culturalist stance and different methods: at a time in which information theory and communication systems became popular subjects, the analysis of non-verbal communication (the "languages of the body") emerged as a new field, one that could take advantage of the possibilities offered by recording technologies. The most notable expert in non-verbal and intercultural communication was US anthropologist Edward T. Hall, author of *The Silent Language* (1959) and *The Hidden Dimension* (1966), among other works, who

[5] Gregory Bateson and Margaret Mead, *Balinese Character: A Photographic Analysis*, New York, New York Academy of Sciences, 1942.

[6] See chapter 5 ("The Two Bodies") of Mary Douglas, *Natural Symbols: Explorations in Cosmology*, Harmondsworth, Penguin Books, 1978, pp. 93–112, on p. 101 and p. 112. Douglas's *Natural Symbols* was originally published in 1970 (London, Barrie & Rockliff).

[7] Mary Douglas, *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo*, London, Ark, 1966. On the "rarely recognized" importance of Douglas as a trailblazer for the anthropology of the senses, see Herzfeld, "Senses", p. 241.

coined the term "proxemics".[8] His colleague Ray Birdwhistell pioneered "kinesics", that is the study of body motion.[9] During those years Canadian sociologist Erving Goffman was also developing his views of everyday life as theatrical stage; in particular, his *The Presentation of Self in Everyday Life* (1959) explored the meaning of behaviour in public, underlining the corporeal dimension (appearance, manner) of social interaction.[10] Goffman's ideas resonated with John Austin's theory of performative utterances, Victor Turner's reflections on the performativity of ritual,[11] and the voices of other anthropologists, linguists and theatre studies scholars that will eventually become part of the history of performance studies.[12]

On the other hand, British ethnomusicologist John Blacking, who edited an important anthology on the anthropology of the body in 1977, underlined the need to understand not only—as Douglas had proposed—how societies influence bodies, but also "the ways in which the physical organism constrains and inspires patterns of social interaction and the invention of culture".[13] Instead of opposing the physical to the social body, he argued that "[s]ince a biologically based human faculty requires social interaction, we can say that the social conditions are also biologically determined".[14] At

[8] Edward T. Hall, *The Silent Language*, New York, Doubleday, 1959; and *The Hidden Dimension,* New York, Doubleday, 1966.

[9] Ray L. Birdwhistell, *Kinesics and Context: Essays on Body-Motion Communication*, Harmondsworth, UK, Penguin, 1973 (first published in Philadelphia, University of Pennsylvania Press, 1970); see also Csordas, "The Body's Career in Anthropology", pp. 175–176.

[10] Erving Goffman, *The Presentation of Self in Everyday Life*, New York, Anchor Books, 1959. Later on, the author transformed this intuition into a the research method to study social situations: "frame analysis"; see Erving Goffman, *Frame Analysis: An Essay on the Organization of Experience*, with a foreword by Bennett M. Berger, Boston, Northeastern University Press, 1986 (published initially in 1974, New York, Harper & Row).

[11] See for instance Victor Turner, "The Anthropology of Performance" in his book of the same title, *The Anthropology of Performance*, preface by Richard Schechner, New York, PAJ Publications, 1987, where, among other subjects, the author compares his notion of "ritual" with that of Goffman.

[12] For a brief introduction to the subject see Barbara Kirshenblatt-Gimblett, "Performance Studies", in Henry Bial (ed.), *The Performance Studies Reader*, New York-London, Routledge, 2004, pp. 43–55.

[13] John Blacking (ed.), *The Anthropology of the Body*, London, Academic Press, 1977, p. v.

[14] John Blacking, "Towards an Anthropology of the Body", in Blacking (ed.), *The Anthropology of the Body*, pp. 1–28, on p. 3. As epigraph to this chapter, Blacking chose two quotations by Merleau-Ponty that he took from Roger Poole's essay "Objective Sign and Subjective Meaning", in Jonathan Benthall and Ted Polhemus (eds), *The Body as a*

least to a certain extent, Blacking's position anticipated the new directions that the anthropology of the body would take in the 1980s, when scholars became less interested in the symbolic dimension of the body, and more in bodily experience. These new directions were influenced, in the first place, by phenomenology, particularly by French philosopher Maurice Merleau-Ponty's *Phenomenology of Perception*, which was originally published in 1945, but had a late reception outside France.[15]

In *Phenomenology of Perception* Merleau-Ponty, who was inspired by the perception theories of the Gestalt school,[16] questioned the distinction between sensation and perception, and that between subject and object, while he tried to capture the moment in which perception begins, in the "pre-objective realm".[17] He described how oneself could become aware of the importance of the body in the action of perceiving the world, since "every external perception is immediately synonymous with a certain perception of my body". [18] Though Merleau-Ponty did not coin the term "embodiment", his thought has come to be identified with it, i.e. with the notion that acts of perception, emotion and cognition cannot be dissociated from the physicality of the body, or (in Thomas J. Csordas' terms) with "an existential condition in which the body is the subjective source or intersubjective ground of experience".[19] Besides phenomenology,

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Medium of Expression, London, Allen Lane, 1975, pp.74–106. Though in the text Blacking shows his appreciation of Merleau-Ponty's approach, it is not quite clear whether he had read him, or had just known of him through Poole's essay. On the importance and signitication of Blacking's contribution to the anthropology of the body, see also Csordas, "The Body's Career in Anthropology", p. 177.

[15] Maurice Merleau-Ponty's, *Phénoménologie de la perception* (Paris, Gallimard, 1945) was first translated into English by Colin Smith in 1962 (*Phenomenology of Perception*, London, Routledge and Kegan Paul, 1962) and has recently been translated again by Donald A. Landes with the same title (Abingdon, UK-New York, Routledge, 2013). Italian and German translations were also issued in the 1960s, while the Spanish translation appeared in 1975.

[16] See Taylor Carman and Mark B.N. Hansen's introduction to *The Cambridge Companion to Merleau-Ponty*, Cambridge, Cambridge University Press, 2005, pp. 1–25, on pp. 10–12.

[17] Merleau-Ponty, *Phenomenology of Perception* (1962), p. 12 and passim. For an analysis of the "pre-objective" (or "preobjective") see Thomas J. Csordas, "Embodiment as a Paradigm for Anthropology", *Ethos*, vol. 18, no. 1, March 1990, pp. 5–47, on pp. 8–10.

[18] Merleau-Ponty, *Phenomenology of Perception*, p. 206.

[19] Csordas, "The Body's Career in Anthropology", p. 181. Csordas has also noticed (ibid., p. 183) the reappreciation of the notion of "experience" effected by theorists of embodiment; for an introduction to the questions associated

Pierre Bourdieu's theory of practice, and particularly his concept of "habitus",[20] as well as Michel Foucault's historical investigations, especially his "genealogies" of disciplinary punishment and of sexuality, which put the body at the centre, were also relevant to the new developments of the anthropology of the body during the 1980s.[21]

In that decade anthropologists of the body like Csordas, Michael Jackson or Margaret Lock[22] advocated a paradigm of embodiment that, in Csordas's words, "takes the 'lived body' as a methodological starting point rather than considering the body as an object of study".[23] Thus, Jackson and Csordas have drawn a contrast between, on the one hand, a semiotic, textual and representational approach, which they identify with the "anthropology of the body", and particularly (as I mentioned above) with Mary Douglas, and, on the other hand, a phenomenological, experiential and practical one,

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with the notion of "experience" in the history of philosophy, see Martin Jay, *Songs of Experience. Modern American and European Variations on a Universal Theme*, Berkeley, University of California Press, 2005.

[20] See Pierre Bourdieu, *Esquisse d'une théorie de la pratique: précédé de trois études d'ethnologie kabyle*, Geneva, Droz, 1972 (English translation: *Outline of a Theory of Practice*, translated by Richard Nice, Cambridge, Cambridge University Press, 1997); *La Distinction*, Paris, Minuit, 1979 (translated into English as *Distinction: a Social Critique of the Judgement of Taste*, translated by Richard Nice, Cambridge, Harvard University Press, 1984); and *Le Sens pratique*, Paris, Minuit, 1980 (English translation: *The Logic of Practice*, translated by Richard Nice, Cambridge, Polity Press, 1990). For an introduction to Bourdieu's theory of practice, see Sherry B. Ortner, "Theory in Anthropology since the Sixties", *Comparative Studies in Society and History*, vol. 26, no. 1, January 1984, pp. 126–166.

[21] Michel Foucault, *Discipline and Punish: The Birth of the Prison*, translated by Alan Sheridan, London, Penguin, 1976; and *Histoire de la sexualité, I: La volonté de savoir* (Paris, Gallimard, 1976); *II: L'usage des plaisirs* (Paris, Gallimard, 1984); *III: Le souci de soi* (Paris, Gallimard, 1984), published in English as *The History of Sexuality, vol. 1: An Introduction* (translated by Robert Hurley, London, Allen Lane, 1979; reprinted in 1998 with the subtitle *The Will to Knowledge*, though the American edition has kept the old title), *The History of Sexuality, vol. 2: The Use of Pleasure* (translated by Robert Hurley, London, Viking, 1986), and *The History of Sexuality, vol. 3: The Care of the Self* (translated by Robert Hurley, New York, Pantheon Books, 1986).

[22] See Michael Jackson, "Knowledge of the Body", *Man*, New Series, vol. 18, no. 2, June 1983, pp. 327–345; Turner, *The Body and Society*, 1984; Nancy Scheper-Hughes and Margaret Lock, "The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology", *Medical Anthropology Quarterly, New Series*, vol. 1, no. 1, 1987, pp. 6–41; also by Michael Jackson, *Paths Toward a Clearing: Radical Empiricism and Ethnographic Inquiry*, Bloomington and Indianapolis, Indiana University Press, 1989; and the bibliographical essay by Margaret Lock, "Cultivating the Body: Anthropology and Epistemologies of Bodily Practice and Knowledge", *Annual Review of Anthropology*, vol. 22, 1993, pp. 133–155.

[23] Thomas J. Csordas, "Somatic Modes of Attention", *Cultural Anthropology*, vol. 8, no. 2., May 1993, pp. 135–156, on p. 136. On the importance of the so-called "paradigm of embodiment" for anthropology see also by Csordas, "Embodiment as a Paradigm for Anthropology"; see also his Introduction to Thomas J. Csordas (ed.), *Embodiment and Experience: The Existential Ground of Culture and Self*, Cambridge, Cambridge University Press, 1994, pp. 1–24; and Jackson, "Knowledge of the Body".

which would correspond to the paradigm of embodiment.[24] According to Jackson, the "anthropology of the body" reduces the body to a mental thing, and bodily praxis to a succession of cognitive and semantic operations.[25] Instead, as Csordas has thoroughly argued drawing both from Merleau-Ponty's notion of the "preobjective" and from Bourdieu's "habitus", the "approach to embodiment begins from the methodological postulate that the body is not an *object* to be studied in relation to culture, but is to be considered as the *subject* of culture, or in other words as the existential ground of culture".[26]

The cultural approach to phenomenology represented by Csordas and Jackson has developed in parallel to an intellectual trend in contemporary cognitive science that has also brought the body to the fore, and which is usually known as "enactivism" or "embodied cognition". In a nutshell, enactivism or embodied cognition is a non-representational approach to cognition that defines perception as guided action, and claims that cognitive structures are "embodied", that is that they emerge from recurring sensorimotor patterns. Though some prefer to interpret it as an evolution of cognitivism, this paradigm actually had its origin in at least two different research lines: the enactivism proposed by Francisco Varela, Evan Thompson and Eleanor Rosch,[27] which studied the organization of living systems, and the theories of George Lakoff and Mark Johnson, which tried to explain how language was schematically and metaphorically

[24] Csordas, "Somatic Modes of Attention", pp. 135–137; see also by Csordas, "Introduction: The Body as Representation and Being-in-the-World", in Csordas (ed.), *Embodiment and Experience*, pp. 4–12; and Jackson, "Knowledge of the Body".

[25] Jackson, "Knowledge of the Body", pp. 327–330; see also his *Paths Toward a Clearing*, pp. 122–124.

[26] Csordas, "Embodiment as a Paradigm for Anthropology", p. 5.

[27] Francisco J. Varela, Evan Thompson and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge, MIT Press, 1991.

related to the human body.[28] Yet, it was also inspired by older theories, in particular by the paradigm of embodiment of Merleau-Ponty's phenomenology, which I have just discussed, and James Gibson's ecological psychology, among others.[29] The embodied cognition approach offers a fresh comprehension of the connection body-mind and of human interaction with the world: it underscores the connection between perception and action, that is the importance of physical movement and interaction to perception,[30] and it also stresses the connection between perception, emotion, and knowledge. In general, the advocates of embodied cognition are pushing the understanding of the senses beyond the synchronic, contextless information-processing model of cognitivism, claiming instead that scientific and philosophical research should be able to account for the complexity of the perceptual process.[31]

2.1.2 From sensory models to sensory skills

The critiques raised in the 1980s by Csordas, Jackson, and other advocates of the paradigm of embodiment against the "representational" approach and the "anthropology of the body" seem to have set the pattern for recent criticism of the Concordia group and the whole field of the anthropology of the senses. Since the beginning of this

[28] See Mark L. Johnson, *The Body in the Mind: The Bodily Basis of Meaning, Imagination and Reason*, Chicago, University of Chicago Press, 1987; and George Lakoff and Mark L. Johnson, *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*, New York, Basic Books, 1999.

[29] For a thorough account of the theoretical precedents of embodied cognition, see Robert A. Wilson and Lucia Foglia, "Embodied Cognition", *The Stanford Encyclopedia of Philosophy* (Fall 2011 edition), edited by Edward N. Zalta, accessible online: http://plato.stanford.edu/archives/fall2011/entries/embodied-cognition/ [last access: February 2015]. By James J. Gibson see *The Senses Considered as Perceptual Systems*, Boston, Houghton Mifflin, 1966. The many striking parallels between the ideas of Gibson and Merleau-Ponty have been traced by John T. Sanders in his article "Merleau-Ponty, Gibson, and the Materiality of Meaning", *Man and World*, no. 26, 1993, pp. 287–302.

[30] See for instance Alva Noë, *Action in Perception*, Cambridge, MIT Press, 2004.

[31] Though the paradigm of embodied cognition may seem hardly compatible with what in chapter 1 I have called the "brain model", some of its central claims have recently been confirmed by neurobiological research. For instance, neurobiologist Antonio Damasio has argued that "the body contributes more than life support and modulatory effects to the brain. It contributes a *content* that is part and parcel of the workings of the normal mind"; see Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain*, New York, G.P. Putnam's Sons, 1994, p. 226

century some scholars strongly influenced by the phenomenological tradition and the anthropology of the body—Tim Ingold and Sarah Pink have been the most outspoken ones—have questioned the importance of the representational level, i.e. the level of sensory models and linguistic metaphors, and have stressed instead the value of sensorial experiences, pleading also for a more intensive treatment of multisensoriality and intersensoriality.[32] Besides, responding to the increasing cultural centrality of neurobiology, they have made the case for the need to reconcile "cultural" interpretations of the senses with "natural" or scientific ones.

In particular, Tim Ingold has raised two main objections against anthropologists of the senses. Firstly, he argues that in spite of their interest in cross-cultural comparison, they often bring to the field their own preconceptions about the senses, and so they often exaggerate the contrast between hearing and vision. Secondly, he contends that they have focused mainly on ideas about the senses, articulated around the notion of "sensory models", setting aside somatic experiences, and seemingly ignoring the fact that "human beings are not simply endowed by nature with ready-made powers of perception, but that these powers are rather cultivated, like any skill, through practice and training in the environment"[33] (more on the concept of "skill" below). Thus, according to Ingold, while the senses are certainly associated with cultural notions and values, they also relate to culture in a more specific, material way, since the characteristics and objects of our immediate environment necessarily influence the way in which we engage with the world, our perceptions, and how these perceptions evolve through life.

[32] For instance, Sarah Pink states that in her *Doing Sensory Ethnography* she "outline[s] a way of thinking about and doing ethnography that takes as its starting point the multisensoriality of experience, perception, knowing and practice" (p. 1).

[33] Tim Ingold, "Stop, Look and Listen! Vision, Hearing and Human Movement", chapter 14 of *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*, London-New York, Routledge, 2000, pp. 243–287, on p. 283.

In consequence, whereas contemporary advocates of the senses as "culturally constructed" have often taken a stance against a presumed "naturalness of the senses", for Ingold the question should not necessarily be interpreted as a sheer dichotomy. He argues that the cultural approach should be supplemented with an ecological and developmental approach, which would conceive the exercise of the senses as a learning interaction with and within a certain social and natural environment. According to him, cultural and developmental aspects are necessarily in a dynamic relationship: while differences in conception may contribute in diverse ways to shaping perceptual experiences, conceptions (cultural representations, notions and ideas) are also rooted in concrete acts of perception. Therefore, the senses must be regarded as processes in which nature and culture collaborate, and which ultimately blur the distinction between nature and culture—"the nature-nurture divide", as some prefer to call it.[34]

In line with Ingold's critique, Sarah Pink has even drawn a distinction between the "original" anthropology of the senses, understood as a disciplinary field, and a newer "sensory anthropology" or "sensory ethnography", which in her opinion implies a re-thinking of anthropology, a reconsideration (even a renovation, in some cases) of its methods, and the establishment of an interdisciplinary field of practice and theory.[35] David Howes has replied to Pink's attacks on the anthropology of the senses by denying that any major difference exists between that discipline and sensory anthropology, and by denouncing that phenomenology ultimately universalizes the subjective sensations of

[34] On the "nature-nurture divide" see his "From the Transmission of Representations to the Education of Attention", in Harvey Whitehouse (ed.), *The Debated Mind. Evolutionary Psychology vs. Ethnography*, New York, Berg Publishers, 2001, pp. 113–154.

[35] I am reviewing here Sarah Pink's controversial arguments in her debate with David Howes, "Debate Section: The Future of Sensory Anthropology/The Anthropology of the Senses", *Social Anthropology/Anthropologie Sociale*, vol. 18, no. 3, 2010, pp. 331–340. Tim Ingold responded to David Howes' criticism in a later issue: "Debate Section: Worlds of Sense and Sensing the World: a Response to Sarah Pink and David Howes", *Social Anthropology/Anthropologie Sociale*, vol. 19, no. 3, 2011, pp. 313–317, and his reply was followed in the same issue by a "Reply to Tim Ingold" by David Howes (pp. 318–322), a "Reply to David Howes" by Tim Ingold (pp. 323–327), and a final "Reply to Tim Ingold" by David Howes (pp. 328–331).

the individual, whereas it does not leave any space for the social or cultural diversity. According to Pink, far from concerning themselves with the kind of cross-cultural comparisons typical of the anthropology of the senses, sensory ethnographers should conduct their research by "attending to the senses throughout the research process, that is during the planning, reviewing, fieldwork, analysis and representational processes of a project".[36] On the other hand, Pink, like other authors, has pointed to new research methodologies that challenge further the centrality of the text, and which in many cases include the use of audiovisual technologies.[37]

Those scholars that, like Pink or Ingold, stress the physical and experiential aspects of the senses normally favour the term "skill", in such expressions as "visual skills", "skilled visions"[38] or "auditory skills". Defined as the "human ability to do something well; expertise",[39] "skill" has historically been linked to craft—for instance, in debates about the abilities of craftsmen, as opposed to deskilled contemporary artists—,[40] as well as to technologies and production processes—for example, in research into labour processes under industrial capitalism.[41] In that sense, "skill" is almost synonymous with "technique", though it makes reference to subjects, to their

[36] Pink, *Doing Sensory Ethnography*, p. 10.

[37] Ibid., pp. 47–49.

[38] See for instance Cristina Grasseni (ed.), *Skilled Visions: Between Apprenticeship and Standards*, London, Berghahn Books, 2007.

[39] *Oxford Dictionaries Online*, http://oxforddictionaries.com.

[40] On skills and contemporary crafts, see chapter 3 ("Skill – a word to start an argument") of Christopher Frayling, *On Craftsmanship: Towards a New Bauhaus*, London, Oberon Books, 2011, pp. 61–82. On the sense of deskilling as an aesthetic and political stance in contemporary art practice, see Benjamin H.D. Buchloh's remarks on Hans Haacke's artistic practice in *Neo-Avantgarde and Culture Industry: Essays on European and American Art: Essays on European and American Art from 1955 to 1975*, Cambridge, MA, MIT Press, 2000, pp. 110–112; chapter 4 ("The Importance of Skill") of James Elkins, *Master Narratives and Their Discontents*, with an introduction by Anna Sigrídur Arnar, New York-London, Routledge, 2005, pp. 123–145; and also John Roberts, "Art After Deskilling", *Historical Materialism*, no. 18, 2010, pp. 77–96.

[41] The work that originally raised academic and general attention to this topic was Harry Braverman's *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*, New York, Monthly Review Press, 1974.

abilities, whereas "technique" alludes primarily to what they do.[42] Regardless of what results from them, skills (like techniques)[43] are a modality of practical knowledge, since they are normally acquired and transmitted without resource (or only marginally) to language.[44] As Tim Ingold has stated, they are "at once a form of knowledge and a form of practice, or—if you will—both practical knowledge and knowledgeable practice".[45] We may talk of "sensory skills" to refer specifically to sensory abilities—already in the 1970s anthropologist Edmund Carpenter wrote that "[a]ny sensory experience is partly a skill & any skill can be cultivated",[46] and this aspect has become more and more apparent in this century, also as a consequence of the "sensory turn".[47]Furthermore, as I will discuss hereafter, Ingold has shown that the sensorial dimension is implicit in the notion of skill.

While skills could possibly be considered "body techniques" in the sense defined by Mauss,[48] Ingold has criticized this notion, which according to him disconnects the body both from human agency and from the environment. He has

[42] The first meaning of "technique" is "a way of carrying out a particular task, especially the execution or performance of an artistic work or a scientific procedure"; see *Oxford Dictionaries Online*, http://oxforddictionaries.com.

[43] For a vindication of technique and technology as forms of knowledge, against the extended opinion, even today, that they would be just applications of basic science, see Edwin T. Layton, Jr., "Technology as Knowledge", *Technology and Culture*, January 1974, vol. 15, no. 1, pp. 31–41. On p. 33 Layton gives the following definition of technique: "Technique means detailed procedures and skill and their application."

[44] On practical knowledge see chapter 1 ("Language, Anthropology and Cognitive Science") of Maurice E.F. Bloch, *How We Think They Think: Anthropological Approaches to Cognition, Memory, and Literacy*, Boulder, Westview Press, 1998, pp. 3–21, esp. pp. 7–11.

[45] Ingold, "Society, Nature and the Concept of Technology", in *The Perception of the Environment*, pp. 312–322, on p. 316.

[46] Carpenter, *Oh, What a Blow That Phantom Gave Me!*, p. 20.

[47] There are probably also other reasons, like the centrality of mental and sensory abilities to "immaterial labour" (to borrow the term from Maurizio Lazzarato and Antonio Negri), whose processes do not produce goods, but mainly communication or knowledge; see Maurizio Lazzarato, "Immaterial Labor", in Paolo Virno and Michael Hardt (eds), *Radical Thought in Italy: A Potential Politics*, Minneapolis, University of Minnesota Press, 2006, pp. 133–147, and also Michael Hardt and Antonio Negri, *Empire*, Cambridge, MA-London, Harvard University Press, 2000, esp. pp. 289–294. On the other hand, goods are still produced (locally or elsewhere) and sold, and sensorial aspects are a key feature in the conception and marketing of new products, which are often evaluated by sensory professionals according to specific procedures (see the institutional website of the US-based Society of Sensory Professionals, founded in 2008: http://www.sensorysociety.org [last access: September 2014]).

[48] Marcel Mauss, "Body Techniques", p. 97.

argued instead that skills demand an ecological approach, as they are "a property not of the individual human body as a biophysical entity, a thing-in-itself, but of the total field of relations constituted by the presence of the organism-person, indissolubly body and mind, in a richly structured environment". Besides, Ingold's conception of skills as a property of "the organism-person, indissolubly body and mind" implies that they cannot just be considered a physical activity. As he has argued, "whatever practitioners do *to* things is grounded in an attentive, perceptual involvement *with* them, or in other words, that they watch and feel as they work". Therefore, rather than just physical activities, skills are attentive engagements; their acquisition and transmission, in particular, "involves both observation and imitation", though—following Ingold—imitation would not consist in applying schemas formed by observing others, but in "the intimate coordination of the movement of the novice's attention to others with his own bodily movements in the world". [49] Yet, once skills have been incorporated, it seems logical to think that they may be performed inattentively, even automatically.

Understanding skills as perceptual engagements makes it possible to think of the practice of the senses itself as a skilling process—an idea that is also reinforced if, in line with Merleau-Ponty[50] and with US ecological psychologist James Gibson, we consider perception as an active process involving the whole individual in relationship to his or her environment, and to the (using Gibson's terminology) "affordances" that the environment offers.[51] This is, again, the stance adopted by Ingold. According to him, as members of a human community we develop and refine our sensorial skills in

[49] Ingold, "Beyond Art and Technology: The Anthropology of Skill", in M.B. Schiffer (ed.), *Anthropological Perspectives on Technology*, Albuquerque, University of New Mexico Press, 2001, pp. 17–31, on p. 21.

[50] As Merleau-Ponty stated, "every perceptual habit is still a motor habit and here equally the process of grasping a meaning is performed by the body" (*Phenomenology of Perception*, pp. 153). Here "habit" translates the French "habitude", but according to Hubert L. Dreyfus "habitude" in Merleau–Ponty would be better translated as "skill"; see Hubert L. Dreyfus, "Merleau-Ponty and Recent Cognitive Science", in Carman and Hansen (eds), *The Cambridge Companion to Merleau-Ponty*, p. 145.

[51] See Gibson, *The Senses Considered as Perceptual Systems*, and also by him *The Ecological Approach to Visual Perception*, Boston, Houghton Mifflin, 1979 (see p. 127 for a definition of "affordance").

contact with a certain physical and social environment that is charged with specific characteristics and values. As he has argued, our senses become what they are in a formative process that is guided by our cultural milieu, but which would be not less natural than the training process by which a young seagull learns to fly.[52]

In sum, the notion of skill seems to successfully integrate the physical, active dimension in the study of the senses, and also opens interesting possibilities to think of the development of the senses as a skilling process. However, it does not explain either the role of ideas (concepts, models) or that of emotions in the acquisition and transmission of skills, and seems to leave out of the scene any kind of linguistic communication. Contrarily, I want to argue that skilling processes are normally social processes, and so they often include words and linguistic exchanges, and may be guided by some kind of model or metaphor. This certainly applies to sensory skills, too. Yet, the question of language has been a blind spot in the history of the "sensory turn"; besides, linguists and anthropologists have approached the vocabulary and discourses on the senses from contrasting perspectives.

2.1.3 The language of the senses

For most of the 20th century linguistic relativity, represented by various formulations of the so-called "Sapir-Whorf hypothesis", was the dominant paradigm on the relationship between language and culture among anthropologists, and generally among social sciences and humanities scholars.[53] Nevertheless, along the past century this paradigm

[52] Ingold, "Stop, Look and Listen! Vision, Hearing and Human Movement", in *The Perception of the Environmen*t, and also by Ingold, "From the Transmission of Representations to the Education of Attention".

[53] In substance, linguistic relativity affirms that cognition, that is the way in which we conceptualize the world, is mediated by linguistic structures and categories, and therefore depends—the extent will vary from author to author—on language. On the "Sapir-Whorf hypothesis" see William O. Beeman, "Linguistics and Anthropology", in Ruth Kempson, Tim Fernando and Nicholas Asher (eds), *Philosophy of Linguistics*, Amsterdam, North Holland, 2012, pp. 531–551, on pp. 533–534. For an introduction to linguistic relativity see John A. Lucy, "Linguistic Relativity", *Annual Review of Anthropology*, vol. 26, 1997, pp. 291–312.

was also challenged by different scholars, particularly linguists, who raised universalist claims regarding different aspects of sensory vocabulary. In 1969 US anthropologist Brent Berlin and linguist Paul Kay published their study on *Basic Color Terms* (1969), where they argued for the existence of a closed inventory of basic colour categories and a series of rules that would condition which categories are encoded in a certain language. They also described a sequence of seven evolutionary stages through which any language would pass as its basic colour vocabulary increased.[54] In spite of dealing with a specific semantic subfield (that of colour terms), and a single sense (sight), the work of Berlin, Kay and their collaborators became very popular at the time, and was instrumental in bringing renewed attention to the question of the universality of the language of the senses, as well as to the more general question of the limits of language in communicating sensory experiences. Their investigation stimulated the publication of other studies and gave rise both to criticisms[55] and subsequent updates culminating in the publication of the *World Color Survey* in 2010.[56] Indeed, the universality of colour terminology has remained controversial.[57]

Following on the steps of Berlin and Kay, other linguists studied the vocabulary of perception cross-culturally, focusing mainly on names and verbs. Thus, as I mentioned in chapter 1, in the 1980s Swedish linguist Ake Viberg studied verbs of perception cross-culturally and classified them into three groups ("experience verbs",

[54] Brent Berlin and Paul Kay, *Basic Color Terms: Their Universality and Evolution*, Berkeley, University of California Press, 1969.

[55] See for example Jaap Van Brakel, "The Plasticity of Categories: The Case of Colour", *British Journal for the Philosophy of Science*, vol. 44, no. 1, 1993, pp. 103–135, and John A. Lucy, "The Linguistics of 'Color'", in C. L. Hardin and Luisa Maffi (eds), *Color Categories in Thought and Language*, Cambridge, Cambridge University Press, 1996, pp. 320–346, where the author criticizes the methodologies employed to test basic color terms, and Berlin and Kay's conception of words as labels applied to things.

[56] See for instance Paul Kay, Brent Berlin, Luisa Maffi and William Merrifield, "Color Naming Across Languages", in C.L. Hardin and Luisa Maffi (eds), *Color Categories in Thought and Language*, Cambridge, Cambridge University Press, 1997, pp. 21–56; and Paul Kay, Brent Berlin, Luisa Maffi, William R. Merrifield, and Richard Cook, *World Color Survey*, Stanford CA, CSLI Publications, 2010.

[57] This is also the case with music universals, see the Introduction.

"activity verbs", and "copulative verbs"), which would apply to the five sensory modalities.[58] According to him, there was a dynamic hierarchy (in order: sight, hearing, touch, and smell and taste) that would account for the existence of certain perceptive verbs in a particular language, and which would predict which perception verbs would appear in that language.[59] This hierarchy of sensory modalities would also explain how the meaning of perception verbs associated with "higher" sensory modalities might be extended to cover all or some of the "lower" modalities.[60] Since Viberg's hierarchy places sight on top, it could be interpreted as an argument for universal ocularcentrism, though his conclusions were actually much more delimited.

After Viberg other linguists have explored perception vocabulary, though their findings do not fully support Viberg's visualist claims. At least to a certain extent, and with some exceptions, the cultural importance of visual terms for semantic extension has been confirmed,[61] though the existence of a universal hierarchy of the senses has been excluded.[62] However, probably more important than the conclusions reached so far is the way in which linguistic research into the vocabulary of perception has evolved from semantics to discourse analysis. As a result, today many linguists recognize that

[58] See Ake Viberg, "The Verbs of Perception: A Typological Study" in Brian Butterwoth, Bernard Comrie and Östen Dahl (eds), *Explanations for Language Universals*, Berlin, Mouton, 1984, pp. 123–162, esp. p. 123. See also Iraide Ibarretxe-Antuñano, Polysemy and Metaphor in Perception Verbs: A Cross-Linguistic Study, Ph.D. dissertation (University of Edinburgh, 1999), pp. 42–46, who basically accept's Viberg's classification, though she prefers the term "percept verbs" to refer to "copulative verbs"

[59] Viberg, "The Verbs of Perception: A Typological Study", pp. 135–136.

[60] Ibid., pp. 136–137.

[61] See for instance Nicholas Evans and David Wilkins, "The Knowing Ear: An Australian Test of Universal Claims about the Semantic Structure of Sensory Verbs and their Extension into the Domain of Cognition", *Arbeitspapiere von Institut für Sprachwissenschaft Universität zu Köln (Neue Folge)*, no. 32, Köln, Institut für Sprachwissenschaft, 1998, pp. 1–63, available online at: http://publikationen.ub.uni-frankfurt.de/frontdoor/index/index/docId/24544 [last access: February 2015]; see also by Evans and Wilkins, "In the Mind's Ear: The Semantic Extensions of Perception Verbs in Australian Languages", *Language*, vol. 76, no. 3, September 2000, pp. 546–592. Evans and Wilkins' 1998 study of Australian languages confirmed that the patterns of semantic extensions in the domain of perception verbs followed Viberg's model, but it also underlined the importance of hearing verbs in those languages

[62] To name just a recent example, see Lila San Roque, Kobin H. Kendrick, Elisabeth Norcliffe et al., "Vision Verbs Dominate in Conversation across Cultures, but the Ranking of Non-Visual Verbs Varies", *Cognitive Linguistics*, 2015, advance online publication, available online at: http://pubman.mpdl.mpg.de/pubman/item/escidoc:2045058:8/component/escidoc:2083297/SanRoque_etal_CogLin_2015.pdf [last access: February 2015]

the expression of perception includes not only the lexicon—names and verbs, and other lexical forms like adjectives or adverbial constructions—but also grammar, e.g. linguistic elements like syntactic structure, modalities, evidentials, personal marks, and metadiscursive marks.[63] Actually, today linguistic research into the language of the senses typically combines textual analysis of everyday reports, questionnaires, or transcriptions of face-to-face conversations, with participant-observation in particular contexts, and sometimes with experimental studies.[64]

A second line of research on the language and the senses is the one developed in cognitive linguistics regarding conceptual metaphors, that is the basic metaphors that structure our thought. Thus, in *Metaphors We Live By* (1980), George Lakoff and Mark Johnson included "Understanding is seeing; ideas are light-sources; discourse is a light-medium" in a list of relevant examples of conceptual metaphors. They recognized the existence of "primary metaphors" "that are directly grounded in the everyday experience that links our sensory-motor experience to the domain of our subjective judgments", and asserted that "many primary metaphors are universal".[65] (Later on, in *Philosophy in the Flesh* (1999) Lakoff and Johnson mentioned "Knowing is Seeing" among primary metaphors).[66] [67] Working in parallel to Lakoff and Johnson, linguist Eve

[63] See for instance Danièle Dubois, "Les 'mots' et les catégories cognitives du sensible: des rapports problématiques. Des couleurs, des odeurs et des bruits", *Cahiers du LCPE*, no. 7, September 2006, pp. 4–38, on pp. 36–37, available online: http://www.lam.jussieu.fr/Publications/CahiersLCPE/cahier7.pdf [last access: February 2015], and also Alexandra Y. Aikhenvald and Anne Storch, "Linguistic Expression of Perception and Cognition: A Typological Glimpse", in Alexandra Y. Aikhenvald and Anne Storch (eds), *Perception and Cognition in Language and Culture*, Leiden, Koninklijke Brill NV, 2013, pp. 1–45. As I will explain below, this realization is analogous to the extension of the notion of the "language of emotions" to cover not only the words describing specific emotions, e.g. anger, joy, sadness, shame, etc., but also emotion metaphors and metonymys, or expressive marks like interjections or exclamations, and even metadiscursive elements like intonation or gestures accompanying talk

[64] See San Roque, Kendrick, Norcliffe et al., "Vision Verbs Dominate in Conversation across Cultures, p. 6.

[65] George Lakoff and Mark Johnson, *Metaphors We Live By*, Chicago, University of Chicago Press, 2003, p. 255 and 257.

[66] See the list of primary metaphors in George Lakoff and Mark Johnson, *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*, New York, Basic Books, 1999, pp. 50–54.

[67] Regarding emotion metaphors, in *Women, Fire, and Dangerous Things* (1987) Lakoff examined the conceptual structure of anger metaphors in English, and argued that the basic-level metaphors ('hot fluid', 'insanity', 'fire', 'burden', 'struggle') on which our understanding of anger depends are most probably embodied—an hypothesis

Sweetser (1990) examined the semantic field of perception verbs and argued that there is "a general tendency to borrow concepts and vocabulary from the more accessible physical and social world to refer to the less accessible worlds of reasoning, emotion, and conversational structure".[68] While this tendency may have psychosomatic roots, it can be better explained with reference to a general "Mind-as-Body Metaphor" connecting physical perception to internal sensations.[69] According to Sweetser, this metaphor, or at least some aspects of it "may be fairly common crossculturally, if not universal—for example, the connection between vision and knowledge—while others (…) may vary a good deal between cultures."[70]

However, this claim has later been questioned by other scholars, like Evans and Wilkins, who investigated "hearing verbs" in some Australian languages and found that those languages form verbs of cognition like 'think' and 'know' from the equivalents of 'hear', but not from the equivalents of 'see'—[71] an outcome that is in line with the positions of the anthropology of the senses that I have reviewed in this chapter. More recently, Iraide Ibarretxe-Antuñano has also criticized universalist positions and has offered a more detailed analysis of perception metaphors. Drawing on physiological and

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that, he claimed, was supported by experimental research. Lakoff refers to experimental research on emotion-related activity of the autonomic nervous system conducted by Paul Ekman, Robert Levenson and Wallace Friesen; see George Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind*, Chicago, University of Chicago Press, 1987, pp. 380–415, esp. pp. 406–408. His collaborator, Zoltán Kövecses, enlarged the conclusions of that research by studying anger and other emotion metaphors cross-culturally, and concluded at least some emotions—including anger—seem to be rooted in human physiology, as attested by the presence of similar conceptual metaphors in different languages—for instance, in the case of anger, the 'pressurized container metaphor'. However, Kövecses' theory also leaves ample space for cultural variation in the conceptualization of emotion; see Zoltán Kövecses, *Metaphor and Emotion: Language, Culture, and Body in Human Feeling*, Cambridge, Maison des Sciences de l'Homme-Cambridge University Press, 2000, esp. chapters 8 ("Universality in the Conceptualization of Emotions", pp. 139–163) and 9 ("Cultural Variation in the Conceptualization of Emotion", pp. 164–181). The main langages considered by the author are English, Hungarian, Chinese and Japanese, though references to other languages are also included.

[68] Eve Sweetser, *From Etymology to Pragmatics. Metaphorical and Cultural Aspects of Semantic Structure*, Cambridge-New York-Melbourne, Cambridge University Press, 1990, p. 31.

[69] Ibid., pp. 28–32.

[70] Ibid., p. 45.

[71] Nicholas Evans and David Wilkins, , "In the Mind's Ear: The Semantic Extensions of Perception Verbs in Australian Languages", *Language*, vol. 76, no. 3, September 2000, pp. 546–592. Yet, Evans and Wilkins's research confirms Viberg's pattern of meaning extension from "higher" to "lower" sensory modalities.

psychological literature on the senses, she has summarized the properties that may characterize each sense and has argued that perception metaphors may cover some or all of the properties characterizing the sense associated with that metaphor. Ibarretxe-Antuñano has also recognized that analyses of perception metaphors cannot solely rely on physiological and psychological knowledge of the sensorimotor system, but must be complemented with cultural information.[72]

A third line of research in cognitive linguistics regards the question of the limits of language in communicating sensory experiences, and more specifically the question of "differential ineffability" across sensory modalities and languages, which would explain, for instance, why in English it is normally considered easier to talk about colours than smells.[73] While differences like this, both across the senses (e.g. odours vs. colour shades) and across languages (English vs. Jahai, for instance) are far from rare and beg for an explanation,[74] the main researchers currently working in this field—Asifa Majid and Stephen C. Levinson, of the Max Planck Institute in Berlin—do not seem to have found a simple one. According to them, explanations of differences across the senses may be cognitive-architectural, that is related to the structure of the human mind, or may point to the limits of language. [75] On the other hand, differences across languages may either depend on the characteristics of a particular language, or may also

[72] See Ibarretxe-Antuñano, Polysemy and Metaphor in Perception Verbs; also by her see "The Power of the Senses and the Role of Culture in Metaphor and Language", in Rosario Caballero and Javier E. Díaz Vera (eds), *Sensuous Cognition: Explorations in Human Sentience, Imagination, (E)motion and Perception*, Berlin, Walter de Gruyter, 2013, pp. 109–133.

[73] On the notion of "differential ineffability" see Stephen C. Levinson and Asifa Majid, "Differential Ineffability and the Senses", *Mind & Language*, vol. 29, no. 4, September 2014, pp. 407–427.

[74] In a cross-cultural experiment Asifa Majid and Niclas Burenhult tested ten native speakers of Jahai (a language spoken in the mountain rainforests along the border between Peninsular Malaysia and Thailand) and ten speakers of American English and found out that the first ones were able to name odours "with the same conciseness and level of agreement as colours", and certainly with much more precision and ease than American English speakers; see Asifa Majid and Niclas Burenhult, "Odors Are Expressible in Language, As Long as You Speak the Right Language", *Cognition,* 130, 2014, pp. 266–270, on p. 269.

[75] Asifa Majid and Stephen C. Levinson, "The Senses in Language and Culture", *Senses & Society*, vol. 6, no. 1, 2011, pp. 5–18, on p. 9.

have cultural roots, since "underdeveloped coding of sensory domains may simply reflect lack of preoccupation".[76] In other words, plausibly the level of sophistication attained by the vocabulary of a certain sensory modality would be related to the complexity of the cultural practices and objects in which that modality is normally engaged in a certain community,[77] as attested by the already classical example of Eskimo words to describe snow, reported originally by Franz Boas.[78]

In contrast to those ambiguous developments in the field of linguistics, anthropologists have only showed a limited interest in the question of the language of the senses. On the one hand, as I have anticipated, the critics of the anthropology of the senses and the proponents of sensory ethnography—scholars like Sarah Pink, Tim Ingold, or Cristina Grasseni—have steered the discipline further away from language, into bodily experience. Many of them are moved by a desire either to break what they perceive as the constrictive mould of language, or to explore the new ways of knowledge, expression and communication that digital audiovisual technologies have brought to the field.

On the other hand, general disinterest, or even animosity towards "textualism", understood as a modality of visualism, and a progressive abandonment of the question

[76] Levinson and Majid, "Differential Ineffability and the Senses", pp. 417–421, on p. 421.

[77] Similar subjects have also been tackled with reference to emotions, in particular by Robert Levy, who in his early ethnography of self and emotion among the Tahitians discussed "hypercognized" and "hypocognized" emotions, that is emotions that are very much elaborated, or scarcely elaborated in a certain culture. However, while "hypercognized" and "hypocognized" emotions are apparently established by comparison inside a certain culture, the process of defining a grid of emotions belonging to that culture necessarily mobilizes the notions and typologies of emotions of the ethnographer's native culture. According to Levy, "hypercognition" and "hypocognition" must be understood as different ways of controlling the emotions: while "hypercognized" emotions would be controlled by discrimination, "hypocognized" emotions, by cultural invisibility; see Robert I. Levy, *Tahitians: Mind and Experience in the Society Islands*, Chicago, University of Chicago Press, 1973, p. 324.

[78] See Franz Boas, "Introduction to the Handbook of American Indian Languages"; *Smithsonian Institution Bulletin*, Part I, 1911, on pp. 25–26. For a later reconsideration from an anthropological point of view, Laura Martin, "Eskimo Words for 'Snow': A Case Study in the Genesis and Decay of an Anthropological Example", *American Anthropologist*, New Series, vol. 88, no. 2, June 1986, pp. 418–423, and more recently see Igor Krupnik and Ludger Müller-Wille, "Franz Boas and Inuktitut Terminology for Ice and Snow: From the Emergence of the Field to the 'Great Eskimo Vocabulary Hoax', in Igor Krupnik et al. (eds), *SIKU: Knowing Our Ice: Documenting Inuit Sea Ice Knowledge and Use*, New York, Dordrecht-Heidelberg-London-New York, Springer Verlag, 2010, pp. 377–400.

language has come to characterize the scholarship of the Concordia group, too. As Thomas Porcello, Louise Meintjes, Ana Maria Ochoa and David Samuels have observed, "a recurring feature in the anthropology of the senses is its rejection of language, discourse, and semiotics as modes for encountering and understanding the sensuous cultural world".[79] Thus, Constance Classen's chapter on "Words of sense" (1993), which to the best of my knowledge is the only essay devoted to the subject by a scholar of the Concordia group, presents an etymological exploration of English words and metaphors—in particular, words and metaphors belonging to the sensory domain. Altogether it is a suggestive, though minor essay, where Classen punctuates a series of examples with observations about visualism, the multisensorial resonances of some words, or differences in changes in meaning. However, she neither refers to the relevant linguistic bibliography on the subject, nor engages with the sociolinguistic preoccupations that had emerged in previous decades among linguistic anthropologists.[80]

These sociolinguistic preoccupations are related to what linguistic anthropologist Alessandro Duranti has called the "second paradigm" in the history of the discipline, which emerged in the early 1960s as a reaction against Noam Chomsky's transformational-generative programme for linguistics and his attempt to change the discipline into, practically, a branch of psychology. Dell Hymes and John Gumperz, among others, advocated instead an approach initially called the "ethnography of speaking", which was known later as the "ethnography of communication". Unlike Chomskian generative grammar, the ethnography of communication was more concerned with performance than with competence: bridging the gap between linguistic

[79] Thomas Porcello, Louise Meintjes, Ana Maria Ochoa and David W. Samuels, "The Reorganization of the Sensory World", *Annual Review of Anthropology*, vol. 39, 2010, pp. 51–66, on p. 59.

[80] In Constance Classen, *Worlds of Sense: Exploring the Senses in History and Across Cultures*, London-New York, Routledge, 1993, pp. 50–76.

structures and sociocultural ethnographies, it put an accent on the contexts and the circumstances where "speech events" happened, and tried to describe how they happened. [81] Among the different types of speech events analysed, Richard Bauman elaborated his theories on performance as an emergent quality of verbal art.[82]

The "third paradigm" in the history of linguistic anthropology, as defined by Duranti, was associated with the reappearance of social constructivism in the 1980s and 1990s, where the notion of discourse occupied a place of honour.[83] Though it has not been influential in the development of the anthropology of the senses and sensory ethnography, it has become central to the neighbouring field of the anthropology of emotions.

2.1.4 The anthropology of the emotions and the question of discourse

Like the anthropology of the senses, the anthropology of the emotions developed as a field in the 1980s,[84] and it also emerged in contrast to the conception of emotions as natural, merely physiological—thus, universal—and opposed to rational thought.[85] The theoretical and methodological challenges attached to it were thus remarkably similar to those attached to the anthropology of the senses.

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[81] Duranti's "second paradigm" is explained in Alessandro Duranti, "Language as Culture in U.S. Anthropology", *Current Anthropology*, vol. 44, no. 3, June 2003, pp. 323–347, on pp. 326–332. On the ethnography of communication see Dell H. Hymes, *Foundations in Sociolinguistics: An Ethnographic Approach*, Philadelphia, University of Pennsylvania Press, 1974, and Richard Bauman and Joel Scherzer, "The Ethnography of Speaking", *Annual Review of Anthropology*, vol. 4, 1975, pp. 95–119; see also Beeman, "Linguistics and Anthropology", pp. 538–542.

[82] See for example Richard Bauman, *Verbal Art as Performance*, with supplementary essays by Barbara A. Babcock, Gary H. Gossen, Roger D. Abrahams and Joel F. Sherzer, Prospect Heights, Waveland Press, 1984 (originally published in 1977).

[83] Duranti, "Language as Culture in U.S. Anthropology", pp. 332–333.

[84] For a well-crafted (though a bit outdated) review of the field, see Catherine A. Lutz and Geoffrey M. White, "The Anthropology of Emotions", *Annual Review of Anthropology*, vol. 15, 1986, pp. 405–436.

[85] For a critique of this conventional view, see chapter 3 of Catherine A. Lutz, *Unnatural Emotions: Everyday Sentiments on a Micronesian Atoll and Their Challenge to Western Theory*, Chicago, University of Chicago Press, 1988, pp. 53–80. Many philosophers have also criticized this view, see for instance Robert C. Solomon, "Getting Angry: The Jamesian Theory of Emotion in Anthropology", in Shweder and Levine (eds), *Culture Theory: Essays on Mind, Self and* Emotion, pp. 238–254, and Roland de Sousa, *The Rationality of Emotion*, Cambridge, MA, MIT Press, 1987.

The conventional view that emotions are natural and universal has historically relied on Charles Darwin's *The Expression of the Emotions in Man and Animals* (1872), where the author underlined the continuities between the expressive actions of man and lower animals and made the case for the innateness of most of those actions.[86] Besides, William James' influential essay "What is an Emotion?" (1884) focused on emotions that are normally associated with some kind of bodily disturbances. He argued that those feelings are not the cause of bodily changes, but happen at the same time that bodily changes take place, as a result of the perception of some exciting fact.[87] While James recognized that some emotions are related to mental processes exclusively, in "What is an Emotion?" he associated emotional processes to motor and sensory processes—an idea that was independently explored by Danish physiologist Carl Lange, and which is hence known as the James-Lange theory of emotion.

Drawing both on Darwin's research and on the investigations into affect of his mentor, Silvan Tomkins,[88] US psychologist Paul Ekman has elaborated since the 1960s a theory of so-called "basic emotions", or rather "emotion families"—at least six: anger, fear, sadness, happiness, disgust (or contempt) and surprise—that would be present in all cultures, and which would be associated with specific facial expressions.[89] In spite of recognizing the social dimension of emotions, Ekman and his collaborators have argued that "basic emotions" are unintentional and therefore independent from the memories,

[86] Charles Darwin, *The Expression of the Emotions in Man and Animals*, with a new introduction by Konrad Lorenz, Chicago, The University of Chicago Press, 1965.

[87] William James, "What is an Emotion?", *Mind*, vol. 9, no. 34, April 1884, pp. 188–205.

[88] By Tomkins see for instance Silvan S. Tomkins, *Exploring Affect: The Selected Writings of Silvan S. Tomkins*, edited by E. Virginia Demos, Cambridge-Paris, Cambridge University Press-Éditions de la Maison des sciences de l'homme, 1995.

[89] See mainly Paul Ekman, "The Argument and Evidence About Universals in Facial Expressions of Emotion", in Hugh L. Wagner and Anthony Manstead (eds), *The Handbook of Social Psychophysiology*, New York, John Wiley & Sons, 1989, pp. 143–164; on "emotion families" see for instance Paul Ekman, "An Argument for Basic Emotions", *Cognition and Emotion*, vol. 6, no. 3–4, 1992, pp. 169–200. Along the years Ekman has updated his theories in a miriad of publications, by himself alone or with others, most of which are available here: http://www.ekmaninternational.com/paul-ekman-international-plc-home/research.aspx [last access: March 2015].

expectations or judgements of individuals. So influential as this notion has become, it only deals with a very specific aspect of emotions, namely their non-verbal expression. It has also received sound criticisms, for instance regarding the tagging of "basic emotions" with English terms,[90] or the employment of stereotypical images (posed facial expressions) in experimental tests.[91]

Indeed, one of the earliest and most severe critics of Ekman was Margaret Mead, who in 1975 questioned his methods and accused him of ignoring the contributions of anthropologists to the study of facial expression.[92] Mead was not particularly interested in facial expression, but in the pre-war years had produced a series of ethnographical studies that—as Gregory Bateson's *Naven* (1936)—tried to capture the emotional tone of a culture, its *ethos*—a concept she and Bateson borrowed from her mentor, Ruth Benedict. These studies[93] could be considered a precedent for the anthropology of emotions, although other, earlier precedents have been identified, like the investigation into sentiment among the Andaman Islanders carried out by British Alfred Radcliffe-Brown (published as *The Andaman Islanders*, 1922), or French Lucien Lévy-Bruhl's

[90] See chapter 4 ("Reading Human Faces") of Anna Wierzbicka, *Emotions Across Languages and Cultures: Diversity and Universals*, Cambridge-Paris, Cambridge University Press-Éditions de la Maison des Sciences de l'Homme, 1999, pp. 168–215.

[91] See Ruth Leys, "How Did Fear Become a Scientific Object and What Kind of Object Is It?", *Representations*, 110, Spring 2010, pp. 66–104, which also summarizes criticisms by others. Leys alerts to the fact that, in the wake of 9/11, Ekman is receiving federal funds to work on methods of surveillance that would read involuntary facial signs on potential terrorists and discover their intentions.

[92] Margaret Mead's review of Paul Ekman (ed.), *Darwin and Facial Expression: A Century of Research in Review* (New York, Academic Press, 1973) appeared in the *Journal of Communication*, vol. 25, no. 1, 1975, pp. 209–213. Ekman's account of and response to the episode constitutes the main subject of his "Afterword: Universality of Emotional Expression? A Personal History of the Dispute" to Charles Darwin, *The Expression of the Emotions in Man and Animals*, with an introduction, afterword and commentaries by Paul Ekman, and an essay on the history of the illustrations by Phillip Prodger, New York-Oxford, Oxford University Press, 1998, pp. 363–393.

[93] I am referring to Mead's, *Coming of Age in Samoa: A Psychological Study of Primitive Youth for Western Civilisation* (New York, William Morrow & Co., 1928), *Growing Up in New Guinea: A Comparative Study of Primitive Education* (New York, Blue Ribbon, 1930) and *Sex and Temperament in Three Primitive Societies* (New York, William Morrow & Co., 1935); and to Gregory Bateson, *Naven: A Survey of the Problems suggested by a Composite Picture of the Culture of a New Guinea Tribe Drawn from Three Points of View* (Cambridge, Cambridge University Press, 1936).

theories of "primitive mentality" (more on these theories in the next chapter).[94] At the end of the 1950s US anthropologist Hildred Geertz published a pioneering essay on "The Vocabulary of Emotions" (1959/1974).[95] Her then husband, Clifford Geertz, studied the Javanese notion of *rasa*, translatable as 'feeling' or 'meaning',[96] and in his study of pre-colonial Bali (*Negara*, 1980) concluded that the passions informing the Balinese political institutions of domination were as cultural as those institutions.[97] Jean Briggs' analysis of anger in an Eskimo family (1970) and Robert Levy's study of self and emotion in Tahiti (1973) provided early examples of ethnographic reports focused on emotional life.[98]

The studies produced by the Geertzs, Briggs and Levy stimulated other, more substantial attempts at an anthropology of the emotions in North America, between the end of the 1970s and the early 1980s: Fred Myers's survey of emotions among the Australian Pintupi[99] and Michelle Rosaldo's study of emotions among the Ilongots of the Philippines. Rosaldo, in particular, defined emotions "as cognitions implicating the immediate, carnal 'me'—as thoughts embodied", [100] though she also made the case for a consideration of their sociocultural basis, in line with the assumptions of social

[94] See Vincent Crapanzano, "Réflexions sur une anthropologie des émotions", *Terrain*, March 1994, pp. 109–117, on p. 109.

[95] Hildred Geertz, "The Vocabulary of Emotions: A Study of Javanese Socialization Processes", *Psychiatry* , vol. 22, 1959, pp. 225–237; later republished in Robert LeVine (ed.), *Culture and Personality*, Chicago, Aldine, 1974, pp. 249–264.

[96] Clifford Geertz, *The Interpretation of* Cultures, 1973, pp. 126–141. Emotions are also briefly discussed in another chapter of the same book, "The Growth of Culture and the Evolution of the Mind", pp. 55–83, on pp. 80–82.

[97] Clifford Geertz, *Negara: The Theatre State in Nineteenth-Century Bali*, Princeton, NJ, Princeton University Press, 1980, p. 124. Geertz's observation about the emotions was heavily dismissed as "rubbish" by British social anthropologist Edmund Leach in his review of the book; see Edmund Leach, "A Poetics of Power (1981)", in Stephen Hugh-Jones and James Laidlaw (eds), *The Essential Edmund Leach, vol. 1: Anthropology and Society*, New Haven, CT, Yale University Press, 2001, pp. 136–140, on pp. 139–140. For a reconsideration of Leach's position, see Robert I. Levy, "Emotion, Knowing, and Culture", in Shweder and Levine (eds), *Culture Theory: Essays on Mind, Self and Emotion*, pp. 214–237.

[98] Jean L. Briggs, *Never in Anger: Portrait of an Eskimo Family*, Cambridge, MA, Harvard University Press, 1970; Levy, *Tahitians: Mind and Experience in the Society Islands*; an also Levy, "Emotion, Knowing, and Culture".

[99] Fred Myers, "Emotions and the Self: A Theory of Personhood and Political Order among the Pintupi Aborigines", *Ethos*, vol. 7, no. 4, Winter 1979, pp. 343–370.

[100] Rosaldo, "Toward and Anthropology of Self and Feeling", p. 138.

constructionism.[101] Distancing herself from interpretations of emotions as symbols, Rosaldo tried to understand how Ilongot terms—for instance, the notion of *liget*, translatable as "anger"—acquired meaning in everyday linguistic usage "through their association with enduring patterns of social relationship and activity in Ilongot daily life".[102] Other notable anthropologists, like Catherine Lutz and Lila Abu-Lughod, among others, have contributed ethnographies of emotions (among the Ifaluk of Micronesia and among the Egyptian Bedouin, respectively)[103] that also place an emphasis on their *discursive* nature, that is on the fact that they exist primarily as notions in linguistic exchanges (as "emotion talk") and are employed in relationship to particular situations and contexts.[104] Indeed, not only anthropologists, but also linguists like Anna Wierzbicka, and psychologists like Rom Harré and Graham Richards have recognized the importance of language in the understanding of emotions.[105]

However, as John Leavitt has pointed out, the starting point of many ethnographic reports on emotions has been (and is) empathy, and this ultimately points, if not to a cross-cultural understanding of emotions, at least to the possibility of

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[101] On social constructionism in connection with the study of emotions, see Claire Armon-Jones, "The Thesis of Constructionism", in Rom Harré (ed.), *The Social Construction of Emotions*, Oxford, Basil Blackwell, 1986, pp. 32–56.

[102] Michelle Rosaldo, *Knowledge and Passion: Ilongot Notions of Self and Social Life*, Cambridge, Cambridge University Press, 1980, pp. 20–30, on p. 27. Rosaldo's invocation of everyday linguistic usage ("modes of speaking" instead of words or semantic systems) takes inspiration from Wittgenstein's *Philosophical Investigations*, as she acknowledges ibid., note 16, p. 261. Emotions are also at the center of Edward Schieffelin's cultural ethnography of the Gisaro ceremony of the Kaluli, in Papua New Guinea, *The Sorrow of the Lonely and the Burning of Dancers* (New York, Saint Martin's Press, 1976).

[103] Lutz, *Unnatural Emotions*; and Lila Abu-Lughod, *Veiled Sentiments: Honor and Poetry in a Bedouin Society*, Berkeley, University of California Press, 1986.

[104] On the relevance of the Foucaultian notion of "discourse" in this context, see Lila Abu-Lughod and Catherine A. Lutz, "Introduction" to Catherine A. Lutz and Lila Abu-Lughod (eds), *Language and the Politics of Emotion*, Cambridge, Cambridge University Press, 1990, pp. 1–23. For a critical appraisal of the role of the notion of "discourse" in the anthropology of emotions, see Daniel V. Rosenberg, "Language in the Discourse of the Emotions", ibid., pp. 162–185. On the importance of "emotion talk" see also Paul Heelas, "Emotion Talk Across Cultures" in Rom Harré and W. Gerrod Parrott (eds), *The Emotions: Social, Cultural and Biological Dimensions*, London-Thousand Oaks, CA-New Dehli, SAGE, 1996, pp. 171–199.

[105] Wierzbicka, *Emotions Across Languages and Cultures*; Harré (ed.), *The Social Construction of Emotions*; Rom Harré and Grant Gillett, "Emotion Words and Emotional Acts" in their *Discursive Psychology,* Thousand Oaks, CA, SAGE, 1994, pp. 144–161; Graham Richards, "Emotion into Words—or Words into Emotions?", in Penelope Gouk and Helen Hills (eds), *Representing Emotions: New Connections in the Histories of Art, Music and* Medicine, Aldershot, Ashgate, 2005, pp. 49–65.

translating emotion-talk and even, to a certain extent, *translating* the feelings experienced in the situation through ethnographic description.[106] On this experiential and theoretical basis, Leavitt has argued for a model of emotions that would recognize them "as involving both cultural meaning and bodily feeling".[107] Thinking along the same lines, Margot Lyon has criticized the constructionist approach to emotions as an attempt to equate the understanding of emotion to the understanding of cultural categories of emotion. Also, historian William Reddy has also found fault with the difficulties of using the constructionist approach to explain emotional change.[108] As I will report in the next chapter, Reddy has elaborated a theory of the emotions that tries to bridge the gap between psychological (universalist) and anthropological (constructivist) approaches to the subject, by explaining how emotion-language has an effect on emotion-experiences.[109]

Since the 1980s psychological debates have revolved around such key subjects as the relationship between affect and cognition,[110] or the possibility of decomposing emotions into different dimensions or aspects.[111] On the other hand, in this century the

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[106] John Leavitt, "Meaning and Feeling in the Anthropology of Emotions", *American Ethnologist*, vol. 23, no. 3, 1996, pp. 514–539, on p. 519 and pp. 529–531. Yet, for a moving vindication of empathy within the constructionist tradition, see Renato Rosaldo, "Introduction: Grief and a Headhunter's Rage", in his *Culture & Truth: The Remaking of Social Analysis*, Boston, Beacon Press, 1989, pp. 1–21.

[107] Leavitt, "Meaning and Feeling in the Anthropology of Emotions", p. 531.

[108] William M. Reddy, "Against Constructionistm: The Historical Ethnography of Emotions", *Current Anthropology*, vol. 38, no. 3, June 1997, pp. 327–351, including also comments by Donald Brenneis, Linda C. Garro, Signe Howell, Lynn Hunt, Chia Longman, Catherine Lutz, and a final reply by William M. Reddy.

[109] William M. Reddy, *The Navigation of Feeling: A Framework for the History of Emotions,* Cambridge, Cambridge University Press, 2001.

[110] The relationship between affect and cognition was the subject of heated debate between US psychologists Robert Zajonc, who defended the primacy of affect, and Richard Lazarus, who pioneered research into the pairing of emotion and thought, though both scholars seem to have based their tenets on significantly different definitions of emotion; see Robert B. Zajonc, *The Selected Works of R.B. Zajonc*, Hoboken, NJ, J. Wiley and Sons, 2004, esp. parts five, six and seven (pp. 168–361); and Richard Lazarus, *Emotion and Adaptation*, Oxford, Oxford University Press, 1994.

[111] For an introduction to contemporary psychological theories of emotions, see Klaus R. Scherer and Paul Ekman (eds), *Approaches to Emotion*, Hillsdale, NJ, Lawrence Erlbaum, 1984; Paul Ekman and Richard J. Davidson (eds), *The Nature of Emotion: Fundamental Questions*, New York-Oxford, Oxford University Press, 1994; and Richard J. Davidson, Klaus R. Scherer and H. Hill Goldsmith (eds), *Handbook of Affective Sciences*, Oxford-New York, Oxford University Press 2003 (latest edition, 2009). For a very brief summary of classical and contemporary psychological

notion of affect theorized by Tomkins, that is the biological or preconscious side of emotions,[112] is receiving increasing attention from various disciplinary fields thanks to the influence of French philosophers Gilles Deleuze and Félix Guattari, and to the efforts of their Canadian translator, Brian Massumi. In contrast to the social constructionist approach to the emotions, theorists of affect place bodily experience at the centre of their research.[113] In that sense they may be considered to be intellectually close to neurobiologists like Antonio Damasio, who has also devoted close theoretical attention to the role of emotions and feelings in consciousness. Thus, in *The Feeling of What Happens* (2000) Damasio claimed that "background emotions", induced most often by internal sensations, play an important role in the development of what he calls "core consciousness".[114] As Ruth Leys has recently argued, there is at least one principle that binds together Deleuze-inspired affect theorists, neurobiologists like Damasio, and psychologists of basic emotion like Tomkins and Ekman (in spite of the fact that not all of them speak of "affect"; Damasio and Ekman mainly employ the term "emotions"): what she calls their "shared anti-intentionalism", that is "the belief that affect is independent from signification and meaning".[115]

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theories of emotions, see George Mandler, "Emotion", in Freedheim and Weiner (eds): *Handbook of Psychology, vol. 1. History of Psychology*, pp. 157–175.

[112] On the differences between affect, emotions and feelings see Eric Shouse, "Feeling, Emotion, Affect", *M/C Journal*, vol. 8, no. 6, 2004, available online: http://journal.media-culture.org.au/0512/03-shouse.php [last access: July 2015].

[113] See the introduction to Brian Massumi, *Parables for the Virtual: Movement, Affect, Sensation*, Durham, NC, Duke University Press, 2002, pp. 1–21. By Gilles Deleuze and Félix Guattari see *Mille Plateaux: capitalisme et schizophrénie*, Paris, Éditions du Minuit, 1980; translated into English as *A Thousand Plateaus: Capitalism and Schizophrenia*, translated by Brian Massumi, Minneapolis, University of Minnesota Press, 1987. The treatment of affect by Deleuze, Guattari and Massumi follows a thread of philosophical reflections on the subject by Baruch Spinoza, Henri Bergson, Gilbert Simondon and others.

[114] Antonio R. Damasio, *The Feeling of What Happens: Body, Emotion and the Making of Consciousness*, London, Vintage, 2000. Later Damasio has explored emotions more deeply in *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain*, London, William Heinemann, 2003, where (like Deleuze and Massumi) he returns to Spinoza's treatment of affect in the *Ethics*.

[115] Ruth Leys, "The Turn to Affect: A Critique", *Critical Inquiry*, no. 37, Spring 2011, pp. 434–472, on p. 443.

2.1.5 From the anthropology of music to acoustemology

Many of the intellectual developments that I have reviewed in the previous section, and which place the question of the senses into a wider framework—one including bodily and emotional experiences, and considering also their relationship to cognition and language—have found a reception among scholars dealing with hearing and sound. As early as 1976 US philosopher Don Ihde published *Listening and Voice: A Phenomenology of Sound*, where he engaged not only with Merleau-Ponty's phenomenology of perception, but also with his precursors, Edmund Husserl and Martin Heidegger, in order to formulate an "ontology of the auditory". While criticizing the two aspects of visualism, namely the reduction of knowledge to vision, and the separation of sense from significance,[116] Ihde attempted a description of embodied auditory experience at the existential level.

Phenomenology also inspired the course taken by Steven Feld's research in the 1980s and 1990s, when he evolved from a consideration of "sound as a symbolic system to acoustemology".[117] Notions like "symbolic systems" or "patterns" were indeed central to the conceptual structure of his major book, *Sound and Sentiment* (1982), where he ultimately relied on ideational, symbolic and interpretive approaches to culture.[118] Yet, the innovative impulse of that research lay on the author's effort to go beyond the anthropology of music, as advocated by Alan Merriam—that is, as the joint study of musical sounds and the social behaviours and concepts involved in producing them—in order to explore an "anthropology of sound", including the expressive forms

[116] See chapter 1 ("In Praise of Sound") of Don Idhe, *Listening and Voice: Phenomenologies of Sound*, Albany, State University of New York Press, 2007, pp. 3–15. (The first 16 chapters of the 2007 edition correspond to the first edition, which appeared as *Listening and Voice: A Phenomenology of Sound*, Athens, Ohio University Press, 1976).

[117] "From sound as a symbolic system to acoustemology" is the title of one of the sections of Steven Feld, "Sound Worlds", in Patricia Kruth and Henry Stobart (eds), *Sound*, Cambridge, Cambridge University Press, 2000, pp. 173–200, on p. 183.

[118] See Steven Feld, *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression*, thirtieth anniversary edition with a new introduction, Durham-London, Duke University Press, 2012 (3rd ed.), pp. 225–230.

that are in between language and music, as well as the relationship between bioacoustics (the sounds of the forest, water streams, animals, etc.) and socioacoustics.[119] For that purpose Feld turned to Hymes' ethnography of communication, which I have mentioned above.[120] Yet, the consideration of music and sound as part of an ethnography of communication had been anticipated by British ethnomusicologist John Blacking, who must be credited with conceiving music listening as a communicative process. [121]

In his 1973 essay *How Musical is Man?* Blacking declared that "the capacity to listen and to distinguish patterns of sound" is "the basic capacity without which no musical tradition can exist",[122] and explained that, in order for men and women to be able to listen to music, there must be "some common ground of experience", because the possibility of perceiving a certain "order in sound" necessarily depends on "some consensus of opinion about the principles on which the sounds of music should be organized".[123] In this way Blacking defined music as a communicative process based on a fundamental correspondence between production rules and reception rules, implying that different communities might have different correspondence rules conforming to their own particular ideas of what should be considered as music. In other words, Blacking advocated a cultural comprehension of musical practices that privileged the

[119] See the Introduction to the third edition, in Feld, *Sound and Sentiment*, pp. xiii–xxxvii, on pp. xxiv–xxv. On Feld's project of an "anthropology of sound" and his relationship with Merriam see Steven Feld and Donald Brenneis, "Doing Anthropology in Sound", *American Ethnologist*, vol. 31, no. 4, 2004, pp. 461–474, on p. 463. See also Alan P. Merriam, *The Anthropology of Music*, Evanston, IL, Northwestern University Press, 1964.

[120] Hymes, *Foundations in Sociolinguistics*; see Feld, *Sound and Sentiment*, pp. 14–16. As Feld himself, Dell Hymes studied with US linguist and anthropologist Carl Voegelin at Indiana University; on Feld's relationship with Voegelin see Feld and Brenneis, "Doing Anthropology in Sound", p. 463. Sociolinguistics was also part of the intellectual background of Feld's close friend Bambi Schieffelin, who together with anthropologist Edward Schieffelin had been working in the Bosavi area for years at Feld's arrival, and who introduced him to the Kaluli community.

[121] Feld mentions Blacking in an early paper (Steven Feld, "Linguistic Models in Ethnomusicology", *Ethnomusicology*, vol. 18, no. 2, May 1974, pp. 197–217) where he invokes him in support of his criticism of the application of transformational grammar models to the study of music

[122] John Blacking, *How Musical is Man?*, Seattle, University of Washington Press, 1973, p. 8.

[123] *Ibid*., p. 10.

emic prospective over the etic one, and which conceived ethnomusicology as an effort to listen to what *others* were listening to.[124]

However, by identifying listening with "distinguish[ing] patterns of sound" and perceiving "order in sound", Blacking seemed to refer basically to mental operations accomplished by the intellect, through the senses, making thus the case for a concept of music listening—"creative listening" or "structured listening"—built on shared knowledge ("some consensus of opinion"), but where the listeners' bodies and emotions would not primarily matter.[125] This position is basically in tune with Feld's "Communication, Music, and Speech about Music" (1984), where he characterizes listening as a communicative process that is socially situated, and where he sees music as a sound object to be decoded by the listener through various "interpretive moves" ("locational", "categorical", "associational", "reflective", "evaluative").[126]

In a later essay—"Music, Culture and Experience", published originally in 1984—Blacking gave another definition of listening that is of interest here. Addressing the question of "music cognition", though also trying to avoid "the false dichotomies of thought/feeling, reason/emotion, and mind/body", he distinguished "two contrasting but complementary modes of discourse, which are necessary components of music-making and which can also reveal how people think about music": the *verbal* mode, and the *nonverbal* mode. Under *nonverbal*, i.e. "performing music as a way of knowing, and

[124] On this point see also John Blacking, "The Problem of 'Ethnic' Perceptions on the Semiotics of Music", in Wendy Steiner (ed.), *The Sign in Music and Literature*, Austin, University of Texas Press, 1981, pp. 184–194; see John M. Chernoff, *African Rhythm and African Sensibility: Aesthetics and Social Action in African Musical Idioms*, Chicago, University of Chicago Press, 1979; and Stephen Blum,"Hearing the Music of the Middle East", in Virginia Danielson, Scott Marcus and Dwight Reynolds (eds), *The Garland Encyclopedia of World Music*, *vol. VI: The Middle East*, New York, Garland, 2002, pp. 3–13.

[125] Blacking, *How Musical is Man?*, p. 10. On this see also John Blacking, "Towards a Theory of Musical Competence", in E.J. de Jager (ed.), *Man: Anthropological Essays Presented by O.F. Raum*, Capetown, C. Struik, 1971, pp. 19–34. In connection to this observation, it is probably worth mentioning Jean Molino's criticism of Blacking's use of the term *extramusical* in *How Musical is Man*?; see Jean Molino, "La musique et le geste: Prolégomènes à une anthropologie de la musique", *Analyse musicale*, 10, 1988, pp. 8-15, on p. 9.

[126] Steven Feld, "Communication, Music, and Speech about Music", Yearbook for Traditional Music, vol. 16, 1984, pp. 1–18, later included in Charles Keil and Steven Feld, *Music Grooves*, Chicago, University of Chicago Press, 1994, pp. 77–91.

especially bimusical experience, that is, learning to perform adequately the music of two different traditions", Blacking summarized previous reflections on the role of listening and stated that "listening to music is a kind of performance, insofar as listeners must actively recreate and make sense of the sounds they hear".[127] However it may be interpreted, this statement represents a subtle shift in Blacking's approach to the question of listening, and one that precisely seems to take into account the nascent field of the anthropology of the body, of which he was one of the founders. Later on, in *'A Commonsense View of All Music'* (1987) Blacking digested his views on music listening by stating that the power of music as such depends on the bodily sensations that it elicits, but that making sense of it sometimes requires considering other social experiences or symbolic meanings that the music may evoke.[128]

At the beginning of the 1980s Feld got acquainted with the work of Murray Schafer about soundscapes and acoustic ecology, which influenced not only his successive research, but also, even more importantly, his works based on field recordings.[129] Indeed, as he declared later, one important motivation for his research among the Kaluli was his interest in sound recording as anthropological work, triggered by his own professional experience as audio technician and jazz musician, and by his student relationship with British-American anthropologist Colin Turnbull, who since the end of the 1950s had published books and recordings of African forest people.[130] While acknowledging the significance of "the Carpenter-McLuhan-Schaffer lineage", Feld has

[127] John Blacking, *Music, Culture and Experience. Selected Papers of John Blacking*, edited with an introduction by Reginald Byron, with a foreword by Bruno Nettl, Chicago, Chicago University Press, 1995, p. 231.

[128] John Blacking, *'A Commonsense View of All Music': Reflections on Percy Grainger's Contribution to Ethnomusicology and Music Education*, Cambridge, Cambridge University Press, 1987, p. 30.

[129] Feld and Brenneis, "Doing Anthropology in Sound", pp. 465–466. On the importance of Murray Schafer's theories for Feld's research see also Steven Feld, "From Ethnomusicology to Echo-muse-ecology: Reading R. Murray Schafer in the Papua New Guinea Rainforest", presentation at The Tuning of the World Conference on Acoustic Ecology, held at the Banff Centre for the Arts, Banff, Canada, in August 1993, http://www.acousticecology.org/writings/echomuseecology.html [last access: July 2015]

[130] Feld and Brenneis, "Doing Anthropology in Sound", pp. 461–465. Colin Turnbull's *The Forest People* (New York, Simon and Schuster, 1962), on the Mbuti Pygmies of Zaire, includes a chapter on "The Song of the Forest".

also criticized, drawing both on Don Ihde and David Howes, the polar opposition between the eye and the ear, and has stated that a re-evaluation of sensory rations must examine "how tendencies for sensory dominance always change contextually with bodily emplacement".[131] Bodily emplacement is, indeed, central to his notion of "acoustemology" (from the union of "acoustics" and "epistemology"), which he coined in the 1990s and defined as "local conditions of acoustic sensation, knowledge, and imagination embodied in the culturally particular sense of place resounding in the Bosavi".[132] As he explained elsewhere, acoustemology takes inspiration from Merleau-Ponty's concept of embodiment, and from Ihde's descriptions of the reciprocity of hearing and the voice, which Feld supplements with references to the way in which memory is also implicated in perception, that is how "the soundingness of hearing and voicing constitute an embodied sense of presence and of memory".[133]

As the last quotation makes clear, in the debate between representation and experience Feld has been, at least since the mid-1990s, clearly in line with the critics of representation,[134] as it is apparent in his approach to language and emotions. Regarding language, the notion of "iconicity of style", developed in his essay "Aesthetics as Iconicity of Style; or, Lift-up-over-Sounding: Getting into the Kaluli Groove" (1988), referred to the way in which Kaluli musical and verbal performances were shaped by the spatial-acoustic metaphor *dulugu ganalan* or "lift-up-over-sounding", which

[131] Steven Feld, "Waterfalls of Song: An Acoustemology of Place Resounding in Bosavi, Papua New Guinea", in Steven Feld and Keith Basso (eds), *Senses of Place*, Santa Fe, NM, School of American Research Press, 1996, pp. 91–135, on p. 96.

[132] Ibid., p. 91.

[133] Steven Feld, "Sound Worlds", in Patricia Kruth and Henry Stobart (eds), *Sound*, Cambridge, Cambridge University Press, 2000, pp. 173–200, on p. 184. On the importance of memory alongside sensual presence and embodiment see also Feld, "Waterfalls of Song", pp. 93–94.

[134] As a further step in that direction, Feld has recently reframed "acoustemology" within "relational ontology" by underlining his connection to "existential relationality, a connectedness of being" and "the between-ness of experience", where "between-ness" may refer both to interspecies and nature-culture relations; see Steven Feld, "Acoustemology", in David Novak and Mark Sakakeeny (eds), *Keywords in Sound*, Durham, NC-London, Duke University Press, 2015, pp. 12–21, on p. 13.

imitated or resembled environmental sounds that were familiar to the community, like birdsongs in the forest or waterfalls. Therefore, "iconicity" was not a property of language as such, but a characteristic of the style represented by the *dulugu ganalan* metaphor, which embodied "a dual dialectics, sound/environment on the one hand, sound/social relations on the other".[135] Yet, in later writings Feld has increasingly underlined the non-referential aspects of words, pointing to a naturalness of language. For instance, in "Waterfalls of Song" (1996) he analysed the use of placenames in expressive forms among the Kaluli and observed that Kaluli placenames are not only linked to particular stories and memories, and to "the embodied sensation of places", but "over and beyond referentiality" they also implement that sensation since verbal invocation "brings place into heightened conceptual presence".[136] As for emotions, in "Wept Thoughts: The Voicing of Kaluli Memories" (1990) Feld disapproved of the traditional mind/body split and the naturalized view of feelings as reflex acts that comes with it, and presented Kaluli ritual wailing, *sa-yalab*, as a thoughtful expressive behaviour that aesthetically performs personal and social feelings.[137] Yet, in "Waterfalls of Song" he affirmed that his phenomenology-inspired conception of hearing and voicing as involving (sensually and emotionally) the whole body was at odds with Abu-Lughod and Lutz's defence of the primarily discursive character of emotion (see

[135] Steven Feld, "Aesthetics as Iconicity of Style; or, Lift-up-over-Sounding: Getting into the Kaluli Groove", *Yearbook for Traditional Music*, vol. 20, 1988, pp. 74–113, on p. 102. (This essay was later included in Charles Keil and Steven Feld, *Music Grooves*, Chicago, University of Chicago Press, 1994, pp. 109–150). As Feld points out on p. 93, he took the notion of "iconicity", meaning "the non-arbitrariness of any metaphor", from Judith and Alton L. Becker, "A Musical Icon: Power and Meaning in Javanese Gamelan Music", in Wendy Steiner (ed.), *The Sign in Music and Literature*, Austin, University of Texas Press, 1981, pp. 203–215.

[136] Feld, "Waterfalls of Song", p. 113.

[137] Steven Feld, "Wept Thoughts: The Voicing of Kaluli Memories", *Oral Tradition*, vol. 5, no. 2-3, 1990, pp. 241–266, on pp. 257–258.

previous section). Even if, he admitted, emotions may be created in discourse, for him this social creation always depends on (embodied) performance.[138]

2.2 Hearing vs. listening, again

After having taken stock of the contributions to the sensory turn by scholars of different theoretical orientations, I would now try and extract the notions that I consider more useful for the task of rethinking what in the previous chapter I called "the hearing/listening divide", and generally for advancing a provisional explanation of audition on which the rest of this work will build.

It seems obvious to say that listening already implies hearing, but the opposite also happens to be true: hearing is already listening, as we cannot "just hear". Actually, as Merleau-Ponty pointed out, the concept of hearing as mere "physical reception" does not correspond to any distinct human experience: "pure sensations" or "impressions" are "not only undiscoverable, but also imperceptible and so inconceivable as an instant of perception".[139] This is also in line with the enactive approach to perception that I mentioned above, and with ecological model of the senses that I brought up in the previous chapter. A clear example of this would be audiometric tests, which are precisely designed to measure hearing acuity, but must be taken in conditions of focused attention, in the state of readiness that is commonly associated with listening, and ideally in a sound-isolated room.[140] Auditory illusions would also be a good example of this: the fact that auditors hear sounds that are not played, or "impossible"

[138] Feld, "Waterfalls of Song", p. 97. As a matter of fact, a phenomenological view of emotion was already present in *Sound and Sentiment*, where Feld credits Robert Plant Armstrong's *The Affecting Presence* (1971) and *Wellspring: On the Myth and Source of Culture* (1975) as an influence on his views on aesthetic objects as mainly elicitors of feelings; see Feld, *Sound and Sentiment*, pp. 232–236, and also "Aesthetics as Iconicity of Style", pp. 103–104.

[139] Merleau-Ponty, *Phenomenology of Perception*, p. 3.

[140] See chapter 4 ("The Audiometer and Test Environment") of Stanley A. Gelfand, *Essentials of Audiology*, New York-Stuttgart, Thieme, 2009 (3rd ed), pp. 109–126.

sounds", or that they misrepresent the distribution of different auditory channels does not mean that they "hear" something and are then deceived in interpreting it. There is a single moment of (illusory) perception.[141]

As I hope to demonstrate in the course of this research, from an academic point of view the distinction between "hearing" (understood as a "purely physiological" process) and "listening" (defined as a perceptual or cognitive activity) basically functions as a way of delimiting different disciplinary fields, and thus different theoretical approaches to the subject. That distinction is not only rooted, as I have argued so far, in the historical emergence of the pair sensation-perception, but it is also the result of the conceptual separation of the senses and their consideration outside the communicative intermodal matrix where speech, vision, audition, as well as the other senses, make sense together.[142]

Nevertheless, everyday language has still a point in distinguishing "hearing" from "listening", and in using preferably "listening" to refer to the bodily dimension and the contextual engagement implied in auditory perception. As I mentioned in chapter 1, "to listen" may be defined as "to give attention with the ear", where attention (from Latin "*ad tendere*", meaning "to stretch toward") denotes a tension towards a real or imaginary sound source, a tension that normally engages also vision. Tim Ingold has observed that: "we 'hear' with the eyes as well as the ears", and that "*it is the very incorporation of vision into the process of auditory perception that transforms passive hearing into active listening*".[143] I would object that there is no "passive hearing" to

[141] On auditory illusions, see Diana Deutsch's website: http://deutsch.ucsd.edu/psychology/pages.php?i=201 [last access: October 2013], and her CD compilations: *Musical Illusions and Paradoxes* (1995),and *Phantom Words, and Other Curiosities* (2003) both published by Philomel.

[142] On the vocal, auditory, visual and gestural nature of this matrix, see Tim Ingold, "Introduction: Relations between visual—gestural and vocal—auditory modalities of communication", in Kathleen R. Gibson and Tim Ingold (eds), *Tools, Language and Cognition in Human Evolution*, Cambridge, Cambridge University Press, 1993, pp. 35–42.

[143] Tim Ingold, "Stop, Look and Listen! Vision, Hearing and Human Movement", chapter 14 of *The Perception of the Environment*, on p. 277 (emphasis is the author's).

which vision may be incorporated, but just everyday situations where the visual component of hearing may not be so relevant for human communication, or theoretical approaches to which the fact of shunning context would represent some methodological advantage. Therefore, we can as well argue that listening is normally accompanied by a bodily attitude, a certain stock of gestures, as attested by the fact that one can feign listening (or, conversely, pretend not to be listening). In the sense defined by Marcel Mauss (see above, this chapter), listening would be a "body technique", that is a bodily disposition related to a certain activity and normally disseminated by imitation within a specific cultural context.[144]

On the other hand, we never experience our hearing capacity as such, but from the beginning develop it in contact with the world and inside our communities. Hearing and listening are in fact abilities that are normally trained and transmitted, consciously or unconsciously, by everyday imitation and repetition, and that involve the body.[145] This becomes obvious if we consider the role of hearing in the learning process of children in our culture.[146] Immersed before birth in a world of sound, from the moment infants are born they develop their hearing and listening capacities at the same time as they become acquainted with the world through the exploratory behaviour described, among others, by psychologists Jean Piaget and Eleanor Gibson. Exploratory behaviour does not engage children's ears only, but according to Piaget hearing and the voice (phonation) are connected since the moment when children start to react to and learn

[144] Marcel Mauss, "Body Techniques", in *Sociology and Psychology: Essays*, translated by Ben Brewsler, London, Routledge and Kegan Paul, 1979, pp. 95–123.

[145] For a similar claim, although with reference to all the senses and to perception generally, see Rodaway, *Sensuous Geographies: Body, Sense and Place*, p. 22.

[146] See Ingold, "From the Transmission of Representations to the Education of Attention", pp. 129–130.

from the world (what he calls "acquired adaptation").[147] Also, for Gibson looking and listening systems "appear coordinated from the start and unite in attending to the same event";[148] indeed, perceptual exploration engages children's whole "actions systems" and "sensory systems". This learning process must be understood as an "organism-environment system", since "[t]he young organism grows up in the environment (both physical and social) in which his species evolved, one that imposes demands on his actions for his individual survival".[149] As a result, children's ears are attuned to the sounds that predominate in the environment where they grow up; unsurprisingly, they will become better at differentiating those familiar sounds.

Finally, the act of hearing necessarily implies the memories of past experiences, which provide the basis on which the subject interprets the world. As I mentioned above, this aspect was underlined by Steven Feld in his acoustemological research. Yet, it has also been argued by British psychologist Richard Gregory with reference to vision and perception generally: according to him, perceptions are just predictive hypotheses based on stored knowledge.[150] As he has pointed out, they may also be based on a consideration of what can be appropriate to the situation: "Listen to a tape recording of an audience clapping. In the kitchen it sounds like bacon frying. In the garden on a dull day it sounds like rain".[151]

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[147] Jean Piaget, *The Origins of Intelligence in Children*, translated by Margaret Cook, New York, International Universities Press, 1952, p. 77. (The book had originally been published in French as *La Naissance de l'intelligence chez l'enfant*, Neuchâtel, Delachaux & Niestlé, 1936).

[148] Eleanor J. Gibson, "Exploratory Behavior in the Development of Perceiving, Acting, and the Acquiring of Knowledge", *Annual Review of Psychology*, vol. 39, 1988, pp. 1–41, on p. 10.

[149] Gibson, "Exploratory Behavior in the Development of Perceiving, Acting, and the Acquiring of Knowledge", p. 37.

[150] See Richard L. Gregory. "Knowledge in Perception and Illusion", *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, vol. 352, 1997, pp. 1121–1128; "Brainy mind", *British Medical Journal*, vol. 137, 19–26 December 1998, pp. 1693–1695; and also "Perceptions as Hypotheses", in Alva Noë and Evan Thompson (eds), *Vision and Mind. Selected Reading in the Philosophy of Perception*, Cambridge, MA, MIT Press, 2002, pp. 111–133.

[151] Gregory, "Brainy Mind", p. 2.

2.2.1 Auditory (or aural) skills

As I have just argued, while our hearing abilities certainly depend on bodily constraints and particularly on the functioning of the auditory system, they also imply a relationship to a structured environment where regularities (particular situations, times, objects, places, etc.) may be established, and where specific "auditory skills", "aural skills" or, as Trevor Pinch and Karin Bijsterveld prefer to name them, "sonic skills" may be developed with reference to those regularities. [152]

Recalling the definition of "skill" that I reported above, "auditory skills" must be understood as both "practical knowledge and knowledgeable practice".[153] As other sensory skills, auditory skills may be acquired by repeating a certain task or becoming acquainted with sounds of a certain kind, that is establishing perceptual engagements with sound environment. According to Ingrid Monson's definition, auditory skills are a form of "perceptual agency", that is the conscious focusing of sensory attention [on sounds, in the case of hearing] that can yield differing experiences of the same event".[154] Nevertheless, as Andi Schoon and Axel Volmar have pointed out, the process through which an ear acquires different auditory skills and becomes a "trained ear" (*geschulte Ohr*) is often some kind of—invoking Michael Polanyi's notion—"tacit knowledge".[155] The many different listening skills that are necessary to master a foreign language would be a good example of this: while listening is a crucial part of the

[152] Apparently, Pinch and Bijsterveld prefer the denomination *sonic skills* because it would include both *auditory skills* and *musical skills*; see their introduction to Trevor Pinch and Karin Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, Oxford, Oxford University Press, 2012, p. 14. However, I do not quite see why *auditory skills* should exclude musical abilities: in this research I am using it in that all-embracing sense.

[153] Ingold, "Society, Nature and the Concept of Technology", in *The Perception of the Environment*, p. 316.

[154] Ingrid Monson, "Hearing, Seeing, and Perceptual Agency", *Critical Inquiry*, no. 34, suppl., Winter 2008, pp. S36–S58, on p. S37.

[155] Andi Schoon and Axel Volmar (eds), *Das geschulte Ohr. Eine kulturgeschichte der Sonifikation*, Bielefeld, Transcript Verlag, 2012, p. 13.

learning process, and we are continuously exercising and improving our listening skills while we learn, we are aware of our progress only at particular moments.

Even if listening does not necessarily involve the use of specific objects, it often does: in affirming this, I am thinking not only of contemporary audio technologies, as recording or playback devices, microphones, loudspeakers, etc., but also older technologies like ear trumpets, musical instruments, or the stethoscope, as well as practices apt to the transmission of sound, and practices on and around sound, including writing. Therefore, as Pinch and Bijsterveld have stressed, auditory (sonic) skills are not just listening skills, but also "the skills needed to employ the tools for listening",[156] "such as positioning a stethoscope properly on a patient's body or effectively handling a magnetic tape recorder".[157] The association between the action of scanning for a particular radio station and the gesture of fiddling with the dial (or pressing a button, in radios with digital search option) makes also clear the kind of bodily involvement that many auditory skills call for.

Besides, the concept of auditory skill includes both lay (popular) practices, and expert ones, though they may not be easily distinguishable in real life. Thus, it is far from unusual that professional auditory skills be, especially in their initial stages, scarcely formalized or not even recognized as such, as happened in the 1920s with the various auditory skills of car mechanics, which did not seem appreciably different from those of ordinary motorists at the time.[158] Conversely, listening skills that we would probably classify as "lay", like those developed by hi-fi audiophiles, particularly in the 1950s and 1960s, can attain in time great sophistication and even a higher level of

[156] See their introduction to Pinch and Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, p. 11.

[157] Ibid., p. 14.

[158] See Stefan Krebs, "'Sobbing, Whining, Rumbling': Listening to Automobiles as Social Practice", in Pinch and Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, pp. 79–101.

theorization than many professional skills.[159] On the other hand, both popular and expert auditory skills can produce knowledge.

The last decade has been witness to an increasing interest in a particular kind of expert auditory skills: those developed in scientific environments.[160] Within that context, Trevor Pinch and Karin Bijsterveld have proposed to distinguish four modes of listening, which may also require different sets of auditory skills: "monitory listening", used to determine *whether* something is wrong in a machine, instrument or human body; "diagnostic listening", which alludes to the mode of listening that is able to identify *what* is wrong; "exploratory listening", that is listening to discover something new; and "synthetic listening", which refers to the ability to interpret multilayered auditory displays of scientific data.[161] Whereas the first three categories are defined according to the intentions of those who listen (i.e., to what they are listening *for*), the fourth one ("synthetic listening") is somewhat heterogeneous, since it has to do with the characteristics of listening. "Analytical listening", that is the ability to focus on single auditory streams that are part of a multilayered audio conglomerate, would be an obvious addition to the inventory of listening modes. Besides, we can suppose that there must be—or there will be, since the use of non-speech audio to present scientific data,[162] and generally the use of audio in scientific environments is currently under

[159] See for instance Franco Fabbri, "Hi-Fi Revisited: High, Low, or Just Right Fi?", paper presented at the international conference "Transnational Mediascapes: Sound and Vision in Europe", organized by the Facoltà di Lettere e Filosofia and Facoltà di Scienze Linguistiche e Letterature Straniere, Università del Sacro Cuore, Milan, 14–15 May 2013.

[160] A fine example of this interest is Dutch research project "Sonic Skills: Sound and Listening in the Development of Science, Technology and Medicine (1920–now)", led by Karin Bijsterveld (Maastricht University), http://www.nwo.nl/en/research-and-results/research-projects/95/2300157595.html [last access: July 2015].

[161] Pinch and Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, p. 14.

[162] The use of non-speech audio to present scientific data is called "sonification"; see Christian Dayé and Alberto de Campo, "Sounds Sequential: Sonification in the Social Sciences", *Interdisciplinary Science Reviews*, vol. 31, no. 4, 2006, pp. 349–364; also Katharina Vogt, Alberto de Campo and Gerhard Eckel, "An Introduction to Sonification and its Applications in Theoretical Physics", in *Proceedings of the AAA - Alps Adria Acoustics*, Graz, 2007, available online: http://www.alpsadriaacoustics.org/archives/AAAA-Congress_Proceedings.pdf [last access: October 2013]; Thomas Hermann, Andy Hunt and John G. Neuhoff (eds), *The Sonification Handbook*, Berlin, Logos Verlag, 2011; and Schoon and Volmar (eds), *Das geschulte Ohr. Eine kulturgeschichte der Sonifikation*.

development—other modes of listening to be considered. For instance, the skill that audio engineers developed in pre-digital times, when they had to listen carefully for the best point for a tape edit, could neither be classified as a form of monitoring, nor as diagnostic, exploratory or synthetic listening.[163]

However, in our cultural context musical practice is the field where auditory skills have more consistently developed through history, and where a subset of them—in particular, those associated with the tonal system, like pitch perception (required also for tuning musical instruments), or with orchestral music, like the ability to separate superimposed streams of sound (a form of "analytical listening", indeed)—has received privileged attention in education.[164]

2.2.2 Musical skills, listening styles and adequate modes of listening

While musical skills are not often considered in relationship to other auditory skills, the fact that—as I will argue below—even before the emergence of acoustics, and well until the end of the 19th century musical questions and instruments were at the core of scientific research on sound, meant that "some musician's practices were transformed into scientist's experimental practices"; for instance, the perception of beats for tuning instruments was adopted by scientists to calculate the frequency of pitches.[165] Even during the 20th century, after musical issues had been displaced from the heart of acoustics, musical skills continued to play a role in scientific research, in particular for those scientists who had received a musical education.

[163] I owe this observation to Franco Fabbri.

[164] See Dayé and de Campo, "Sounds Sequential: Sonification in the Social Sciences", p. 350; on "analytical listening" see Reinier Plomp, *The Intelligent Ear: On the Nature of Sound Perception*, Mahwah, NJ, Lawrence Erlbaum, 2002, p. 12, and also Monson, "Hearing, Seeing, and Perceptual Agency", S39–S41;. On the other hand, Schoon and Volmar's *Das geschulte Ohr* also advocates a cultural approach to sonification that does not exclude musical skills.

[165] Ja Hyon Ku, "British Acoustics and its Transformation from the 1860s to the 1910s", *Annals of Science*, vol. 63, no. 4, 2006, pp. 395–423, on p. 406.

This point may be beautifully illustrated by an episode reported by physiologist Georg von Békésy in his acceptance speech for the 1961 Nobel Prize in Physiology or Medicine. During the time in which he was employed in the laboratory of the Hungarian Post Office, he was trying to find a quick method to test the telephone lines that crossed the country. Then he remembered that "when a musician tests his violin by plucking a string, he can tune it immediately. (…) Therefore, I transmitted a click through the line by switching in a small D.C. voltage and then listening and observing the returning signal. It turned out that the operator's switch always had some D.C. potential difference, and before long I was able to tell precisely in which city a disturbance of the lines had occurred just by listening to the clicks."[166] Like the violinist who learns to tune his or her instrument, Békésy had to exercise his ears intensively in order to be able to distinguish those changes in potential difference and to locate them in the network.

Musical auditory skills may include relatively complicated tasks, like judging if an instrument is perfectly in tune or guessing harmonic progressions by deducing them from the music that somebody is playing (something that most professional musicians should be able to do, in particular if they improvise with other musicians)—those skills are normally developed through repeated listening, and often with the help of teachers or advisors. Yet, musical auditory skills may cover other, easier abilities that ordinary people normally develop, like recognising musical styles that belong in the musical traditions of their community—those abilities are not always formally taught, but may be acquired by repeated exposure to music, or through the participation in music events. While auditory skills could be considered as a component of what musicologists and semioticians call "musical competence"—that is, following Gino Stefani's definition,

[166] Georg von Békésy, "Concerning the pleasures of observing, and the mechanics of the inner ear. Nobel Lecture, December 11, 1961", in *Nobel Lectures Physiology or Medicine 1942–1962*, Amsterdam, Elsevier, 1964, pp. 722–746, on p. 729. Apparently, Békésy had studied music "seriously" as a young man, see Floyd Ratliff, "Georg von Békésy 1899–1972. A Biographical Memoir", in *Biographical Memoirs Vol. 48*, Washington D.C., National Academy of Sciences, 1976, pp. 24–49, on p. 31.

"the ability to produce sense through music"—,[167] the notion of "skill" is meant to bridge the gap between capacity and action that lies in the opposition between competence and performance.[168]If we consider Philip Tagg's classification of types of musical knowledge, auditory skills would seem to primarily belong to "aesthesic competence", "i.e. the ability to recall, recognise and distinguish between musical sounds, as well as between their culturally specific connotations and social functions", but they are equally involved in "poïetic" processes, though usually in a more conscious way.[169]

As Judith Becker has pointed out, "[m]ost of our styles of listening have been learned through unconscious imitation of those who surround us and with whom we continually interact". The apparent naturalness of this process, the fact that we often "listen in a *particular* way without thinking about it, and without realizing that it even is a particular way of listening" is captured, according to Becker, by the concept of "habitus", which she borrows from Bourdieu (see above), and which is an "embodied pattern of action and reaction". In the case of musical occasions, an "habitus of listening" refers to "a disposition to listen with a particular kind of focus, to expect to experience particular kinds of emotion, to move with certain stylized gestures, and to interpret the meaning of the sounds and one's emotional responses to the musical event in somewhat (never totally) predictable ways."[170] Yet, being a skilling process, the

[167] Gino Stefani, "A Theory of Musical Competence", *Semiotica: Special Issue on the Semiotics of Music* (Eero Tarasti, ed.), vol. 66, 1/3, 1987, pp. 7–22, on p. 7.

[168] As it is known, the term "competence" was coined by linguist Noam Chomsky to refer to linguistic competence; for a historical account of its application to music studies, see chapter 3 ("Introducción a la competencia musical") of Rubén López Cano, De la retórica a la ciencia cognitiva. Un estudio de los *Tonos Humanos* de José Marín (ca. 1618–1699), Ph.D. thesis, University of Valladolid, 2004, pp. 328–405, accessible online: http://lopezcano.org/Articulos/DRCC/3.competencia.pdf [last access: November 2013].

[169] On the difference between "aesthesic" and "poïetic" competence, see Philip Tagg, *Music's Meanings: A Modern Musicology for Non-Musos*, New York-Huddersfield, The Mass Media Musicologists' Press, 2013, pp. 104–107 (quoted definition is on p. 105).

[170] Judith Becker, *Deep Listeners: Music, Emotion and Trancing*, Bloomington, Indiana University Press, 2004, p. 71 (but see the whole chapter 3: "Habitus of Listening", pp. 69–86).

development of audition is also a process of enculturation: children and young adults not only learn to discriminate sounds and react to them, but they are also taught, or tacitly apprehend certain ideas about sounds (linguistic interactions, weeping and laughter, bodily sounds, music) and about the appropriate modes to behave in front of them.[171]

Ola Stockfelt has observed that listening styles, which he calls "modes of listening", may be linked to specific music genres (or types of music events) or may be conditioned by the situation in which the music is encountered. For Stockfelt "adequate listening" happens "when one listens to music according to the exigencies of a given social situation and according to the predominant sociocultural conventions of the subculture to which the music belongs."[172] However, cultural contexts where the music—recorded music—is most often amplified and consumed through (public or personal) loudspeakers seem to offer listeners a wider "repertoire" of modes of listening to choose from according to their personal "listening strategies". Actually, we may suppose that any music listener—any listener—has the possibility of choosing among different modes of listening, which Stockfelt graphically represents at the intersection of the listener's total repertoire of modes (related to her competence), the situation, the music, and the particular listening strategies of that listener.[173] While this schema offers a useful representation of the position of (Western) listeners within a sound context dominated by recorded music, it lacks at least one important element: the notion of which "listening styles" are deemed appropriate within a certain culture—that is, what

[171] See for instance a research by psychologists Teresa M. McDevitt, Norm Spivey, Eugene P. Sheehan, Randy Lennon and Rita Story on the criteria for what counts as "good listening" among 7-, 9-, and 11-year old US children: "Children's Beliefs about Listening: Is It Enough to Be Still and Quiet?", *Child Development*, vol. 61, no. 3, June 1990, pp. 713–721.

[172] Ola Stockfelt, "Adequate Modes of Listening", in David Schwarz, Anahid Kassabian and Lawrence Siegel (eds), *Keeping Score: Music, Disciplinarity, Culture*, Charlottesville, University Press of Virginia, 1997, pp. 129–146, on p. 137.

[173] Ibid., p. 134.

counts generally as “good listening”—, which would go beyond the adequacy to music genre that Stockfelt considers in that essay, and would eventually include linguistic interchanges or the participation in other sound events.

CHAPTER 3

Hearing and Listening in the History of the Senses and Emotions

3.1 Towards a history of the senses, sensibilities and emotions

Although interdisciplinarity is normally considered fundamental to sensory scholarship, many scholars still distinguish between an anthropological approach to the senses and a historical one. Thus, while the anthropology of the senses, or sensorial anthropology, deals with sensorial concepts and contexts across different cultures, which are assumed to be more or less synchronically stable (see previous chapter), the history of the senses studies historical changes in perception in the so-called "Western world". [1] Because of this labour division, historians do not always take into account anthropological notions and methods in their research,[2] and only few anthropological studies of the senses adopt a diachronic perspective.[3] Yet, as I will argue in this chapter, this separation contradicts the synthetic drive showed by the founders of the French Annales School, to which the historiographical interest in the senses is usually traced back, and which has also been recognized as a major influence by many sensory scholars active since the end of the 1980s on both sides of the Atlantic. Indeed, as I mentioned in the previous chapter, British historian of science Roy Porter coined the expression "cultural anthropology of the senses" in his foreword to the English translation of French historian Alain Corbin's

[1] On the paradoxes of the conception of time in anthropology, see Johannes Fabian's trailblazing critique, *Time and the Other: How Anthropology Makes its Object*, New York, Columbia University Press, 1983.

[2] See David Howes, "Can These Dry Bones Live? An Anthropological Approach to the History of the Senses", *The Journal of American History*, vol. 95, no. 2, 2008, pp. 442–451.

[3] Nevertheless, there are also some exceptions, for instance Gunter Senft, "Talking about Color and Taste on the Trobriand Islands. A Diachronic Study", *Senses & Society*, vol. 6, no. 1, 2011, pp. 48–56.

Le miasme et la jonquille (1982), which appeared in 1986 as *The Foul and the Fragrant*.[4]

On the other hand, much like the anthropology of the senses, the history of the senses seems to have been constructed on ordinary assumptions of what the senses are and how they relate to other parts of the self. Different ways of dealing with these assumptions have resulted in distinct (and changing) approaches to the history of the senses within national historiographical traditions. Generally speaking, French sensory historians have conceived the senses as part of a matrix including also feelings, emotions, states of mind, memory, and intellectual constructs: an approach that, since the end of the 1920s, has received such diverse denominations as "history of sensibilities" (*histoire des sensibilités*), "history of mentalities" (*histoire des mentalités*), and even "history of representations" (*histoire des représentations*). In contrast, British and North American historians, whose interest in the subject became apparent in the 1990s, seem to hold a more clear-cut concept of the senses, what has left space for the emergence of new adjacent fields, in particular the history of emotions, whose evolution and challenges I will also trace briefly in this chapter. Besides, historians of the senses usually share sensory anthropologists' criticism of visualism, as well as their interest in the other senses, namely taste, smell, touch, and also hearing.[5]

[4] See Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imagination,* Cambridge, MA, Harvard University Press, and Leamington Spa, UK, Berg Publishers, 1986, p. vii; see Classen, "Foundations for an Anthropology of the Senses", *International Social Science Journal*, n. 153, 1997, pp. 401–412, on p. 406.

[5] Among the works by Concordia scholars dealing also with the history of lower senses, see Constance Classen, David Howes and Anthony Synnott, *Aroma: The Cultural History of Smell*, London and New York, Routledge, 1994; Constance Classen (ed.), *The Book of Touch*, Oxford and New York, Berg Publishers, 2005; Howes (ed.), *The Sixth Sense Reader,* 2009; and Constance Classen, *The Deepest Sense: A Cultural History of Touch*, Champaign, IL, University of Illinois Press, 2012; and by Corbin see *Le Foul and the Fragrant*, and *Village Bells*. Other historical studies on the "lower senses" are mentioned in Mark M. Smith, "The Explosion of Sensory History", *The Psychologist*, vol. 23, no. 10, October 2010, available online: https://thepsychologist.bps.org.uk/volume-23/edition-10/looking-back-explosion-sensory-history [last access: March 2015].

3.1.1 The French Annales School, before and beyond

Concerning the antecedents of the history of the senses, French historian Hervé Mazurel has underlined the importance of Karl Marx, Friedrich Nietzsche and Sigmund Freud, the three "masters of suspicion" (*maîtres du soupçon*), who during the second half of the 19th century and the first decades of the following century challenged the primacy of reason in philosophy, and uncovered the hidden impulses governing both the social structure and the life of the mind—a passage that Mazurel identifies with the Nietzschean expression "psychology of deepness" (*psychologie des profondeurs*).[6] Certainly Marx and Nietzsche were among the authors that influenced Georg Simmel's social theories, which underlined the tensions between the individual and social structures, and between life and culture. A German and a contemporary of Freud, Simmel wrote at the beginning of the 20th century two pioneering essays on the crisis of the senses in modern life, and on the way in which the eye and the ear were involved in social interactions: "Die Grossstädte und das Geistesleben" (1903, translated as "The Metropolis and Mental Life") and "Soziologie der Sinne", (1907, translated as "Sociology of the Senses").[7]

However, Simmel's interest in the senses must also be understood as a response to the strain that urbanization and modernization were putting on the inhabitants of big

[6] Hervé Mazurel, **"**De la psychologie des profondeurs à l'histoire des sensibilités. Une généalogie intellectuelle", *Vingtième Siècle. Revue d'histoire*, 2014/3, no. 123, p. 22–38. The expression "*psychologie des profondeurs*" refers to the "psychological depths" that Nietzsche mentions in section 23 of *Beyond Good and Evil*: "All psychology so far has been stuck in moral prejudices and fears: it has not ventured into the depths"; see Nietzsche, *Beyond Good and Evil*, edited by Rolf-Peter Horstmann and Judith Norman, Cambridge, Cambridge University Press, 2002, p. 23.

[7] Georg Simmel, "Die Grossstädte und das Geistesleben", in *Aufsätze und Abhandlungen 1901–1908, Band I*. *Gesamtausgabe Band 8*, herausgegeben von Rüdiger Kramme, Angela Rammstedt und Otthein Rammstedt, Frankfurt a.M., Suhrkamp, 1995, pp. 116–131, published in English as "The Metropolis and Mental Life (1903)", translated by H.H. Gerth with the assistance of C. Wright Mills, in Richard Sennett (ed.), *Classic Essays on the Culture of Cities*, Englewood Cliffs, NJ, Prentice-Hall, 1969, pp. 47–60; and "Soziologie der Sinne", in *Aufsätze und Abhandlungen 1901–1908, Band II*. *Gesamtausgabe Band 8*, herausgegeben von Alessandro Cavalli und Volkhard Krech, Frankfurt a.M., Suhrkamp, 1993, pp. 276–292, published in English as "Sociology of the Senses (1907)", translated by Mark Ritter and David Frisby, in David Frisby and Mike Featherstone (eds), *Simmel on Culture*, London, Sage, 1997, pp. 109–120. Simmel discusses the contrast between the role of the eye and that of the ear in social relations in "Sociology of the Senses".

towns—of Berlin, for instance, where he spent most of his life. Thus, in "The Metropolis and Mental Life" (1903) Simmel identified the psychological basis of metropolitan life with the "*intensification of nervous stimulation*", consisting in high tempo, "shocks" and "inner upheavals", which created "a heightened awareness" in the metropolitan individual. He argued that the intellectualistic mentality of citizens tried to control this heightened awareness by reacting with the head instead of the heart, in a bid "to preserve subjective life against the overwhelming power of metropolitan life": this was purportedly the origin of the "blasé attitude" typical of the metropolis.[8]

Yet, for Simmel the opposition between modern and premodern attitudes towards sensorial interactions referred to a larger evolutionary framework where—as he contended in "Sociology of the Senses"—the perceptual acuity of subjects sank as culture became more refined, whereas emphasis upon liking and disliking rose.[9] These ideas about the historical evolution of the senses seem to be ultimately based on that belief in the sensorial acuity of "primitive subjects" that I discussed in the previous chapter, and that was commonplace in Europe in the second half of the 19th century.[10] Thus, according to Simmel modern subjects would generally be less sensitive and more intellectual than premodern subjects; short-sensed, but more sensitive at short distances.[11]

The impact of Marx, Nietzsche and Freud on French scholars during the first decades of the 20th century, and the links of German "psychology of deepness" to the

[8] Simmel, "The Metropolis and Mental Life", pp. 48–51, on p. 48 (emphasis in the original).

[9] Simmel, "Sociology of the Senses", p. 118.

[10] See again Herbert Spencer's essay "The Comparative Psychology of Man", *Man*, vol. 1, no. 1, January 1876, pp. 7–20. There is no doubt that Simmel was influenced by the evolutionary theories of Darwin and Spencer, as attested by his "Psychologische und ethnologische Studies über Musik" (1882), translated as "Psychological and Ethnological Studies on Music", in Georg Simmel, *The Conflict of Modern Culture and other Essays*, translated, with an introduction, by K. Peter Etzkorn, New York, Teachers College Press (Teachers College, Columbia University), 1968, pp. 98–140, which deal with the origins of music. See also chapter 8 ("Echoes of Darwin: Simmel's Evolutionism") of Henry Schermer and David Jary, *Form and Dialectic in Georg Simmel's Sociology: A New Interpretation*, Houndmills, Basingstoke, UK, Palgrave Macmillan, 2013, pp 222–260.

[11] Simmel, "Sociology of the Senses", p. 119.

beginnings of the history of the senses in France, though not easy to elucidate, cannot be overstated.[12] Besides, at a historical moment in which sociology had just emerged as an academic discipline (*L'Année Sociologique* was founded by Émile Durkheim in 1898), psychology was trying to define itself in relation to physiology, and both branches of knowledge still shared a large intellectual territory with philosophy, the tensions between individual and collective life appeared as an urgent problem, particularly with reference to contemporary collective life. Charles Blondel's reflections on collective and individual psychology, Henri Wallon's works on the constitution of mental life, and Maurice Halbwachs's essays on collective memory must be interpreted within this intellectual framework.[13]

At the end of World War I, Blondel and Halbwachs took positions as professors at the University of Strasbourg, where Simmel had taught before the war: the Alsatian institution had just been taken over by the French government, which aimed at creating an innovative research environment shaped on the seminar-oriented model that German universities had established.[14] In Strasbourg Blondel and Halbwachs became colleagues of historians Lucien Febvre and Marc Bloch, who in 1929 would found the journal *Annales. Histoire, Sciences Sociales*, after which the Annales historiographical school would later take its name.[15] In 1927 they would be joined by another historian, Georges

[12] Mazurel, **"**De la psychologie des profondeurs à l'histoire des sensibilités", p. 31. Still, Mazurel suggests some possible connections on pp. 32–33.

[13] Charles Blondel, *La Mentalité* primitive, preface by Lucien Lévy-Bruhl, Paris, Stock, 1926, and *Introduction à la psychologie* collective, Paris, Armand Colin, 1928; Henri Wallon, *La Vie mentale*, edited by Émile Jalley, Paris, Éditions sociales, 1982 (published originally in volume 8 of *Encyclopédie française*, Paris, 1938, which Wallon edited); and Maurice Halbwachs, *La Mémoire collective*, Paris, PUF, 1950 (published in English as *On Collective Memory*, edited, translated, and with an introduction by Lewis A. Coser, Chicago, University of Chicago Press, 1992).

[14] On the innovative atmosphere at the University of Strasbourg after World War I, see chapter 6 ("The University of Strasbourg as a center of disciplinary change") in Susan W. Friedman, *Marc Bloch, Sociology and Geography: Encountering Changing Disciplines*, Cambridge, Cambridge University Press, 1996, pp. 93–109; and also Bertrand Müller, *Lucien Febvre, lecteur et critique*, Paris, Albin Michel, 2003, pp. 68–73.

[15] On the history and relevance of the Annales School, see the entry "Annales" by Jacques Revel and Roger Chartier, in Jacques Le Goff, Roger Chartier and Jacques Revel (eds), *La Nouvelle Histoire*, Paris, Retz, 1978, pp. 26–32; François Dosse, *L'Histoire en miettes: des "Annales" à la "nouvelle histoire"*, Paris, La Découverte, 1987; Peter Burke,

Lefebvre, whose early study on the French Revolution, *La Grande Peur de 1789* (1932), reviewed favourably by Marc Bloch at the time,[16] is often mentioned as a model for the investigation of collective emotions.

However, Febvre's essays "Une vue d'ensemble. Histoire et psychologie" (1938) and "Comment reconstituer la vie affective d'autrefois? La sensibilité et l'histoire" (1941) are usually considered the first steps in the formation of a history of sensibilities.[17] In this second essay, Febvre called for a history of sensibilities that would study affective life and its manifestations, including the senses. He recognized Johan Huizinga's *Herfsttij der Middeleeuwen* (1919, published in French as *Déclin du moyen âge*, 1932), as a stimulating albeit controversial precedent,[18] and he also mentioned the volume *La vie mentale* (1938), edited by his close friend Wallon, which dealt with affective relationships and emotions, among other subjects.[19] In a later work, *Le problème de l'incroyance au XVI^e siècle: la religion de Rabelais* (1947),[20] he also

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The French Historical Revolution: The Annales School, 1929–89, Cambridge, Polity Press, 1990; André Burguière, *L'École des Annales: une histoire intellectuelle*, Paris, Odile Jacob, 2006.

[16] Marc Bloch's review is commented by Jacques Revel in his introductory text to Georges Lefebvre, *La Grande Peur de 1789, suivi de Les foules révolutionnaires*, Paris, Armand Colin, 1988, pp. 8–9.

[17] Lucien Febvre, "Comment reconstituer la vie affective d'autrefois? La sensibilité et l'historie", in *Combats pour l'histoire*, Paris, Armand Colin, 1953, pp. 221–238, and "Une vue d'ensemble. Histoire et psychologie", ibid., pp. 207–220. Both have been published in English in the collection *A New Kind of History: From the Writings of Febvre*, edited by Peter Burke, translated by K. Folca, New York, Harper & Row, 1973 ("Sensibility and History: How to Reconstitute the Emotional Life of the Past", pp. 12–26, and "History and Psychology", pp. 1–11). See also Alain Corbin, "Charting the Cultural History of the Senses" (1990), in David Howes (ed.), *Empire of the Senses: The Sensual Culture Reader*, Oxford, Berg Publishers, 2005, pp. 128–139 (this essay was published originally as "Histoire et anthropologie sensorielle", in Corbin, *Le Temps, le désir et l'horreur. Essais sur le dix-neuvième siècle*, Paris, Aubier, 1991, pp. 227–244), and chapter 1 ("The History of the History of Emotions") of Jan Plamper, *The History of Emotions*, translated by Keith Tribe, Oxford, Oxford University Press, 2015, pp. 40–74.

[18] Johan Huizinga, *The Waning of the Middle Ages: A Study of the Forms of Life, Thought and Art in France and the Netherlands in the Fourteenth and Fifteenth Centuries*, translated by F. Hopman, Harmondsworth, Penguin, 1976. Indeed, Huizinga's book is rich in allusions to sensory and emotional life at the end of the Middle Ages, and it is also notable for its focus on artworks.

[19] Apparently, Febvre had presented a first version of "Comment reconstituer la vie affective d'autrefois?", entitled "La sensibilité dans l'histoire: les courants de pensée et d'action" at the 10th "Semaine international de synthèse", which took place in June 1937; see Müller, *Lucien Febvre, lecteur et critique*, p. 434. Henri Wallon's *La vie mentale* had been published as volume 8 of the *Encyclopédie française* (Paris, La Société de gestion de l'Encyclopédie française, 1938) and republished later as *La vie mentale*, edited by Émile Jalley, Paris, Éditions sociales, 1982.

[20] Lucien Febvre, *Le Problème de l'incroyance au XVI^e siècle: la religion de Rabelais*, Paris, Albin Michel, 1947 (translated into English as *The Problem of Unbelief in the Sixteenth Century: The Religion of Rabelais*, translated by Beatrice Gottlieb, Cambridge, MA, and London, Harvard University Press, 1982).

pointed to a reappraisal of the premodern sensorium, where, he thought, sight had been less important than in later times. Drawing on ideas of French historian of science Abel Rey, who had underlined the centrality of sight as the scientific sense par excellence, arguing that it allowed the passage from qualification to quantification, Febvre asserted that 16th-century men "doubtless had keen sight", but "[t]hey had not yet set it apart from the other senses"; in short, their sight was "underdeveloped".[21] While these ideas prefigured the ones that McLuhan and Ong advocated a few decades later (see previous chapter), it is interesting to note that Febvre did not place much emphasis on the printing press as an element of historical discontinuity. [22]

As Alain Corbin has interpreted it, Febvre's programme consisted in a history of perception and the usage of each sense, a history of the conception of time and space, and, crowning it, a history of emotions and their contagion. This intellectual project was heavily influenced by the psychology of that period, and aimed at exploring the intersection between the emotional life of the individual and the facts of collective life.[23] As Daniel Wickberg has argued, the notion of "sensibility" (*sensibilité*) invoked by Febvre emphasizes adequately the continuity between perceptions, aesthetic and moral emotions, and ideas; indeed, "sensibility" seems to be more apt to this task than other terms that have been proposed during the 20th century, like Marxist "ideology", "mentality", Bourdieu's "habitus" or Williams's "structure of feeling". Besides,

[21] Lucien Febvre, *Le Problème de l'incroyance au XVI^e siècle: la religion de Rabelais*, Paris, Albin Michel, 1947, published in Englisn as *The Problem of Unbelief in the Sixteenth Century: The Religion of Rabelais*, translated by Beatrice Gottlieb, Cambridge, MA, and London, Harvard University Press, 1982; see esp. pp. 436–437, and more generally the sections titled "Smells, Tastes, and Sounds", "Music", and "Underdevelopment of Sight", pp. 423–437.

[22] See the section on "printing and its effects" in *The Problem of Unbelief in the Sixteenth Century* (pp. 385–387), where Febvre argues that observation was not born again in the Renaissance, but just reappeared and took a new form because of the abundance of printed texts. Febvre also co-authored with Henri-Jean Martin *L'Apparition du livre* (*The Coming of the Book: The Impact of Printing, 1450–1800*), which is a rather factual account of the origins and expansion of the book as a cultural object.

[23] See Febvre, "Une vue d'ensemble. Histoire et psychologie", and Alain Corbin, "'Le Vertige des foisonnements'. Esquisse panoramique d'une histoire sans nom", *Revue d'histoire moderne et contemporaine*, 39–1, janvier-mars 1992, pp. 103–126, on pp. 105–107; see also Corbin, "Charting the History of the Senses", pp. 128–129.

"sensibility" has historical roots in 18th-century empiricism and literary culture and is still in use today, what allows to investigate its evolution within the context of changing ideas about the structure of the subject. [24]

Nevertheless, as I have mentioned above, the historiographical project of a history of sensibilities has often been presented under the label "history of mentalities" (*histoire des mentalités*),[25] or "history of collective mentalities" (*histoire des mentalités collectives*, a phrase coined by Georges Lefebvre), [26] which adopts a term notably employed by Lucien Lévy-Bruhl to discuss how the structures of thought had changed through history. [27] Indeed, Lévy-Bruhl's studies on the "primitive mentality" were an important inspiration for Febvre and the Annales School, even if the notion of a "pre-logical mentality", as opposed to a "logical" or "civilized" one, now seems hugely problematic, and could be interpreted as a manifestation of "scientific racism" (see previous chapter).[28] According to Lévy-Bruhl's *Les fonctions mentales dans les sociétés inférieures* (1910, translated as *How Natives Think*, 1926), the "primitives"'s images and thoughts are not properly differentiated, since they are usually mixed with emotions

[24] Daniel Wickberg, "What Is the History of Sensibilities? On Cultural Histories, Old and New", *The American Historical Review*, vol. 112, no. 3, June 2007, pp. 661–684.

[25] For a brief introduction to the history of mentalities, see the entry "L'histoire des mentalités" by Philippe Ariès, in Le Goff, Chartier and Revel (eds), *La Nouvelle Histoire*, pp. 402–423; and also André Burguière, "Mentalités, histoire", in *Encyclopædia Universalis* (online edition), http://www.universalis.fr/encyclopedie/mentalites-histoire/ [last access: September 2014]. For a more critical view of the evolution of the field, see Burke, "Strengths and Weaknesses of the History of Mentalities".

[26] Burke, *The French Historical Revolution*, p. 115.

[27] However, according to Florence Hulak, at least Febvre did not borrow the term *"mentalité"* directly from Lévy-Bruhl, but from Charles Blondel, who had taken it from Lévy-Bruhl; see Hulak, "En avons-nous fini avec l'histoire des mentalités?", p. 91.

[28] Lévy-Bruhl was the author, among other works, of *Primitive Mentality* (1923; published originally in 1922 as *La Mentalité primitive*), and *Primitives and the Supernatural* (1936; published originally in 1931 as *Le Surnaturel et la nature dans la mentalité primitive*). On the evolutionary ideas implicit in Lévy-Bruhl's work, see Peter Burke "Strengths and Weaknesses of the History of Mentalities", *History of European Ideas*, vol. 7, no. 5, 1986, pp. 439–451, on pp. 442–443 (this essay has been republished in Peter Burke, *Varieties of Cultural History*, Cambridge, Polity Press, 1997, pp. 162–182).

and motions, and have a mystical character.[29] As Damien Boquet has argued, Febvre's interest in affective life was based on similar rationalizing premises: studying sensibilities was important for him because they represented a previous phase in the history of psychic activity.[30]

Yet, "history of mentalities" was employed by Febvre only rarely, since over *mentalité* he favoured *outillage mentale*, which could be translated literally as "mental tools or equipment", or less literally as "structures of thought", though it would also include sensorial and emotional attitudes, and modes of action.[31] On the other hand, Bloch described his innovative work *Les Rois thaumaturges* (1924), published in English as *The Royal Touch* (1973), as a history of "collective representations" (*représentations collectives*, a Durkheimian notion), "mental representations" or even "collective illusions".[32] As several scholars have argued, Febvre and Bloch followed somewhat different research programmes, and the development of the history of mentalities has ultimately been more influenced by the latter's approach. In contrast to Febvre's interest in the individual,[33] Bloch pursued a line of investigation—a kind of anthropological history—that stressed the social background of collective beliefs and

[29] See the first chapter ("Les représentations collectives dans les perceptions des primitifs et leur caractère mystique") of Lucien Lévy-Bruhl, *Les fonctions mentales dans les sociétés inférieures*, Paris, Presses Universitaires de France, 1910, pp. 27–67 (translated into English as *How Natives Think*, London, Allen and Unwin, 1926).

[30] Damien Boquet, "L'erreur de Lucien Febvre: anti-historiographie de l'histoire des émotions", Carnet d'EMMA, 12 novembre 2013, available online: http://emma.hypotheses.org/?p=2067 [last access: February 2015]. A similar point is made by Barbara H. Rosenwein in "Worrying about Emotions in History", *American Historical Review*, vol. 17, no. 3, June 2002, pp. 821–845, on pp. 822–823.

[31] Febvre explains his notion of "*outillage mentale*" in *Le problème de l'incroyance au XVI^e siècle*, p. 141, and pp. 383–411 (p. 150, and pp. 355–369 of the English edition). See also Müller, *Lucien Febvre, lecteur et critique*, pp. 434 –435.

[32] Burke, *The French Historical Revolution*, p. 115; and Marc Bloch, *Les Rois thaumaturges: étude sur le caractère surnaturel attribué à la puissane royale, particulièrement en France et en Anglaterre*, Paris, Armand Colin, 1961 (English edition: *The Royal Touch: Sacred Monarchy and Scrofula in England and France*, translated by J.E. Anderson, London, Routledge and Kegan Paul, 1973).

[33] Febvre's interest in the individual can easily be deduced from his focus on great historical personalities, like Luther (in *Un destin: Martin Luther*, 1928) or Rabelais (in *Le Problème de l'incroyance au XVI^e siècle: la religion de Rabelais*, 1942).

the unconscious mechanisms of their transmission.[34] A good example of it would be the chapter about "Modes of Feeling and Thought" included in his *Feudal Society* (1961, published originally as *La Société feodale*, 1939-1940), which opens with a description of material and environmental conditions, on the basis of which Bloch tries to describe the sensibility and mentality of medieval men.[35]

The notion of mentality circulated widely during the 1960s, when the French Annales School—directed then by Fernand Braudel, and counting Robert Mandrou, Georges Duby and Alphonse Dupront among its most distinguished members—established a dialogue with structuralism and experimented with the new quantitative methods that were in vogue in historiography. Following on Febvre's steps, Mandrou examined the "psychical man" (*l'homme psychique*) of 16th-century France, and wrote about his (her) senses, affections and mental equipment, arguing—before Ong—for a primacy of hearing and touch over vision at the time.[36] More generally, during the 1960s the French history of mentalities focused mainly—according to Bloch's orientation—on collective ideas that had been formed without their agents' knowledge—hence the importance of such historical subjects as archaic conventions, affectivity, everyday perceptions or irrationality.[37]

Later on, in the 1970s, the history of mentalities was influenced by microhistory, which flourished mainly in Italy, with the contribution of Giovanni Levi and Carlo Ginzburg, who did not properly consider the senses a historical topic, but penned

[34] See again Burguière, "Mentalités, histoires", and also Hulak, "En avons-nous fini avec l'histoire des mentalités?".

[35] Marc Bloch, *Feudal Society, 1: The Growth of Ties of Dependence*, translated from the French by L.A. Manyon, with a new foreword by T.S.Brown, London, Routledge, 1961, pp. 72–75 (original edition: *La Société feudal*, 2 vols, Paris, Albin Michel, 1939–1940).

[36] See chapters III and IV of Robert Mandrou, *Introduction à la France moderne, 1500–1640: essai de psychologie historique*, Paris, Albin Michel, 1974, pp. 75–104.

[37] See for instance the preface to Carlo Ginzburg, *Il formaggio e I vermi. Il cosmo di un mugnaio del '500*, Turin, Einaudi, 1976, pp. xi–xxv, on p. xxii; see also Burke, "Strengths and Weaknesses of the History of Mentalities", p. 439; and also Roger Chartier, "Intellectual History and the History of *Mentalités*: A Dual Re-evaluation", in *Cultural History: Between Practices and Representations*, Ithaca NY, Cornell University Press, 1998, pp. 19–52, on p. 28.

descriptions of common lives that were often rich in sensorial detail. Microhistory was also practiced by important members of the Annales School, like Emmanuel Le Roy Ladurie,[38] whose highly successful book *Montaillou, village occitan de 1294 à 1324* (1975) includes also observations about perceptions and systems of aesthetic appreciation.[39]

The 1970s also saw the publication in English and French of Norbert Elias's two-volume *Über den Prozess der Zivilisation* (in English, *The Civilizing Process*), a socio-historical investigation that had been published originally in 1939 and republished in 1969, when the author's research into the constitution of the court society, *Die höfische Gesellschaft* (in English, *The Court Society*), was also issued.[40] Clearly influenced by Sigmund Freud's psychoanalytic theories, in particular by *Das Unbehagen in der Kultur* (1930, in English as *Civilization and Its Discontents*), and by Max Weber's rationalization theories,[41] Elias' works deal with the process of civilization understood as a transformation of sensibility and an exercise of self-control—in other words, as the interiorization or psychologization of external constraints –, which Elias considered a consequence of the increasing social complexity

[38] For a brief introduction to microhistory, see Carlo Ginzburg, "Microhistory: Two or Three Things That I Know about It", translated by John and Anne C. Tedeschi, *Critical Inquiry*, vol. 20, no. 1, Autumn, 1993, pp. 10–35; and also Giovanni Levi, "On Microhistory", in Peter Burke (ed.), *New Perspectives on Historical Writing*, Cambridge, Polity Press, 1991, pp. 93–113.

[39] See, for example, the beginning of chapter XIX ("Le sentiment de la nature et du destin") of Emmanuel Le Roy Ladurie, *Montaillou, village occitan de 1294 à 1324*, Paris, Gallimard, 1975, pp. 449–464.

[40] Norbert Elias, *The Civilizing Process, vol. 1: The History of Manners*, translated by Edmund Jephcott with some notes and revisions by the author, Oxford, Blackwell, 1978; *The Civilizing Process, vol. 2: State Formation and Civilization*, Oxford, Blackwell, 1982; and also *The Court Society*, translated by Edmund Jephcott, Oxford, Blackwell, 1983; also a one-volume edition appeared in 1994 under the title *The Civilizing Process: Sociogenetic and Psychogenetic Investigations* (hereafter I will refer to a revised version of this edition). French translations had appeared a few years earlier, between 1973 and 1975: *La civilisation des moeurs*, Paris, Calmann-Lévy, 1973; *La société de cour*, translated by Pierre Kamnitzer, Paris, Calmann-Lévy, 1974; and *La dynamique de l'Occident*, Paris, Calmann-Lévy, 1975 (translation of vol. 2 of *Über den Prozess der Zivilisation*). On Elias' contribution to the history of sensibilities, see Corbin, "'Le Vertige des foisonnements'", pp. 113–116.

[41] *Civilization and Its Discontents* is included in volume 21 of *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, edited by James Stratchey in collaboration with Anna Freud, assisted by Alix Strachey and Alan Tyson, London, Hogarth Press and the Institute of Psycho-analysis, 1964, pp. 59–145. Max Weber initially discussed rationalization in his *Die protestantische Ethik und der Geist des Kapitalismus* (1905), which was translated into English in 1930, see *The Protestant Ethic and the Spirit of Capitalism*, translated by Talcott Parsons, with a foreword by R.H. Tawney, London, Unwin University Books, 1930.

and interdependence that accompanied the formation of modern states. In spite of not placing himself into the history of sensibilities, Elias tackles some of the issues that were also key to the Annales School project, in particular the relationship between the psychological life of individuals and changes in society,[42] though he presents a theory of the formation of modern subjects that goes beyond psychology to include also bodily practices and manners. Even more importantly, Elias shows the sensible and emotional roots of rationality, and the rationality of sensible life.

In parallel to the reception of Elias's investigations, Michel Foucault's successive attempts to articulate the question of knowledge, in which the body progressively gained a central position,[43] also contributed to raise awareness of the importance of the senses and the history of mentalities, even if those terms were not part of his vocabulary.[44] Sociologist Pierre Bourdieu's reworking of the theory of practice was also instrumental in counterbalancing the structuralist approach to social sciences by shifting the focus towards human action and by analysing the way in which structures are embodied in the second nature of what he calls "habitus". [45] Later on, he extended his interest into the study of aesthetics, exploring the connection between habitus, perception and appreciation.[46] His theses became popular in the 1980s, when

[42] See Robert van Krieken, "Norbert Elias and Emotions in History", in David Lemmings and Ann Brooks (eds), *Passion, Power and Elias: Emotional Styles and Historical Change*, London, Routledge, 2014, pp. 19–24.

[43] Among Michel Foucault's works more directly concerned with the body and the senses, see *Surveiller et punir: Naissance de la prison* (Paris, Gallimard, 1975), and *Histoire de la sexualité, I: La volonté de savoir* (Paris, Gallimard, 1976); *II: L'usage des plaisirs* (Paris, Gallimard, 1984); *III: Le souci de soi* (Paris, Gallimard, 1984). On Foucault's influence on the history of sensibilities and mentalities, see Corbin, "'Le Vertige des foisonnements'", pp. 111–113.

[44] On the singular status of Foucault as a historian, see Paul Veyne, "Foucault révolutionne l'histoire", in *Comment on écrit l'histoire, suivi de Foucault révolutionne l'histoire*, Paris, Seuil, 1979, pp. 201–242.

[45] See Pierre Bourdieu, *Esquisse d'une théorie de la pratique: précédé de trois études d'ethnologie kabyle*, Geneva, Droz, 1972 (English translation: *Outline of a Theory of Practice*, translated by Richard Nice, Cambridge, Cambridge University Press, 1997) and *Le Sens pratique*, Paris, Minuit, 1980 (English translation: *The Logic of Practice*, translated by Richard Nice, Cambridge, Polity Press, 1990). For an introduction to Bourdieu's theory of practice, see Sherry B. Ortner, "Theory in Anthropology since the Sixties", *Comparative Studies in Society and History*, vol. 26, no. 1, January 1984, pp. 126–166.

[46] Pierre Bourdieu, *La Distinction*, Paris, Minuit, 1979 (translated into English as *Distinction: a Social Critique of the Judgement of Taste*, translated by Richard Nice, Cambridge, Harvard University Press, 1984).

they contributed to the so-called "practical" or "practice turn" in the humanities and social sciences.[47] The works of Foucault and Bourdieu also played a key role in the development of a history of the body and bodily practices, which in France would grow in dialogue with the history of sensibilities.[48]

During the 1980s the weaknesses of the notion of "mentalities" became more and more obvious:[49] a new generation of the Annales School rescued the Durkheimian notion of "collective representations" and reformulated the project of a history of mentalities in terms of "representations". This move was in line with the new cultural history that was developing at the time, mainly in anglophone countries, which focused on issues of discourse and cultural representation.[50] According to French historian Roger Chartier, representations could be understood not only as classification and perception systems, but also as the matrix of practices through which agents construct the social world.[51] Alain Corbin, who has made the most important single contribution to the history of the senses,[52] sees himself as a continuator of the history of mentalities,

[47] For an introduction to the "practice turn" see Sherry B. Ortner, "Theory in Anthropology since the Sixties", *Comparative Studies in Society and History*, vol. 26, no. 1, January 1984, pp. 126–166 (esp. 144–160), and Theodore R. Schatzki, Karin Knorr Cetina and Eike von Savigny (eds), *The Practice Turn in Contemporary Theory*, London and New York, Routledge, 2001.

[48] Indeed, in the last decade two French authorities on the history of bodily practices, Georges Vigarello and Jean-Jacques Courtine, have coedited two big historical syntheses together with the most notable historian of the senses, Alain Corbin: *Histoire du corps, XVI–XXème siècle* , 3 vols, Paris, Seuil, 2005–2006, and *Histoire de la virilité*, *de l'Antiquité au XXIème siècle*, 3 vols, Paris, Seuil, 2011.

[49] See Burke, "Strengths and Weaknesses of the History of Mentalities"; see also Pascal Ory, "L'histoire culturelle de la France contemporaine: question et questionnement", *Vingtième Siècle. Revue d'histoire*, no. 16, October-December 1987, pp. 67–82, on pp. 69–70; and also Corbin, "'Le Vertige des foisonnements'", p. 103.

[50] On the new cultural history see Lynn Hunt (ed.), *The New Cultural History*, Berkeley, University of California Press, 1989. However, Wickberg, "What Is the History of Sensibilities? On Cultural Histories, Old and New", p. 661, emphasizes the distance between the authors of the new cultural history, concerned with issues discourse and cultural representation (identity, race, gender, class), and the "old" history of sensibilities advocated by Febvre and developed by others.

[51] Roger Chartier, "Le monde comme représentation", *Annales. Économies, Sociétés, Civilisations*, 44e année, no. 6, 1989, pp. 1505–1520, on p. 1513.

[52] Among Alain Corbin's publications on the history of the senses, see *Le miasme et la jonquille: l'odorat et l'imaginaire social XVIIIe–XIXe siècles*, Paris, Aubier Montaigne, 1982 (translated into English as *The Foul and the Fragrant*); *Le Temps, le désir et l'horreur* (appeared in English as *Time, Desire and Horror: Towards a History of the Senses*, Cambridge, Polity Press, 1995); and *Les cloches de la terre: paysage sonore et culture sensible dans les campagnes au XIXe siècle*, París, Albin Michel, 1994 (appeared in English as *Village Bells: The Culture of the Senses in the Nineteenth-Century French Countryside*, New York, Columbia University Press, 1998).

and has also emphasized the importance of representations. According to him, any system of appreciation, which would determine the modalities of perception of the world, the society and the self, and which would also organize the emotional life, would necessarily include a system of representations. Yet, Corbin does not ultimately champion any particular "history of", but a "history without a name" ("*histoire sans nom*"), which would study sensibilities, mentalities and also representations.[53]

3.1.2 From the history of sensibilities to sensory history

The history of sensibilities and mentalities, as developed in France, may be placed under the umbrella of the 1970s *nouvelle histoire* or "new history", which today includes such diverse fields as new social history, cultural history, microhistory, the history of everyday life, or the history of the body.[54] However, it may also be considered a part of cultural history: although cultural history has more often identified with the study of cultural objects, institutions, and practices, Corbin has argued that it should also cover the evolution of sensibilities and the affective mechanisms that are in act in processes of cultural reception.[55] British historian Peter Burke has also made the case for the incorporation of the "cultural history of perception" into the wider field of new cultural history, which for him seems to be an updated and expanded version of the Annales School tradition, influenced also by Bakhtin, Foucault, Elias and Bourdieu.[56]

While French historians have tended to underline the continuities between bodily sensations, feelings, ideas and symbols—an approach influenced by the usage of

[53] See Corbin, "'Le Vertige des foisonnements'", and "De l'histoire des représentations à l'histoire sans nom. Entretien avec Alain Corbin", edited by Yves Déloye and Florence Haegel, *Politix*, vol. 6, no. 21, 1993, pp. 7–14.

[54] For a contemporary view on the emergence of *nouvelle histoire*, see the reference work co-edited by Le Goff, Chartier and Revel, *La Nouvelle Histoire*; for a more internationally-oriented update, see Burke (ed.), *New Perspectives on Historical Writing*.

[55] Corbin, "'Le Vertige des foisonnements'", pp. 116–117; for a reformulation of cultural history in terms of representations, see Ory, "L'histoire culturelle de la France contemporaine: question et questionnement".

[56] Peter Burke, *What Is Cultural History?*, Cambridge, Polity Press, 2005, p. 4.

such terms as "sensibilities", "mentalities" or "representations"—, British and North American sensory scholars have normally addressed "sensory history" or "the history of the senses" as if it was a well-delimited field, basing their research on a common-knowledge approach to the senses. Nevertheless, US historian Daniel Wickberg has made the case for the adequacy and convenience of the notion of "sensibility", and has identified a series of US historians, going back even to the years before the new social history of the 1960s and 1970s, whom he considers exponents of a sensibility-oriented approach to history.[57] Paradoxically, though, Wickberg does not mention the scholar that probably fits more perfectly in the Annales School lineage: Peter Gay, author of the five-volume *The Bourgeois Experience: Victoria to Freud* (1984-1998), a psychohistorical investigation into the formation of the bourgeois sensibility. Heavily influenced by psychoanalysis, in *The Bourgeois Experience* Gay deals with a variety of topics including Romantic sensibility, the history of sexuality, and the cultural shaping of passions. [58]

Among those English-speaking scholars that have aligned themselves clearly to sensory history, it is worth mentioning Donald Lowe and his visionary *History of Bourgeois Perception* (1982), which spans from the Middle Ages to the 20th century, and draws both on McLuhan and Ong's theories about the changing sensorium and on notions borrowed from Marx, Merleau-Ponty and Foucault.[59] Thus, Lowe linked five historical periods (the Middle Ages, the Renaissance, the Estate Society, the Bourgeois

[57] Among those scholars are Richard Hofstadter, who in the 1960s analyzed the "paranoid style" in US history, as well as historians of later generations, such as Jackson Lears, who focused mainly on consumer culture, and a group of scholars interested in the rise of the humanitarian sensibility in 18th- and 19th-century Britain and North America, like David Brion Davis, Thomas Haskell and others; see Wickberg, "What Is the History of Sensibilities? On Cultural Histories, Old and New", pp. 677–681.

[58] The subtitles of the five volumes are: *Vol. I: The Education of the Senses* (New York-London, W.W. Norton, 1984), *Vol. II: The Tender Passions* (New York-London, W.W. Norton, 1986), *Vol. III: The Cultivation of Hatred* (New York-London, W.W. Norton, 1993), *Vol. IV: The Naked Heart* (New York-London, W.W. Norton, 1995), *Vol. V: Pleasure Wars* (New York-London, W.W. Norton, 1998).

[59] Donald M. Lowe, *History of Bourgeois Perception*, Chicago, University of Chicago Press, 1982.

Society and the Twentieth Century) to three factors: changes in communications media (oral, chirographic, typographic, and electronic media), sensing hierarchies (that is sensory models) and epistemic orders (from Foucault's "epistemes": medieval anagogy, Renaissance similitude or resemblance, early modern representation-in-space, late modern development-in-time, and 20th-century synchronic system).[60]

Much more recently, US historian Mark Smith, who has tackled mainly the question of racism in American history, has established himself as a leading figure in the field. He has underscored the connection between the history of the senses and the social history that emerged in the 1970s, arguing that Marxist-inspired concern for writing history "from below" has stimulated research into the senses as possible entryways to alternative historical narrations. Therefore, he has contended that sensory history should be placed at the intersection of social history and cultural history.[61] In line with the social history tradition, Smith has stressed the value of sensorial research to reconstruct those historical experiences that have left no written traces, or have historically been deemed insignificant, e.g. the life of lower classes, minorities, the transmission of popular culture, etc. While this purpose resonates with some aspects of the French historiography of sensibilities and mentalities (more intensely, with the Italian tradition of microhistory), it collides at least with its formulation in terms of representations, since representations tend to dissolve social differences or, rather, they present them primarily as mental constructs. Smith has also drawn a line between "the

[60] Ibid., pp. 1–16; a table of correspondences is found on p. 15. On the notion of "episteme" see Foucault's Preface to *The Order of Things: An Archaeology of the Human Sciences*, New York-London, Routledge, 2002, pp. XXIII–XXIV (published originally in French as *Les mots et les choses*, Paris, Gallimard, 1966). On Michel Foucault's "episteme" see also his *The Archaeology of Knowledge*, translated by A.M. Sheridan Smith, New York-London, Routledge, 2002, p. 211 (published originally in French as *L'Archéologie du savoir*, Paris, Gallimard, 1969).

[61] See Mark M. Smith, "Making Sense of Social History", *Journal of Social History*, 31/1, 2003, pp. 165–186; on "history from below" see Jim Sharpe's chapter ("History from Below") in Burke (ed.), *New Perspectives on Historical Writing*, pp. 24–41. By Mark M. Smith see also "Producing Sense, Consuming Sense, Making Sense: Perils and Prospects for Sensory History", *Journal of Social History*, vol. 40, no. 4, Summer 2007, pp. 841–858; *Sensory History*; and also his edited collection *Hearing History: A Reader*, Athens, University of Georgia Press, 2004. Actually, one of the pioneers of the history of emotions in the United States, Peter Stearns, whose theories I will address later in this chapter, was the founder, in 1967, of the *Journal of Social History*.

history of the senses" in the strict sense, which would mainly pay attention to the evolution of specific senses, and "sensory history" (or "sensate history", or "sensuous history"), which would examine not only the history of a given sense, "but also its social and cultural construction and its role in texturing the past", and which would also set past conceptions of the senses and sensorial experiences in their social and cultural context.[62] Ultimately sensory history, which Smith advocates, could be presented as "a habit, a way of thinking about the past, and a way of becoming attuned to the wealth of sensory evidence" that may be found in it.[63]

3.1.3 The history of emotions

Differences between the Annales tradition, oriented towards sensibilities, and the narrower notion of sensory history have probably been a factor in the development of a history of emotions in English-speaking countries, where it is usually said to have appeared in the 1980s (though, as I will explain later in more detail, it soon spread out across other linguistic communities). Even if sensory scholars and historians of the emotions do not seem to interact very often, the latter usually recognize the role of the Annales School in the development of their field.

In the same way as the anthropology of emotions (see previous chapter), the history of emotions is based on ordinary and often controversial notions of the emotions—a term that has proven particularly difficult to define, and whose meaning has changed through history. As British historian Thomas Dixon has argued, the term "emotion" (from the French *émotion*) was already in use in the 17th and 18th centuries, but only became established "as a name for a category of mental states that might be systematically studied" in mid-19th century—earlier, what we now call "emotions" was

[62] Mark M. Smith, *Sensory History*, Oxford, Berg Publishers, 2007, p. 4.

[63] Ibid., p. 5. Smith insists on this idea in "Producing Sense, Consuming Sense, Making Sense", p. 842.

known by a variety of names, including "passions", "affections", "sentiments" and "feelings".[64] Actually, as Damien Boquet and Piroska Nagy have pointed out, while the French term *émotion*—like Catalan *emoció*, Spanish *emoción* and Italian *emozione*—has traditionally referred, unlike *sentiment*—or Catalan *sentiment*, Spanish *sentimiento* and Italian *sentimento*—, to a transitory affective state, the meaning of the English term "emotion" is a bit larger, covering also long-standing feelings.[65]

Even if we are willing to accept, with Barbara Rosenwein, that "there is a continuum, not a decisive break, between *émotion* and *sentiment*, passion and affection",[66] uncertainties about nomenclature and classification become even more evident if we look into single emotions. For instance, should feelings like shame and pride be considered emotions? Are sadness and melancholy two different emotions, or may they just be different degrees or aspects of a single emotion? As British historian Joanna Bourke has observed, the subjects treated by historians of emotions may range from particular emotions to clusters of them, to modes of living, and to more general institutions or social practices, like family or sexuality.[67] In other words, the field remains relatively undefined, being based on a concept, emotion, that many historians still take for granted.

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[64] Thomas Dixon, "'Emotion': The History of a Keyword in Crisis", *Emotion Review*, vol. 4, no. 4, October 2012, pp. 338–344, on p. 338. Actually, in many European languages (in Catalan, Spanish, French and Italian, for instance) equivalent terms to "emotion" ("*emoció*", "*emoción*", "*émotion*", "*emozione*") are still used preferably to talk about fleeting affections that have a physical component to them, and that are closer to a mood than to a sentiment, though the English usage (as a general category) is becoming dominant both in popular and academic discourses.

[65] Damien Boquet and Piroska Nagy, "Une histoire des émotions incarnées", *Médiévales*, 61 ("La chair des émotions. Pratiques et représentations corporelles de l'affectivité au Moyen Âge"), edited by Damien Boquet, Piroska Nagy and Laurence Moulinier-Brogi, Autumn 2011, , pp. 5–24, on p. 11, available online: http://medievales.revues.org/6249?lang=en [last access: February 2015]

[66] Barbara H. Rosenwein, *Emotional Communities in the Early Middle Ages*, Ithaca, NY-London, Cornell University Press, 2006, pp. 3–5, on p. 4. As Rosenwein also mentions, the German concepts *Gefühl* and *Empfindung* would be more or less equivalent to the French terms *émotion* and *sentiment*, respectively (on the historical meaning of these terms with reference to music, see chapter 5 of this work).

[67] Joanna Bourke, "Fear and Anxiety: Writing About Emotion in Modern History", *History Workshop Journal*, issue 55, 2003, pp. 111–133, on p. 114.

Regarding the development of the history of emotions, German historian Jan Plamper has made a distinction between the first generation of historians, where he includes Huizinga and Febvre, and later Delumeau and 1970s psychohistorians like Peter Gay, who "operated with historically invariable emotions concepts, either in a straightforward anachronistic (…) or in a psychoanalytical-anachronistic key", and 1970s historians like Theodore Zeldin or even Elias, and other later historians, who "imagined emotions in a more relativist way as being culturally variable, while allowing room for some universal aspects".[68] Thus, Zeldin's monumental *History of French Passions 1848-1945* (1973-1977) explained how such emotions as ambition, love, pride and anger were shaped by the facts of French contemporary history and the idiosyncrasies of everyday life at the time.[69] As I have mentioned earlier, *The Civilizing Process* (published in English in 1978-1982) analyses Western history as a process of implementation of bodily and emotional constraints towards rationality ("civilization")—[70] a conception that has underpinned many attempts to construct, in Rosenwein's words, "a grand narrative" of the history of emotions.[71]

Besides Elias' sociohistorical research, other sociologists stimulated the first steps of a history of emotions in North America, towards the end of the 1970s—a moment in which feminist theory also flourished, prompting a reexamination of subjects that, like emotions, had traditionally been labelled as "feminine". In particular, drawing

[68] Jan Plamper, "Emotional Turn? Feeling in Russian History and Culture. Introduction", *Slavic Review*, vol. 68, no. 2, 2009, pp. 229–237, on p. 230, available online: http://research.gold.ac.uk/10131/ [last access: March 2015].

[69] Theodore Zeldin, *A History of French Passions, 1848–1945*, Oxford, Clarendon Press, 1993, 2 vols: *vol. 1: Ambition, Love, and Politics*, *vol. 2: Intellect, Taste, and Anxiety*. This work has later been published in five volumes. By Zeldin see also "Personal History and the History of the Emotions", *Journal of Social History*, vol. 15, no. 3, Spring 1982, pp. 339–348.

[70] See Norbert Elias, *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*, translated by Edmund Jephcott with some notes and corrections by the author, edited by Eric Dunning, Johan Goudsblom and Stephen Mennell, Oxford, Blackwell, 2000; and also by him, *The Court Society*. On his role in the history of emotions see Robert Van Krieken, "Norbert Elias and Emotions in History", in David Lemmings and Ann Brooks (eds), *Emotions and Social Change: Historical and Sociological Perspectives*, London, Routledge, 2014, pp. 19–42.

[71] Rosenwein, "Worrying about Emotions in History", pp. 827–828.

on Erving Goffman's studies of social interaction, which analysed how social conventions shape the display of emotions in specific situations, US sociologist Arlie Hochschild has studied how "feeling rules", that is "[t]he social guidelines that direct how we want to try to feel", may produce "emotion work", which is an effort to try to change how we feel and "manage" our feelings. Hochschild has also discussed how emotion work relates to social structure and social classes, and how it is closely associated with issues of gender.[72] As Rosenwein has suggested, Hochschild's research on "feeling rules" was probably a source for the work of US historian Peter Stearns, who together with Carol Stearns launched in the mid-1980s the field of the history of emotions in the United States.[73] According to the Stearns, the history of emotions—like sensory history, I would add—originated in social history,[74] in particular in historical research into subjects like family life, where emotions could not be avoided and historians were able to track major emotional shifts over time. The Stearns proposed the term "emotionology", on which I will comment further later, "to distinguish the collective emotional standards of a society from the emotional experiences of individuals and groups".[75] Peter Stearns has not only studied the history of particular emotions and emotional styles, like anger or cool, but in 1998 also made the first attempt (with Jan Lewis) at tracing *An Emotional History of the United States*.[76]

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[72] Arlie Russell Hochschild, "Emotion Work, Feeling, Rules, and Social Structure", *American Journal of Sociology*, vol. 85, no. 3, November 1979, pp. 551–575, on pp. 563 and 561. By her see also *The Managed Heart: Commercialization of Human Feeling*, Berkeley, University of California Press, 1983 (new updated edition: Berkeley, University of California Press, 2012), especially Appendix A: "Models of Emotion: from Darwin to Goffman", pp. 201–222, and "The Sociology of Emotion as a Way of Seeing", in Gillian Bendelow and Simon J. Williams (eds), *Emotions in Social Life: Critical Themes and Contemporary Issues*, London-New York, Routledge, 1998, pp. 3–15.

[73] Rosenwein, "Worrying about Emotions in History", p. 824.

[74] This statement is hardly surprising, since Peter Stearns had founded the *Journal of Social History* in 1967.

[75] Peter N. Stearns and Carol Z. Stearns, "Emotionology: Clarifying the History of Emotions and Emotional Standards", *The American Historical Review*, vol. 90, no. 4, October 1985, pp. 813–836, on p. 813.

[76] Peter N. Stearns and Jan Lewis (eds), *An Emotional History of the United States*, New York, New York University Press, 1998. Among the Stearns publications on specific emotions I can mention: Carol Z. Stearns and Peter N. Stearns, *Anger: The Struggle for Emotional Control in America's History*, Chicago, University of Chicago Press, 1986;

Other authors, notably William Reddy and the aforementioned Rosenwein in the United States, and Joanna Bourke in Britain, have discussed and questioned the theoretical divide between universalist and constructionist approaches to the subject (see previous chapter). In particular, Reddy's *The Navigation of Feeling: A Framework for the History of Emotions* (2001) has tried to bridge the gap between both approaches by proposing the concept of "emotives", based on J.L. Austin's "performatives". Emotives are statements about how we feel that can potentially change how we feel. Since the author sees cognition as a process of translation, emotives would be "translations into that [a certain] language of a small part of the flow of coded messages that an awake body generates".[77] They could also be defined as intermediaries between body sensations and the social structures incarnated in language, acting as descriptors and relational instruments at the same time, and offering also opportunities for the exploration and transformation of the self. In spite of taking into account the anthropological approach to the history of the emotions, Reddy's theory is ingrained in Western psychology, and advocates "emotional liberty" as an ideal that could be used to judge the merits of any "emotional regime".[78] While this could legitimately be considered an ethnocentric stand, it also makes possible to address questions of power and agency, which so often fall off of the radar of theorists of sensibilities.[79]

Taking a critical stance towards both Stearns' emotionology, which she interprets as a continuation of Elias' theories on the civilizing process, and Reddy's

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and Peter Stearns, *American Cool: Constructing a Twentieth-Century Emotional Style*, New York, New York University Press, 1994.

[77] William M. Reddy, *The Navigation of Feeling: A Framework for the History of Emotions*, Cambridge, Cambridge University Press, 2001, p. 110.

[78] Reddy's theory of emotives is mainly developed in chapters 3 ("Emotional Expression as a Type of Speech Act") and 4 ("Emotional Liberty"), and is summarized in the Conclusion of *The Navigation of Feeling*. An earlier version of his theory can be found in William M. Reddy, "Against Constructionistm: The Historical Ethnography of Emotions", *Current Anthropology*, vol. 38, no. 3, June 1997, pp. 327–351.

[79] See Wickberg, "What Is the History of Sensibilities? On Cultural Histories, Old and New", pp. 673– 674; for a contrary opinion, see Piroska Nagy, "Les émotions et l'historien. De nouveaux paradigmes", *Critique*, janvier-février 2007, tome LXIII, nº 716–717, pp. 10–22, on p. 14.

theory of the emotives, which does not seem to account for the existence of different emotional styles under a certain emotional regime,[80] Barbara Rosenwein has suggested the notion of "emotional communities",[81] which refers to "groups in which people adhere to the same norms of emotional expression and value—or devalue—the same or related emotions" (more on this notion below).[82] While Rosenwein has worked on the history of anger, since the 2000s Joanna Bourke has studied intensively other negative emotions, like fear and anxiety.[83] In contrast to Reddy and Rosenwein's focus on language and emotional discourses—consequently, on texts as main historical sources—Bourke has stressed the fact that most emotions (fear, for instance) are fundamentally about the body: while "discourse shapes bodies", "bodies also shape discourse", since people react to emotions doing certain things, e.g. being "'weak or pale with fright', 'paralysed by fear', and 'chilled by terror'".[84] According to Bourke, historians always need to ask what a certain emotion "is *doing*", and they need to understand not only what that emotion is doing to the individual, but also how it may be affecting power relationships and social balances.[85] In a similar direction, German scholar Monique Scheer has proposed a new research approach to the history of emotions that is based on extended mind theory, situated cognition, and Bourdieuian theory of practice. She has advocated a view of emotion "as an act situated in and

[80] Rosenwein, *Emotional Communities in the Early Middle Ages*, pp. 6–7, and 20–23.

[81] However, as Piroska Nagy has pointed out, the French expression "communauté émotionnelle" has been in use since the 1990s as a peculiar translation of the German *Gemeinde*, employed by Max Weber in *Économie et société* (Paris, Plon, 1971); see Nagy, "Les émotions et l'historien. De nouveaux paradigmes", pp. 21–22.

[82] Rosenwein, *Emotional Communities in the Early Middle Ages*, p. 2, and also pp. 23–25, where the author also explains why "emotional communities" would be close to Foucault's notion of "discourse" and to Bourdieu's "habitus". See also by her "Worrying about Emotions in History", pp. 842–845, and "Problems and Methods in the History of Emotions", *Passions in Context: Journal of the History and Philosophy of the Emotions*, no. 1, 2010, http://www.passionsincontext.de/uploads/media/01_Rosenwein.pdf [last access: February 2015].

[83] See Barbara H. Rosenwein, *Anger's Past: The Social Uses of an Emotion in the Middle Ages*, Ithaca, NY, Cornell University Press, 1998; and Joanna Bourke, "Fear and Anxiety: Writing About Emotion in Modern History", *History Workshop Journal*, issue 55, 2003, pp. 111–133, and also by her *Fear: A Cultural History*, London, Virago, 2005.

[84] Bourke, "Fear and Anxiety: Writing About Emotion in Modern History", p. 123.

[85] Ibid., pp. 123–126.

composed of interdependent cognitive, somatic, and social components, mixed in varying proportions, depending on the practical logic of the situation in which it takes place", and has suggested the notion of "emotional practices" to account for the involvement of body, self, material objects, and the environment in emotions. [86]

The history of emotions is currently going through a process of consolidation, which typically involves a significant increase in the production of historical, self-reflexive works. One of the most recent and valuable additions to the field is Jan Plamper's *The History of Emotions* (2015), which is not exactly what its title suggests, but rather a survey of the historicization of the field—a comprehensive and synthetic effort.[87] As Boquet and Nagy have argued, the emergence of the history of emotions as a research field cannot be separated from the consolidation of a new model of subjectivity that considers emotions and reason as necessary accomplices, leaving behind the opposition between them.[88] Yet, while these authors place this process of consolidation of a new subjectivity in the second half of the 20th century, I (with Pampler) would rather locate it in the past twenty years, as I argued in the last section of the previous chapter. According to Plamper, the development of neurosciences and the repudiation of post-structuralism and postmodernism, at the very beginning of this century, have acted as the main catalysts for the current transdisciplinary interest in the

[86] Monique Scheer, "Are Emotions a Kind of Practice (and Is That What Makes Them Have a History)? A Bourdieuian Approach to Understanding Emotion", *History and Theory*, vol. 51, 2012, pp. 193–220 (quotation is on pp. 219–220).

[87] Jan Plamper, *The History of Emotions*, translated by Keith Tribe, Oxford, Oxford University Press, 2015; originally published in German as *Geschichte und Gefühl: Grundlagen der Emotionsgeschichte*, München, Siedler, 2012.

[88] Boquet and Nagy, "Une histoire des émotions incarnées", pp. 6–7.

emotions.[89] His research bears witness to the growing importance of the history of emotions in the German-speaking academia, and generally among European scholars.[90]

3.2 Theoretical and methodological issues

Commenting on historian Guy Thuillier's efforts to catalogue and measure the sounds that could be heard by the inhabitants of a particular French region in the middle of the 19th-century, Alain Corbin noticed that this approach—namely, tracing "the evolution of the sensory environment", drawing "an inventory of the sensations that were present at a given moment in history in each social milieu"—might appear as the simplest one. Yet, it is not sufficient, since "it implies the non-historicity of the modalities of attention, thresholds of perception, significance of noises… and configuration of the tolerable and intolerable", and ultimately denies the historicity of the senses. Indeed, such "positivist" [91] or (a term employed by Mark Jenner) "materialist" efforts do not abound in current bibliography on the history of the senses and emotions.[92] Along the same lines, Mark Smith has criticized the ambition to replicate or reenact lost sensory worlds—an ambition that he perceives not only in some scholars of the senses, but also in the way in which historical sites and exhibitions are sometimes curated and arranged.

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[89] Jan Plamper, "Historia de las emociones: caminos y retos", *Cuadernos de Historia Contemporánea*, vol. 36, 2014, pp. 17–29, on p. 21, available online: http://revistas.ucm.es/index.php/CHCO/article/view/46680 [last access: April 2015].

[90] Also in Spain: among Spanish publications on the subject, see the collection *Accidentes del alma: las emociones en la edad moderna*, edited by María Tausiet and James S. Amelang, Madrid, Abada, 2009; see also the introductory and useful essay by Juan Manuel Zaragoza Bernal, "Historia de las emociones: una corriente historiográfica en expansión", *Asclepio*, no. 65(1), January-June 2013, available online: http://asclepio.revistas.csic.es/index.php/asclepio/article/viewArticle/547/571 [last access: April 2015]; and also, Javier Moscoso Sanabria and Juan Manuel Zaragoza Bernal, "Historia del bienestar. Desde la historia de las emociones a las políticas de la experiencia", *Cuadernos de Historia Contemporánea*, vol. 36, 2014, pp. 73–88, which includes a short review of the history of emotions in Spain and Latin America.

[91] Corbin, "Charting the Cultural History of the Senses", pp. 129–130. Howes's "Can These Dry Bones Live?" follows a similar path to Corbin's essay in reflecting on the methods and sources of sensory anthropologists, comparing them with those of historians of the senses.

[92] See Mark S. R. Jenner, "Follow Your Nose? Smell, Smelling, and Their Histories", *American Historical Review*, 2011, vol. 116, no. 2, pp. 335–351, on p. 343, where the author refers to those scholars that try to reconstruct the repertory of odours of a certain place and time.

As he has argued, recalling or reconstructing sensory experiences cannot bring those experiences back to us, unless our exercise of memory is supplemented by an understanding of what those experiences may have meant to the people involved in them.[93]

In order to understand the meaning of those experiences, historians of the senses—like historians of emotions—must draw on a plurality of historical sources. Firstly, they must examine written documents, particularly those dealing explicitly with the senses and emotions, be they philosophical, physiological, psychological, or generally scientific texts. (Indeed, as I will explain below, in the last decades physiological and psychological discourses are increasingly being considered by historians of the senses). While, as Jenner has pointed out, "scholars should not assume that changes in the scientific models of sensory perception were or are necessarily translated into equivalent transformations in subjective understandings of sensation and perception",[94] it would also be erroneous to assume—as I will argue later in more detail—that those scientific models are always separate from folk notions, or that they do not have an influence on the way in which common people think about their senses. Regarding the history of emotions, Barbara Rosenwein has also recommended "to consult theorists of the time", paying special attention to the terminology used by them, but also avoiding taking it at face value.[95]

Secondly, according to Corbin, historians may benefit from consulting other written materials, like educational and prescriptive books, or—following on Elias' steps—etiquette manuals, since these are "the writings that reveal the system of norms, and that make it possible to identify the techniques of sensory restriction operating

[93] Smith, "Producing Sense, Consuming Sense, Making Sense"; see also Jenner, "Follow Your Nose? Smell, Smelling, and Their Histories", pp. 335–338.

[94] Jenner, "Follow Your Nose? Smell, Smelling, and Their Histories", p. 346.

[95] Rosenwein, "Problems and Methods in the History of Emotions", pp. 14–15.

within the society under consideration"; or studying private journals, a practice of self-scrutiny that flourished during the 18th century and a privileged way "to understand the historicity of the affective mechanisms, to discover the configuration and functioning of the systems of emotions, or discern the ways in which the senses were educated and employed".[96] Also, as Smith has observed, when considering past descriptions or observations about the senses, it is important to bear in mind who made those observations, and which prejudices or values this person may have carried, since they may be different from those carried by her contemporaries. Smith's observation resonates with Rosenwein's suggestion that historians of emotions should relate particular dossiers of sources to particular emotional communities, and should bear in mind that emotional terms—like sensorial descriptions and terms—are sometimes used "not to express or to describe feelings but to label others".[97] Also, as she has explained elsewhere, texts dealing with emotions (or with the senses) may be full of derivative commonplaces. Besides, the kind of information that scholars may obtain from them will normally be constrained by genre: different sources (private letters, diaries, manuals of manners, etc.) imply different levels of intimacy and different usages, and thus favour the expression of different emotions.[98]

Thirdly, historians of sensibilities must also consider non-textual data, beginning with images. For instance, they must study the iconography of gestures related to each sense or emotion, as it may give them access to the bodily dimension of sensorial and emotional experiences. Nevertheless, they should also bear in mind that artworks, and generally images, normally follow certain conventions of representation, and therefore

[96] Corbin, "Charting the Cultural History of the Senses", pp. 131–132.

[97] Rosenwein, "Problems and Methods in the History of Emotions", pp. 12–13.

[98] Rosenwein, *Emotional Communities in the Early Middle Ages*, p. 27, and generally on sources and research methods pp. 26–29.

must be interpreted, too.[99] Besides, historians must analyse, among other aspects, the places that have hosted specific practices related to the senses, or to one particular sense or emotion; the various objects, instruments and tools devised to extend, alter, test or measure the senses or the emotions; the practices of inscription that have assured the dissemination of sensorial and emotional knowledge; as well as the many forms of sociability and institutions that have emerged around sensible exchanges. All these aspects are implied in the notion of the senses and emotions as bodily, situated practices, and thus must be taken into account whenever possible. The technological aspect is particularly important, as the development of the senses in Western modernity cannot be dissociated from the challenges to perception presented by modern technologies like the telescope, the magnifying glass, the different modalities of hearing aids, or the gramophone, as well as by mass media like radio, television, or the Internet, among others. Also, these technologies may elicit, alter or attenuate particular feelings.

Taking these different sources into account may allow researchers not only to offer accurate descriptions of the uses of the senses and the sensorial environment of a certain historical period, but also, more importantly, to understand the systems of values lying at the base of them. As I have mentioned before, descriptions are useless if they are not accompanied by knowledge of—in Corbin's words—the "thresholds of tolerance" towards particular sensations at certain historical moments; for example, towards stench, however it be defined, or towards the sound of bells in the countryside, where it was first appreciated and latter combated as unwanted noise.[100] In that sense, Corbin has also warned of the perils of "confusing the reality of the employment of the

[99] Peter Burke, "Is There a Cultural History of the Emotions?", in Penelope Gouk and Helen Hills (eds), *Representing Emotions: New Connections in the Histories of Art, Music and Medicine*, Aldershot, UK, Ashgate, 2005, pp. 35–47, on p. 39.

[100] On "thresholds of tolerance" see Corbin, *The Foul and the Fragrant*, p. 56; and also his *Village Bells*.

senses and the picture of this employment decreed by observers"[101] by ignoring that the accounts of observers are always influenced by the hierarchies of representation and appreciation of every epoch. As he has formulated the matter elsewhere, a possible history of sensibilities should be based on the study of both "systems of perception" (*systèmes de perception*) and "modalities of appreciation" (*modalités d'appreciation*),[102] though both modalities may not always be explicit, and thus may be difficult to identify and describe.

The difference between "systems of perception" (rather, "systems of emotion") and "modalities of appreciation" is similar to the distinction between "emotion" and "emotionology" proposed also by Peter and Carol Stearns, where the latter would name "the attitudes or standards that a society, or a definable group within a society, maintains toward basic emotions and their appropriate expression".[103] Nevertheless, the Stearns have also admitted that, as social constructionists have repeatedly argued (see chapter 1), it is not easy to separate "real" emotions from emotional culture.[104] Writing along the same lines, Rosenwein has insisted on the importance of not only studying the emotional terms employed by each emotional community at a certain period, but also trying to understand "the weight and significance of the terms", their relative value to each human group. This may involve not only reading texts and counting words, but also—perhaps more importantly—reading the silences about certain emotions, or even addressing sources that are apparently unemotional.[105] The task of recognizing and interpreting hierarchies of values should be accompanied by an equally important effort to show how these hierarchies are effectively present in particular instances, and, more

[101] Corbin, "Charting the Cultural History of the Senses", p. 133.

[102] Corbin, "'Le Vertige des foisonnements'", p. 122.

[103] Stearns and Stearns, "Emotionology: Clarifying the History of Emotions and Emotional Standards", p. 813.

[104] See for instance Stearns, *American Cool: Constructing a Twentieth-Century Emotional Style*, pp. 2–3.

[105] Rosenwein, "Problems and Methods in the History of Emotions", pp. 15–17.

importantly, how these hierarchies are learnt, transmitted and developed; in brief, how they are *lived*. In the case of emotions, as Rosenwein has pointed out, this involves considering emotions as "instruments of sociability" and forms of social interaction that evolve in time.[106]

As I have observed above with reference to textual sources on the senses, the relationship between "expert" and "folk" discourses on the senses, or—what is not exactly the same—between "intellectual" and "popular" views of the senses has sometimes been considered a controversial issue by historians of sensibilities. Thus, Smith has contrasted the sociohistorical approach to the senses with the "intellectual history of the senses", written by historians "who have traced the way senses and their meanings have preoccupied great thinkers, especially in the Western canon",[107] and who have mainly employed the textual production of those "great thinkers" for this purpose. Yet, in my opinion, this is not a clear distinction. On the one hand, in each historical period learned people have represented and explained the senses using concepts and theoretical models that reflected wider notions of human subjectivity, and which relate the senses to other parts of the self, like intellect or emotions. As I have argued in the previous chapter, ideas about the structure and functioning of the senses may be shaped by different conceptual metaphors,[108] which very often do not belong specifically in learned communities, but are part of common language, or are at least shared by different social classes. This is, for instance, the case of 20th-century information-theory models, according to which sensations are conceived as the input to a computer system, and sensing (or perceiving) would mean "processing information"—all of them

[106] Ibid., pp. 19–21.

[107] Smith, *Sensory History*, p. 13. On this see also Chartier, "Intellectual History and the History of *Mentalités*", pp. 31–32.

[108] On conceptual metaphors see Lakoff and Johnson, *Metaphors We Live by*; on metaphors in the history of psychology see David E. Leary (ed.), *Metaphors in the History of Psychology*, Cambridge, Cambridge University Press, 1990.

terms that have been used in scientific explanations, but that may also come up in everyday conversations.

Another interesting case would be what Rosenwein calls the "hydraulic model" of emotions, based on the classical medical theory of humours, according to which "the emotions are like great liquids within each person, heaving and frothing, eager to let our". As Rosenwein points out, this theory seems to be "embedded in our language", in common expressions like "overcoming sadness" or "channelling anger", but it has also underpinned the expert discourses of physiologists and philosophers,[109] and —as I will comment later (see chapter 5)—it may also be found in 18th-century treatises on the effects of music. On the other hand, historians aiming at reconstructing the history of the senses in the so-called "Western world" can hardly avoid the recourse to intellectual history, since sensory research has not produced so far an alternative historical narration, namely a popular or everyday life approach to the matter covering a substantial variety of sensorial and emotional modalities, sources and periods.[110] Still, when the recourse to intellectual history is unavoidable, it is advisable to make clear at least which sources are being employed and which perspectives on sensibilities will not be covered as a result.

3.2.1 The question of periodization: three historical moments

According to Corbin, "the existence and validity of a history of sensibility" implies "discovering the configuration of what is experienced and what cannot be experienced within a culture at a given moment".[111]As he acknowledges elsewhere, this formulation

[109] Rosenwein, "Worrying about Emotions in History", pp. 834–836.

[110] See for instance C.M. Woolgar, *The Senses in Late Medieval England*, New Haven, CT, Yale University Press, 2006; David Morgan, *Visual Piety: A History and Theory of Popular Religious Images*, Berkeley, University of California Press, 1998.

[111] Corbin, "Charting the Cultural History of the Senses", p. 129.

resonates with Foucault's concept of "episteme", that is "the epistemological field (…) in which knowledge, envisaged apart from all criteria having reference to its rational value or to its objective forms, grounds its positivity and thereby manifests a history (…) of its conditions of possibility".[112] In that same direction, Corbin has stated that mapping the history of the senses amounts to tracing the "emergence" of new concepts or practices in history,[113]and of the value systems associated with them.

Precisely considering its Foucauldian resonances, Corbin's statement should not be understood as an invitation to establish something like a common history of all the senses, or a panoramic history of emotions, surveying their evolution through time. Indeed, even if we restrict ourselves to the so-called Western world, single-author historiographical efforts covering different phases in the history of sensibilities, and dealing with different geographical locations do not currently abound.[114] [115] As Rosenwein has pointed out, such "grand narratives" as Elias' account of the civilizing process as the history of increasing emotional restraint do not seem to have a place any more in the aspirations of scholars.[116]

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[112] See Alain Corbin, "Désir, subjectivité et limites, l'impossible synthèse…", *Espaces Temps*, no. 59–61 ("Le temps réfléchi. L'histoire au risque des historiens"), 1995, pp. 40–46, on p. 44; and again, Foucault's Preface to *The Order of Things*, pp. xxiii–xxiv, and also his *The Archaeology of Knowledge*.

[113] Corbin, "Désir, subjectivité et limites, l'impossible synthèse…", p. 44.

[114] Regarding the senses I can only think of three examples: McLuhan's *The Gutenberg Galaxy* (1962), Lowe's *History of Bourgeois Perception* (1982), and Robert Jütte's *A History of the Senses*, translated by James Lynn, Oxford, Polity Press, 2005, which summarizes philosophical and physiological literature on the senses (more on it below). Regarding the history of emotions, Elias' *The Civilizing Process* (1978–1982) would be a comparable (if not more impressive) effort.

[115] Constance Classen has recently edited a six-volume reference work devoted to the senses as a whole, from Antiquity to the year 2000: *A Cultural History of the Senses*, but unfortunately it could not be included in this investigation, and it is a multi-author work anyway; see Constance Classen (ed.), *A Cultural History of the Senses*, 6 vols., London, Bloomsbury, 2014. The titles of the six volumes are: 1. *A Cultural History of the Senses in Antiquity*, 500 BCE–500, edited by Jerry Toner, 2. *A Cultural History of the Senses in the Middle Ages*, 500–1450, edited by Richard Newhauser, 3. *A Cultural History of the Senses in the Renaissance*, 1450–1650 edited by Herman Roodenburg, 4. *A Cultural History of the Senses in the Age of Enlightenmen*t, 1650–1800 edited by Anne Vila, 5. *A Cultural History of the Senses in the Age of Empire*, 1800–1920, edited by Constance Classen, 6. *A Cultural History of the Senses in the Modern Age*, 1920–2000, edited by David Howes.

[116] Rosenwein, "Worrying about Emotions in History", p. 827.

Reddy has also observed that the crisis of progressive views of the history of sensibilities has been in course since the 1970s, when scholars realized that those histories that had been flowing under the surface of official history (the histories of popular classes, women, deviant populations, etc.) deserved to be told in their own terms, what in many cases involved a questioning of old periodizations. This was also the time when Foucault challenged received historiographical notions: his questioning of the conception of history as a teleological narrative, and his vindication of chance as historical agent inspired other authors to follow the same path.[117] For instance, considering the idea of a history of vision, art historian Jonathan Crary has pointed out that changes in perception are not autonomous, since "what determines vision [and the other senses and emotions, I would add] at any given historical moment is not some deep structure, economic base, or world view, but rather the functioning of a collective assemblage of disparate parts on a single social surface", even in different places, forming "more or less powerful arrangements of forces out of which the capacities of an observer [a perceiver] are possible".[118] On the other hand, somewhat paradoxically, Foucault's three "epistemes"—as defined in *The Order of Things*, namely the Renaissance (roughly, the 15th and 16th centuries), the Classical Age (17th and 18th centuries), and Modernity (from the 19th century on)—are sometimes accepted heuristically, as if they were historical facts.[119]

[117] William Reddy, "Historical Research on the Self and Emotions", *Emotion Review*, vol. 1, no. 4, October 2009, pp. 302–315, on pp. 303–304. On Foucault's approach to history see Thomas Flynn, "Foucault's Mapping of History", in Gary Gutting (ed.), *The Cambridge Companion to Foucault*, Cambridge, Cambridge University Press, 2005 (2nd ed.), pp. 29–48.

[118] Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Cambridge, MA, MIT Press, 1990, p. 6.

[119] See Foucault, *The Order of Things*, and for a clarificaation of the question see also Hubert L. Dreyfus and Paul Rabinow, *Michel Foucault: Beyond Structuralism and Hermeneutics*, Chicago, Chicago University Press, 1982, pp. 16–43. My comment on the heuristic character of some usages of Foucault's epistemes refers to Crary's *Techniques of the Observer*, an otherwise brilliant investigation.

Since the 1990s, the crisis of progressive narratives has consolidated, to the point that contemporary historians often prefer to focus on single senses and emotions and specific historical periods. They consider sensorial and emotional practices in their historical contexts, accepting the possibility that different notions and models of the senses and emotions—therefore, different sensorial and emotional communities—may co-exist in a given space and time.[120] Rosenwein has imagined this coexistence as "a large circle within which are smaller circles, none entirely concentric but rather distributed unevenly within the given space", the larger circle being an "overarching emotional community", and the smaller ones, "subordinate emotional communities".[121] Reddy has even identified a "new methodology" for studying the history of emotions, according to which historians should "look beyond texts that lay down norms or describe ideals", and focus instead on how human groups elaborate particular systems, regimes or styles to try to conform to or resist those standards.[122]

Nevertheless, the focus on particular sensibilities or moments does not seem to have totally cancelled the aspiration to build some sort of general narrative,[123] that is to identify and describe particular temporary stabilizations of the field, at least with reference to some of the many aspects involved in it, or to particular "sensorial" or "emotional communities". Some scholars have referred to these temporary stabilizations with such names as "sensory regimes" or (Reddy's expression) "emotional regimes".[124]

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[120] See Jenner, "Follow Your Nose? Smell, Smelling, and Their Histories", pp. 342–348, which makes the same point with reference to smell though.

[121] Rosenwein, *Emotional Communities in the Early Middle Ages*, p. 24.

[122] Reddy, "Historical Research on the Self and Emotions", p. 311.

[123] See for instance, precisely with reference to the history of hearing, Sophia Rosenfeld, "On Being Heard: A Case for Paying Attention to the Historical Ear", *The American Historical Review*, vol. 116, no. 2, April 2011, pp. 316–334. On p. 319 Rosenfeld states: "In fact, so many distinct historical studies involving sound, audition, or auditory knowledge now exist that we can begin to construct something like a grand narrative for the ear, at least for Western Europe and North America."

[124] While the concept of "emotional regimes" is defined in Reddy's *The Navigation of Feeling*, the notion of "sensory regimes" has been employed by some anthropologist of the senses (for example, it appears in Howes, *The Varieties of Sensory Experience*, and in Corbin, "Charting the Cultural History of the Senses"), though apparently nobody has

The notion of "emotional styles" has also been liberally employed by Peter Stearns to refer to broader historical syntheses going beyond particular emotional standards, and by Reddy and Rosenwein, though it is not clear whether they attach the same meaning to it.[125] We could as well call these stabilizations "sensory models" or "emotional models", if we take these terms to mean not only different patterns of relationships among the senses or emotions, but also particular ways of conceiving their connections with other parts of the self, and with all the aspects involved in sensorial and emotional practices, and if we accept that these models may and will change through time.

Actually, the research efforts of the last decades have not only cast doubt on the periodizations established by "grand narratives"—that of McLuhan and Ong for the senses, and that of Elias for the history of emotions, to name just the most important ones—, but have also contributed to the emergence of new historiographical focuses of interest. These criticisms and contributions may be summarized with reference to three historical moments that are part of those narratives on the history of the senses and emotions.

The first historical moment is the passage from the Late Middle Ages to the Renaissance, which—as I reviewed in chapter 1—McLuhan and Ong identified with the "triumph of visualization" and the "anaesthesia" of the "other" senses in the modern era. According to their periodization of communication technologies, this moment was associated with the invention and spread of the printing press circa 1450, the development of pictorial perspective, and the beginning of the so-called "Scientific

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cared to define it. Even if the term "regime" must be understood, at least in Reddy's usage, in a political sense, "regime" had originally a dietary and pedagogical sense, which is maintained, for instance, in Corbin's expression "the organization of the sensory regime" (ibid., p. 136), which does not allude to collective life, but to the life of the individual.

[125] Stearns, *American Cool: Constructing a Twentieth-Century Emotional Style*, p. 5. Rosenwein, for instance, alludes to the "characteristic styles" of emotional communities in her *Emotional Communities in the Early Middle Ages*, p. 26. Reddy has published a chapter on "Emotional Styles and Modern Forms of Life", in Nicole Karafyllis and Gotlind Ulshöfer (eds), *Sexualized Brains*, Cambridge, MA, MIT Press, 2008, pp. 81–100, but I did not have access to it during the writing of this thesis.

Revolution". The "triumph of the visual"—so the narrative went—apparently entailed the vanishing or obscuration of a pre-modern sensorial world that was imagined as sensually richer and "different" from "ours". As I have explained in this chapter, this idea had been developed in the 1940s by Febvre, who advocated a recovery of past sensibilities and feelings, though he located the "triumph of the visual" somewhat later: for him the sight of 16th-century men was still underdeveloped.[126] However (see again chapter 1), the very notion of the "triumph of the visual" and the chronology associated with the orality/literacy divide have been questioned since the end of the 1960s to the point of discredit.

On the other hand, Huizinga's description of the Middle Ages and Elias' research into the civilizing process as an internalization of external constraints established the image of the Middle Ages as a period where direct and strong feelings, always on the verge of going out of control, reigned without opposition: that was, as Rosenwein has recalled, the "childhood of man".[127] Yet, as she has also argued, this image has been criticized by many contemporary medievalists dealing with different subjects, from courtly love ideals to religious and legal matters, who have made the case for a reappraisal of medieval emotions.[128] Historians and literary scholars studying the medieval senses also seem to have left this paradigm behind: many of them are devoting their efforts to explore the various facets of medieval sensibilities, occasionally stressing the continuities between medieval and early modern notions of the senses.[129]

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[126] Febvre, *The Problem of Unbelief in the Sixteenth Century*, 436–437.

[127] Rosenwein, *Emotional Communities in the Early Middle Ages*, pp. 5–7, which refers to Huizinga, *The Waning of the Middle Ages*, p. 9.

[128] Ibid., pp. 10–13.

[129] See for instance Suzannah Biernoff, *Sight and Embodiment in the Middle Ages*, New York, Palgrave Macmillan, 2002; Gail Kern Paster, Katherine Rowe and Mary Floyd-Wilson (eds), *Reading the Early Modern Passions: Essays in the Cultural History of Emotions*, Philadelphia, University of Pennsylvania Press, 2004; Stephen G. Nichols, Andreas Kablitz and Alison Calhoun (eds), *Rethinking the Medieval Senses*, Baltimore, The Johns Hopkins University Press, 2009; and Elena Carrera (ed.), *Emotions and Health*, Leiden, Brill, 2013.

In contrast to the purportedly unruly Middle Ages, the early modern period was routinely depicted through the prism of rationalism. Thus, Elias described the disciplining of human behaviour in early modernity as a process of rationalization, which he called "court rationality" since it took place within the context of the court.[130] Yet, as Reddy has argued, contemporary scholars have revealed "a great diversity in practical conceptions of self and emotions" during the Renaissance and Reformation periods, up to mid-17th century, to the point that "[w]e no longer see the rise of a rational, skeptical, self-interested individual in these centuries".[131] (In that sense, in chapter 4 I will make the case for the reappraisal of the role of the passions in early modern philosophy, particularly in the work of the philosopher that has routinely been blamed with establishing the mind-body divide.)

Following Elias' narrative, court ideals and good manners were adopted subsequently by the ascending bourgeoisie, which was meant to become the new ruling class.[132] His account already showed how the Enlightenment, the purported "age of reason", was based on the control of sensual and emotional drives. Yet, as Reddy has remarked, it was only in the 1990s that, "the 18th century was beginning to be seen as an age of sentiment".[133] Central to this change was George Barker-Benfield's classic study *The Culture of Sensibility: Sex and Society in Eighteenth-Century Britain* (1992), which drew on Elias' historical investigation, even if it focused mainly on the tensions between the emotional cultures of men and women.[134] This is, indeed, the second

[130] Elias, *The Civilizing Process*, pp. 397–414, and passim.

[131] Reddy, "Historical Research on the Self and Emotions", pp. 305–306; see also Patricia A. Cahill, "Take Five: Renaissance Literature and the Study of the Senses", *Literature Compass*, 6/5, 2009, pp. 1014–1030.

[132] Elias, *The Civilizing Process*, pp. 421–435.

[133] Reddy, "Historical Research on the Self and Emotions", p. 307; and pp. 306–309 for a review of trends and bibliography on the emotions in the 18th century.

[134] See G. J. Barker-Benfield, *The Culture of Sensibility: Sex and Society in Eighteenth-Century Britain*, Chicago, University of Chicago Press, 1992, esp. pp. 77–89, where the author inscribes his research within the framework of Elias' historical investigation.

historical moment on which historians have tended to focus recently: what Reddy has called "the flowering of sentimentalism" in the 18th century, when "emotions were deemed to be as important as reason in the foundation of states and the conduct of politics".[135] While Reddy's investigation deals mainly with French political history, this historical moment would include what British literary scholars have called the "age of sensibility", roughly from mid- to the end of the 18th century.[136] The notion of "sentimentalism" could also cover the Romantic period (approximately, until mid-19th century), though, as Reddy has warned elsewhere "[n]ineteenth-century Romanticism differed sharply from 18th-century sentimental admiration for morally good emotions";[137] Romantic appreciation of strong feelings was not necessarily based on their moral value. In later chapters I will deal with the notion of sensibility, which did not only belong in literary and political contexts, but was also rooted in the physiology of the nerves.

However, the final decades of the 18th century and the 19th century are also the context in which some historians of the senses have located an important topic: that of the "separation of the senses", mainly argued for by Jonathan Crary with reference to the autonomization of vision, and by Jonathan Sterne concerning the constitution of hearing as a proper object of study.[138] Both scholars have inscribed the separation of the

[135] See chapter 5, entitled "The Flowering of Sentimentalism (1700–1850)", of Reddy, *The Navigation of Feeling*, pp. 141–172 (quotation is on p. 143), and generally the entire Part II of the book ("Emotions in History: France, 1700–1850); see also his "Historical Research on the Self and Emotions", pp. 306–309, for a review of trends and bibliography on emotions in the 18th century

[136] The term "age of sensibility" was proposed initially by Canadian literary critic Northrop Frye (see his "Towards Defining an Age of Sensibility", *ELH*, vol. 23, no. 2, June 1956, pp. 144–152) to label the English literature produced roughly in the second half of the 18th century (a period that was previously most often denominated "pre-romantic"). However, as Georges S. Rousseau has remarked, Frye did not define "sensibility" in any way; see Georges S. Rousseau, "Nerves, Spirits and Fibres: Towards Defining the Origins of Sensibility" (1975), in *Nervous Acts. Essays on Literature, Culture and Sensibility*, Basingstoke, Palgrave Macmillan, 2004, pp. 160–184, at note 12, page 180.

[137] Reddy, "Historical Research on the Self and Emotions", p. 309.

[138] See chapter 3 ("Subjective Vision and the Separtion of the Senses") of Crary, *Techniques of the Observer*, pp. 67–96, and chapter 1 ("Machines to Hear for Them") of Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction*, Durham, NC, Duke University Press, 2003, pp. 31–86.

senses within narratives of rationalization and modernization, and approached perception as basically a process of (visual or auditory) knowledge, unrelated to feelings. Since, as I have mentioned above, Thomas Dixon has tracked down the emergence of "emotion" as a category of mental states to the mid-19th century,[139] we could perhaps suppose that the so-called "separation of the senses" happened in parallel to a differentiation between the senses and the emotions, which contrasted with the sensorial and sentimental resonances of the 18th-century category of sensibility. Yet, the dynamics of these processes, if they took place at all, remain entirely to clarify.

A third moment in the history of senses and emotions is the crisis usually located between the second half of the 19th century and the first decades of the 20th century, which would correspond to changes in human perception resulting from those developments that are commonly gathered under the concept of "modernization".[140] This comprehends, firstly, industrialization and urbanization, which have more often been explained in visual terms, though Schafer had already blamed them for the transformation of soundscapes.[141] Secondly, the spread of (then) new technologies like the telegraph, the telephone, the radio, the cinema and the phonograph—all of them technologies of perception, and also of emotion. In the field of art history and visual studies this critical moment has been thoroughly analysed by Jonathan Crary, who stated that "from the mid-1800s on, perception is fundamentally characterized by

[139] See Thomas Dixon, *From Passions to Emotions: The Creation of a Secular Psychological Category*, Cambridge, Cambridge University Press, 2003.

[140] For an excellent, though predominantly visual description of modern urbanism, or rather of urbanism as a modernizing strategy, see Marshall Berman, *All That Is Solid Melts into Air: The Experience of Modernity*, New York, Simon and Schuster, 1982.

[141] See R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*, Rochester, Destiny Books, 1994 (2nd ed.). On the subject of urbanization and the senses during the 19th and 20th centuries see Alexander Cowan and Jill Steward (eds), *The City and the Senses: Urban Culture Since 1500*, Aldershot, Ashgate, 2007, esp. parts II and III (part I deals with early modern cities).

experiences of fragmentation, shock, and dispersal".[142] In his research Crary has invoked, among many other thinkers, Georg Simmel, Sigfried Kracauer, Walter Benjamin and Theodor Adorno, all of whom observed that modernization had led to a sensory crisis, which they sometimes described as a crisis of attention.[143]

Besides Crary, other authors have identified this sensory crisis with modernism, particularly with what it is often called "high-modernist aesthetics", which is understood to be a consequence of modernization. For instance, departing from the antitechnological rhetoric commonly associated with literary modernism, Swedish scholar Sara Danius has read some major modernist novels published between 1880 and 1930 as examples of the aesthetic internalization—"from technological *prosthesis* to technological *aisthesis*"—that took place after World War I, at a key moment in the expansion of mass media.[144] Whereas modernization must also have had effects on emotional life beyond intellectual elites, contemporary research on 20th-century emotional cultures and styles seems to advance in different directions. Yet, the notion of "American cool", which Peter Stearns considers the dominant emotional style in 20th-century North America, and Cas Wouters' theories on "informalization", which refer to the progressive relaxation of manners in Europe and North American since 1890—

[142] Crary, *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, Cambridge, MA, MIT Press, 1999, p. 1.

[143] Ibid., p. 48. By Simmel see "The Metropolis and Mental Life (1903)" and "Sociology of the Senses (1907)"; see also Siegfried Kracauer, *The Mass Ornament: Weimar Essays*, translated, edited, and with an introduction by Thomas Y. Levin, Cambridge, MA-London, Harvard University Press, 1995; Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction (1935)", in *Illuminations*, edited and with an introduction by Hannah Arendt, translated by Harry Zohn, New York, Schocken Books, 1968, pp. 217–252; and T.W.A. Adorno, "Über den Fetischcharakter in der Musik und die Regression des Hörens", in *Gesammelte Schriften,* 14, ed. Rolf Tiedemann, Frankfurt, Suhrkamp, 1973, pp. 14–50 (in English as "On the Fetish-Character in Music and the Regression of Listening", in Adorno, *Essays on Music*, selected, with introduction, commentary and notes by Richard Leppert; translations by Susan H. Gillespie and others, Berkeley, University of California Press, 2002. pp. 288–317).

[144] Sara Danius, *The Senses of Modernism: Technology, Perception, and Aesthetics*, Ithaca, NY, Cornell University Press, 2002, p. 3. Among the major works analyzed by Danius are Marcel Proust's *Remembrance of Things Past* (1913-1927), James Joyce's *Ulysses* (1922), and Thomas Mann's *The Magic Mountain* (1924). On the other hand, Danius' approach seems to follow on the steps of Marshall McLuhan, whose his initial investigations on literary modernism laid the foundation for his media theories, as it has recently been argued by Elena Lamberti in her *Marshall McLuhan's Mosaic: Probing the Literary Origins of Media Studies*, Toronto, University of Toronto Press, 2012.

Wouters, a Dutch sociologist, took inspiration from Elias—have gained critical attention.[145]

Setting aside this sketchy characterization of historical periods, probably a more relevant trend in contemporary efforts to historize the senses and the emotions is the emergence of new disciplinary approaches, in particular those that try to bridge the gap between social and cultural history—the fields were histories of the senses have most commonly been ascribed—and other histories, in particular those of science (including medicine and physiology) and technology. In exploring communication technologies, relating them to changes in perceptual and mental life, McLuhan and Ong set an orientation that, as I have argued previous chapters, was key to the development of sensory studies and is still widely influential today.[146] Other scholars—among which, notably, German scholar Friedrich Kittler—[147] have continued the materialist exploration of changes in communication media and their effects on perception.

Yet, in this century different narratives have appeared, which examine physiological and psychological theories of the senses within the framework of intellectual and social history. This trend is represented, for instance, by the work of German historian of medicine Robert Jütte *A History of the Senses* (2005), which combines the history of medicine with intellectual history, mixing philosophical and physiological literature, though it accounts only to a limited extent for social and

[145] See Stearns, *American Cool: Constructing a Twentieth-Century Emotional Style*; Cas Wouters, *Informalization: Manners & Emotions since 1890*, Los Angeles-London-New Dehli-Singapore, SAGE, 2007; and also Reddy, "Historical Research on the Self and Emotions", p. 310.

[146] Besides the works by Ong and McLuhan that I discussed in the previous chapter, a typical account of McLuhan and Ong's periodization of the senses may be found in Howes, "Sensorial Anthropology", pp. 170–172.

[147] See Friedrich Kittler, *Discourse Networks 1800/1900*, translated by Michael Metteer, with Chris Cullens, foreword by David E. Wellbery, Stanford, CA, Stanford University Press, 1990; also by him "The History of Communication Media", *CTheory*, special issue ga114, July 1996, available online: http: //www.ctheory.net/text_file.asp?pick=45/ [last access: January 2015]; and *Gramophone, Film, Typewriter*, translated, with an introduction by Geoffrey Winthrop–Young and Michael Wutz, Stanford, Stanford University Press, 1999.

technological change.[148] Physiological theories have also been taken into consideration by other scholars of the senses, like North American historians Barbara Maria Stafford, Jonathan Crary, Jonathan Sterne and Veit Erlmann, who have looked into the history of particular senses: sight in Stafford and Crary's case, hearing in Sterne and Erlmann's.[149] While Crary and Stafford are noted for having studied the intermingling of science, technology and aesthetics in the history of visual representation, Sterne has investigated the intersection between the history of communication technologies and the history of physiology and psychology in relation to hearing.[150]

3.3 Audition in history

While the theoretical and methodological issues reviewed in the previous section apply to the study of audition in history, it is commonly acknowledged that doing research into the sounds of the past and the ways in which people dealt with them presents specific problems. To begin with, the primary sources for auditory history would ideally be sound recordings, but these are only available for this and the last century and for the last decades of the 19th century. In addition, as Carolyn Birdsall has pointed out,[151] even when historians can access sound archives, they often complain about their precariousness. As she has also observed, historians may face difficulties in gathering testimonies to the sounds of a certain period (what she calls "earwitness testimonies")—

[148] Jütte's *A History of the Senses* (2005) appeared originally in German as *Geschichte der Sinne: Von der Antike bis zum Cyberspace*, Munich, C.H. Beck, 2000. Jütte divides the history of the senses into three big historical periods: the "traditional order of the senses" (from antiquity to the early modern era), the passage to the "world of reason" (18th and 19th centuries), and the "rediscovery of the senses" (20th century).

[149] See Barbara Maria Stafford, *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine*, Cambridge, MA, MIT Press, 1991, esp. chapter 6 ("Sensing", pp. 401–463); Crary, *Techniques of the Observer*, and *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, Cambridge, MA, MIT Press, 1999; Sterne, *The Audible Past*; and Erlmann, *Reason and Reasonance: A History of Modern Aurality*, New York, Zone Books, 2010.

[150] Besides *The Audible Past*, see also by him: *MP3: The Meaning of a Format*, Durham, NC-London, Duke University Press, 2012.

[151] See her Introduction to Carolyn Birdsall, *Nazi Soundscapes: Sound, Technology, and Urban Space in Germany, 1933–1945*, Amsterdam, Amsterdam University Press, 2012, pp. 11–30, on p. 13. On the poverty of evidence to write the history of hearing, see also Rosenfeld, "On Being Heard", pp. 318–319.

besides, as it obvious, this is only possible for investigations on quite recent times. When available, audio (or audiovisual) recordings and oral (or written) testimonies about auditory experiences must necessarily be supplemented by the consultation of written documents. Indeed, texts of different types (administrative, literary, scientific, philosophical, etc.) are the most important historical source for all the centuries preceding the invention of the gramophone, as attested, for example, by the World Soundscape Project (WSP) database of Sound References in Literature.[152] On the other hand, consideration of non-textual data, e.g. artworks, musical and acoustic instruments, architectural spaces—especially those with special acoustic characteristics, like concert halls, theatres, auditoriums, churches, recording studios, lecture rooms, etc.—[153] is also key to understand sound and audition in both pre-recording and recording times.

The many possibilities of textual archives in evoking past sounds and explaining their meaning are attested by Alain Corbin's study of village bells, which narrates changes in their legal regulation and public perception and debates about their social utility from the aftermath of the French Revolution to the beginning of the 20th century, when the sound of bells lost its symbolic power over the French countryside.[154] In *The Acoustic World of Early Modern England: Attending to the O-Factor* (1998) Bruce Smith faced a serious historiographical challenge in attempting to reconstruct what listeners would have heard within the wooden "O" of Shakespeare's Globe Theatre in 1599, including not only actors' speech, but also all kinds of sounds, either produced on stage or by audiences. For that purpose Smith availed himself of contemporary literature

[152] The database is available here: http://www.sfu.ca/sonic-studio/srs/index3.html [last access: August 2015] and can be accessed by author, subject, geographical region or time period.

[153] On the importance of "aural architecture" in the history of hearing see Barry Blesser and Linda-Ruth Salter, *Spaces Speak, Are You Listening?,* Cambridge, MA, MIT Press, 2006.

[154] Alain Corbin, *Village Bells: The Culture of the Senses in the Nineteenth-Century French Countryside*, translated by Martin Thom, New York, Columbia University Press, 1998 (originally published in French as *Les Cloches de la terre: paysage sonore et culture sensible dans les campagnes au XIXe siècle*, Paris, Albin Michel, 1994).

on hearing and the voice, acting, acoustics, etc., and studied the characteristics of theatrical spaces.[155]

Drawing also basically on textual sources Eric Leigh Schmidt's *Hearing Things: Religion, Illusion, and the American Enlightenment* (2000) placed auditory religious experiences within wider debates about science, religion and popular culture.[156] Literature seems to have been the main inspiration for John Picker's *Victorian Soundscapes* (2003), though the author employed a great variety of textual sources, including also scientific literature.[157] Among the components of auditory environments noise has been a particularly fruitful subject, being as it is a category that refers both to acoustic stimuli and to appreciation thresholds and listening habits. It also offers good opportunities to examine the social dimension of sound, as Karin Bijsterveld has done in her historical research on noise abatement campaigns and antinoise regulations between 1875 and 1975, in Europe and the United States.[158]

Like in Picker's *Victorian Soundscapes*, references to the notion of "soundscape" regularly reappear in the titles of books and papers devoted to the history of sound and hearing. Yet, it would be misleading to consider that all of them aim at some kind of reconstruction of past auditory environments. On the contrary, many scholars employing the term explicitly deviate from Murray Schafer's definition and

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[155] Bruce R. Smith, *The Acoustic World of Early Modern England. Attending to the O-Factor*, Chicago, University of Chicago Press, 1999.

[156] Eric Leigh Schmidt, *Hearing Things: Religion, Illusion, and the American Enlightenment*, Cambridge, MA, Harvard University Press, 2000. Other notable titles dealing with audition in the history of the United States are Mark M. Smith, *Listening to Nineteenth-Century America*, Chapel Hill, University of North Carolina Press, 2001, and by Richard Cullen Rath, *How Early America Sounded*, Ithaca, NY, Cornell University Press, 2003, and "Hearing American History", *The Journal of American History*, vol. 95, no. 2, September 2008, pp. 417–431.

[157] John M. Picker, *Victorian Soundscapes*, New York, Oxford University Press, 2003.

[158] Karin Bijsterveld, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*, Cambridge, MA, MIT Press, 2008. Other titles dealing with noise are Emily Cockayne, *Hubbub: Filth, Noise & Stench in England, 1600-1770*, New Haven, CT-London, Yale University Press, 2007, and Hillel Schwartz, *Making Noise: From Babel to the Big Bang and Beyond*, Cambridge, MA, MIT Press, 2011, though I have not been able to consult them. Historian Peter Bailey's chapter on "Breaking the Sound Barrier", in his book *Popular Culture and Performance in the Victorian City*, Cambridge, Cambridge University Press, 1998, pp. 194–211, could be considered a precedent for those more recent contributions.

intentions in coining the term, and subscribe instead to wider or slightly different meanings. This is the case, for instance, of Emily Thompson in *The Soundscape of Modernity* (2002), where she declares to follow Corbin in defining soundscape "as an auditory or aural landscape" (a *paysage sonore*, though the French expression seems to be precisely a translation of Schafer's "soundscape").[159] Thompson's usage of "soundscape" is somewhat peculiar, since her book deals with the beginning of electroacoustics and how the New Acoustics derived from it changed the way in which theatres and auditoriums were designed in the first decades of the 20th century.

In *Nazi Soundscapes* (2013) the aforementioned Birdsall invokes Barry Truax's elaboration of the notion of soundscape within a communicative model—including the acoustic environment, but also people and their listening habits—, and she criticizes the pessimistic stance that is common to both Schafer and Truax.[160] While she integrates music into her investigation, she typically addresses its presence in public spaces, either as a component of the "festivalization of the everyday" promoted by the Nazi authorities, or as part of public announcements through loudspeakers.[161] In fact, the difficulty in engaging with musical events and activities organized indoors seems to be a characteristic of the majority of studies devoted to past soundscapes or auditory environments.[162] A very interesting exception is Daniel Cavicchi's *Listening and Longing: Music Lovers in the Age of Barnum* (2011), which in addition to more conventional historical sources relies on unpublished personal journals in order to document the development of a "musical ear" among members of 19th-century North

[159] Emily Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933*, Cambridge, MA, MIT Press, 2004, p. 1.

[160] Birdsall, *Nazi Soundscapes*, pp. 21–22. See also the first two chapters of Barry Truax, *Acoustic Communication*, Wesport, Ablex Publishing, 1984.

[161] See chapters 2 and 3 of Birdsall, *Nazi Soundscapes*.

[162] I am setting aside of this review any references to speech and the human voice, though they are also part of the auditory environments considered by some authors.

American bourgeoisie. This focus on individual lives precisely allows Cavicchi to deal both with street sounds and concert attendance, since they could all be part of a single person's auditory experience on a given day.[163]

As I argued in the Introduction, audio technologies and the modalities of audition associated with them have become an intense focus of scholarly attention in the last decades, in particular since the 1990s, with a wealth of publications on the history and consequences of sound reproduction,[164] the radio,[165] the experience of listening to portable audio technologies,[166] or listening to digital compressed formats.[167] In contrast with publications on past sonic environments, many of the books devoted to the experience of listening to audio technologies deal with music, though normally, as it is logical, with mediated music. As I anticipated in the previous section, a relatively new and flourishing research line is the one that looks into scientific discourses and

[163] Daniel Cavicchi, *Listening and Longing: Music Lovers in the Age of Barnum*, Middletown, CT, Wesleyan University Press, 2011.

[164] To name just some of the most significant ones, see (in publication order): Evan Eisenberg, *The Recording Angel: The Experience of Music from Aristotle to Zappa*, New York, Penguin, 1987; Michael Chanan, *Repeated Takes: A History of Recording and Its Effects on Music*, London, Verso, 1995; Timothy Day, *A Century of Recorded Music: Listening to Musical History*, New Haven, CT, Yale University Press, 2000; William H. Kenney, *Recorded Music in American Life: The Phonograph and Popular Memory, 1890–1945*, New York, Oxford University Press, 2003; Mark Katz, *Capturing Sound: How Technology Has Changed Music*, Berkeley, University of California Press, 2004; Tim J. Anderson, *Making Easy Listening: Material Culture and Postwar American Recording*, Minneapolis, University of Minnesota Press, 2006; Colin Symes, *Setting the Record Straight: A Material History of Classical Recording*, Middletown, Wesleyan University Press, 2004; Eric Clarke, "The Impact of Recording on Listening", *Twentieth-Century Music*, 41, 2007, pp. 47–70; Timothy D. Taylor, Mark Katz and Tony Grajeda (eds), *Music, Sound, and Technology in America: A Documentary History of Early Phonograph, Cinema, and Radio*, Durham, NC, Duke University Press, 2013; and Paul Théberge, Kyle Devine and Tom Everrett (eds), *Living Stereo: Histories and Cultures of Multichannel Sound*, New York-London, Bloomsbury Academic, 2015.

[165] See for example: Charles Hamm, "Privileging the Moment of Reception: Music and Radio in South Africa", in S. Paul Scher (ed.), *Music and Text: Critical Inquiries*, Cambridge, Cambridge University Press, 1992, pp. 21–37; Jody Berland, "Contradicting Media: Toward a Political Phenomenology of Listening", in Neil Strauss (ed.), *Radiotext(E),* New York, Semiotext(e), 1993, pp. 209–217; Susan J. Douglas, *Listening In: Radio and the American Imagination*, New York, Times Books, 1999; Kate Lacey, "Towards a Periodization of Listening: Radio and Modern Life", *International Journal of Cultural Studies*, vol. 3, n. 2, 2000, pp. 279–288; Timothy D. Taylor, "Music and the Rise of Radio in Twenties America: Technological Imperialism, Socialization, and the Transformation of Intimacy", in Paul D. Greene and Thomas Porcello (eds), *Wired for Sound: Engineering and Technologies in Sonic Cultures*, Middletown, CT, Wesleyan University Press, 2005, pp. 245–68; Christina L. Baade, *Victory Through Harmony: The BBC and Popular Music in World War II*, New York, Oxford University Press, 2012; and also by Kate Lacey, *Listening Publics: The Politics and Experience of Listening in the Media Age*, Cambridge, and Malden, MA, Polity Press, 2013.

[166] On this see Michael Bull, *Sounding Out the City: Personal Stereos and the Management of Everyday Life*, Oxford, Berg Publishers, 2000; also by Bull, *Sound Moves: iPod Culture and Urban Experience*, London, Routledge, 2006.

[167] See Sterne, *MP·: The Meaning of a Format*.

practices, either to understand the role of sounds in the laboratory or, more commonly, to explain the impact that the notions of hearing and listening shaped there may have had on other discourses and practices. Undoubtedly, the model research to which many of these contributions look up is Jonathan Sterne's *The Audible Past* (2003), which defined the notion of "audile technique" with reference to three different professional contexts, but also in relationship to a certain modern ideal of listening (more on this below). While Sterne's research does not deal directly with music, other authors are currently expanding the field and trying to build bridges between scientific discourses on audition and the usually hermetic discourses of music aesthetics—a line in which I would like to inscribe this research, too.[168]

3.3.1 Auditory regimes

The reference of audile technique to a certain historical period, roughly characterized as Western modernity, also leads us to consider the question of the history of listening, and the proximity of listening models to the notion of "regimes of listening", "aural regimes" or "auditory regimes"—terms that are often invoked in dealing with the possibility of establishing a history of audition, and thus with the feasibility of a periodization. As Martin Jay has observed, the terms "aural regime" or "auditory regime" stem from Christian Metz's "scopic regime" (*régime scopique*), which he coined to stress the differences between cinema and theatre, and specifically to distinguish the relationship between the spectator and the (absent) object at the cinema

[168] Among the most significant contributions are: Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany*, Cambridge, MA, and London, MIT Press, 2006;.Julia Kursell (ed.), *Sounds of Science – Schall im Labor (1800–1930)*, "Preprint 346", Berlin, Max–Planck–Institut für Wissenschaftsgeschichte, 2008; David Pantalony, *Altered Sensations: Rudolph Koenig's Acoustical Workshop in Nineteenth-Century Paris*, New York, Springer, 2009; many of the chapters in Trevor Pinch and Karin Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, Oxford, Oxford University Press, 2012; Alexandra Hui, *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840–1910*, Cambridge, MA, MIT Press, 2013; and *Osiris*, special issue on "Music, Sound, and the Laboratory from 1750 to 1980", edited by Alexandra Hui, Julia Kursell and Myles W. Jackson, vol. 28, 2013.

theatre from that at the theatre.[169] Subsequently, "auditory regimes" and "aural regimes" have been employed quite liberally, normally with reference to certain technologies or media (as implied by Metz's original "scopic regime"), but sometimes also to other aspects, aiming ultimately at a periodization of hearing/listening.

For instance, the concept of "auditory regimes" has been instrumental to Kate Lacey's attempt at a periodization of radio listening, which would be associated with the "positions" and "techniques of observation" mentioned also by Metz in relation to cinema. However, Lacey has also acknowledged the possibility "to identify co-existing if hierarchically differentiated and competing auditory regimes" at a certain time.[170] Peter Szendy has elaborated the concept of "regime[s] of listening" (*régime[s] d'écoute*) to refer to important changes in music listening brought about by various historical circumstances, e.g. the emergence of the idea of "musical work", the practice of transcription, or the evolution of musical style.[171] In sum, the terms "auditory (or aural) regimes" and "regimes of listening" may be functional to discuss historical changes in listening, and in conceptions of audition, although their meaning remains vague, and in some cases seems to be very close to the prescriptive notion of "listening models" that I have mentioned in the Introduction.

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[169] Christian Metz, *Le signifiant imaginaire. Psychanalyse et cinéma*, Paris, Christian Bourgois, 1984 (1st ed. Paris, Union Générale d'Éditions, 1977), pp. 85–89; see Martin Jay, "In the Realm of the Senses: An Introduction", *The American Historical Review*, vol. 116, no. 2, April 2011, pp. 307–315, on p. 312. Jay also contributed to the success of the notion of "scopic regimes" with his essay "Scopic Regimes of Modernity", in Scott Lash and Jonathan Friedman (eds), *Modernity and Identity*, Oxford, Blackwell, 1992, pp. 178–195.

[170] Kate Lacey, "Towards a Periodization of Listening. Radio and Modern Life", *International Journal of Cultural Studies*, vol. 3, n. 2, 2000, pp. 279–288, on p. 280. Interestingly, in her most recent book (*Listening Publics. The Politics and Experience of Listening in the Media Age*, Cambridge, UK-Malden, MA, Polity Press, 2013) Lacey seems to have abandoned the concept of "auditory regimes".

[171] Peter Szendy, *Écoute. Une histoire de nos oreilles (précédé de "Ascoltando" par Jean-Luc Nancy)*, Paris, Les Éditions de Minuit, 2001 p. 31, 128, 134, 150, 153. References to Szendy's "*régime[s] d'écoute*" can be found in Sophia Rosenfeld, "On Being Heard: A Case for Paying Attention to the Historical Ear", *The American Historical Review*, vol. 116, no. 2, April 2011, pp. 316–334, p. 318; and also Jay, "In the Realm of the Senses: An Introduction", p. 312.

The notion of "audile technique", which Sterne introduces and defines in chapter 2 of *The Audible Past*,[172] may be useful for explaining the complex interaction of different historical elements related to sound at a given historical time—elements that may configure a "regime of listening". Thus, according to Sterne, "audile technique"—which he chooses to call "technique" as a derivation from Marcel Mauss' "techniques of the body" or "body techniques" (mentioned above)—[173] is a tag that can be applied to a variety of "techniques of listening" that he traces back "through three very different cultural contexts: modern medicine in Western Europe and the United States from the 1760s into the 1900s [stethoscopy], American sound telegraphy from the 1840s into the 1900s, and sound-reproduction technologies in Europe and the United States between 1876 and 1930". These contexts are not presented in the book as a closed catalogue of possible listening situations, but as examples of a certain number of characteristics that all of them purportedly share: "family resemblances" that Sterne identifies with "theoretical or 'idealized' constructs of listening, and how those constructs were supposed to be put into practice",[174] and which ultimately point to the very broad notion of "modernity". Then Sterne defines six "practical orientations toward sound and listening" related to audile technique where keywords and concepts of modernity—e.g. instrumentality, rationality, the construction of private (bourgeois) acoustic space, distinction—feature prominently. To sum up, he writes: "Speaking generally, audile technique articulated listening and the ear to logic, analytic thought, industry,

[172] See chapter 2 ("Techniques of Listening") of Sterne, *The Audible* Past, pp. 87–136, though the notion is used repeatedly in later chapters. Perhaps significantly, the concept of "audile technique" is not mentioned in Sterne's most recent book, *MP3: The Meaning of a Format*.

[173] See Marcel Mauss, "Body Techniques", in Sociology and Psychology: Essays, translated by Ben Brewster, London, Routledge and Kegan Paul, 1979, pp. 95–123.

[174] Sterne, *The Audible Past*, pp. 90–91.

professionalism, capitalism, individualism, and mastery—even as it required a good deal of guesswork in practice."[175]

Sterne's notion of "audile technique" combines what I regard as three different levels. Firstly, the level of specific practices and skills represented by stethoscopy, telegraphy and sound reproduction, and their cultural contexts, which may have evolved and adapted to new technologies and theories in subsequent years. Secondly, the scientific discourses, i.e. theories of the senses, and specifically of audition, which either inspired the invention of those technologies or were derived from experimentation with them, but which can neither be reduced to a set of practices and skills, nor be identified with them. Thirdly, the level of values explicitly or implicitly attached to these listening practices, which work together as a model (or, we may also say, as an ideology) broadly associated with "modernity", but would also be compatible with different auditory skills and theories of hearing. On the one hand, merging these three levels in a single concept may seem confusing, particularly if we consider the interaction between the level of skills and the values that they are meant to embody.[176] On the other hand, the notion of "audile technique" shows the entanglement of concepts, practices, technologies, values and contexts and the difficulty in analysing their interactions at any given time.

[175] Ibid., pp. 93–95 (the last quotation appears on p. 95).

[176] A similar critique has been formulated by Michele Hilmes, who has pointed out that "the analytical framework of modernity as employed by Sterne (…) while hard to argue with, forms so broad and sweeping a landscape that the specific influences operating on *sound* get lost in the fray"; Michele Hilmes, "Is There a Field Called Sound Culture Studies? And Does It Matter?", *American Quarterly*, vol. 57, no. 1, March 2005, pp. 249–259, on p. 254.

CHAPTER 4

Studying Hearing and Music before 1700

4.1 Hearing as a research field and the question of disciplinarity

As I have argued in previous chapters, the notion of the cultural construction of the senses and, more generally, the "sensory turn" in the humanities and social sciences have enlarged the research field of the senses, which now also includes the cultural practices, concepts and objects involved in sensorial experiences. As a result, today we are able to discover references to and ideas about hearing in a variety of contexts. Obviously we may find these references in philosophical and scientific literature: not only in monographs or papers on the subject, but also in other texts, e.g. medical treatises on the diseases of the ear, musical methods, pamphlets against noise, religious almanacs, reports of psychological experiments, papers on acoustics, etc. Yet, notions of hearing can also be traced in works of fiction, administrative documents, written records of conversations, personal diaries, correspondences, etc., as well as in all kinds of artwork, in architectural spaces, particularly in those designed for sound (opera houses, auditoriums, recording studios, etc.), and in the shape and usage of everyday objects and scientific tools, especially in audio technologies.

In fact, the term "audio technologies", which is normally applied to the electric and electronic products of audio engineering—manipulated by audio technicians, electrical or electronic engineers, or digital audio engineers—and to consumer audio electronics may be extended to all the instruments that are apt to produce or process sounds, as well as to the practices related to them, including (among others) musical instruments, the different types of hearing aids that have been invented through history

(from ear trumpets to cochlear implants),[1] the various generations of audiometers, the instruments and electronic equipment that are commonly found in acoustic laboratories, the hard- and software equipment of recording studios, the technologies for the auditory display of scientific data (called "sonification")[2]—all of which have embodied and helped shape particular ideas about how the human ear works and what hearing is.[3] On the other hand, both unintentional and intentional sounds (particularly, musical works) may elicit auditory experiences: they may allow or facilitate particular listening strategies, and thus may also be related to certain ideas of hearing and listening, and to the way in which an ideal listener may respond to music. In this sense it can be contended—as I will do in the next chapter—that musical works and musical aesthetics belong to the cultural history of hearing, too.

It is sometimes argued that the humanities and social sciences approach to audition has taken the study of hearing outside the lab and into the everyday—or, as David Howes has declared with reference to the senses generally, it has "recover[ed] perception from the laboratory".[4] However, a laboratory is sometimes just a context for reproducing or modelling outside conditions in order to control or measure different parameters; on the other hand, neither experimental research nor laboratories are the exclusive domains of "hard" scientists any more. Rather than opposing their views to

[1] See Albert Mudry and Léon Dodelé, "History of the technological development of air conduction hearing aids", *The Journal of Laryngology & Otology*, vol. 114, June 2000, pp. 418–423. On cochlear implants, see Mara Mills, "Do Signals Have Politics? Inscribing Abilities in Cochlear Implants", in Trevor Pinch and Karin Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, Oxford, Oxford University Press, 2012, pp. 320–346.

[2] On sonification see Christian Dayé and Alberto de Campo, "Sounds Sequential: Sonification in the Social Sciences", *Interdisciplinary Science Reviews*, vol. 31, no. 4, 2006, pp. 349–364; Katharina Vogt, Alberto de Campo and Gerhard Eckel, "An Introduction to Sonification and its Applications in Theoretical Physics", in Proceedings of the AAA – Alps Adria Acoustics, Graz, 2007, available online: http://alpsadriaacoustics.org/aaaa-archives/ [last access: August 2015]; Thomas Hermann, Andy Hunt and John G. Neuhoff (eds), *The Sonification Handbook*, Logos Verlag, Berlin, 2011; and Andi Schoon and Axel Volmar (eds), *Das geschulte Ohr: Eine Kulturgeschichte der Sonifikation*, Bielefeld, Transcript Verlag, 2012.

[3] For a similar broad view of audio technologies see Trevor Pinch and Karin Bijsterveld, "Sound Studies: New Technologies and Music", *Social Studies of Science*, vol. 34, no. 5, 2004, pp. 635–648.

[4] See David Howes' introduction to his edited collection *Empire of the Senses: The Sensual Culture Reader*, Oxford, Berg Publishers, 2005, p. 4.

those of natural sciences scholars, humanities and social sciences scholars should probably aim at a critical re-appraisal of the output of natural sciences, as Judith Becker and Ingrid Monson have attempted with reference, precisely, to music listening.[5] Yet, there are some major obstacles to overcome.

Jonathan Sterne has recently described his position while doing research into the history of the mp3 compression format as "working with two opposed sets of propositions" regarding hearing: one coming from the humanities and the other one from the sciences.[6] He has observed two main points of disagreement between them: the question of universalism, which psychoacousticians and generally scientists normally take for granted, and the fact that humanities and social sciences usually treat hearing in connection to questions of meaning and consciousness, convinced as they are that perception mechanisms are not independent from enculturation.[7] Humanities and social sciences scholars studying "other" or past cultures may certainly be more inclined to adopt a relativist stance towards the purportedly universal truth of scientific theories. However, as Joseph Henrich, Steven Heine and Ara Norenzayan have showed, most economists and psychologists are equally and routinely biased in making universal claims based on experiments that only test the abilities and reactions of subjects living in Western, Educated, Industrialized, Rich and Democratic (WEIRD) societies.[8] Besides, while it is true that, as Sterne claims, "[p]sychoacoustic research tends to separate the process of perception and cognition from any construction of meaning, or

[5] Judith Becker, *Deep Listeners: Music, Emotion and Trancing*, Bloomington, Indiana University Press, 2004, and Ingrid Monson, "Hearing, Seeing, and Perceptual Agency", *Critical Inquiry*, no. 34, suppl., Winter 2008, pp. S36–S58.

[6] Jonathan Sterne, "Being 'In the True' of Sound Studies", *Music, Sound and the Moving Image*, vol. 2, no. 2, Autumn 2008, pp. 163–167, on p. 163.

[7] Ibid., p. 164.

[8] Joseph Henrich, Steven J. Heine and Ara Norenzayan, "The Weirdest People in the World?", *RatSWD Working Paper Series*, no. 139, German Data Forum (RatSWD), April 2010, http://hci.ucsd.edu/102b/readings/WeirdestPeople.pdf; [last access: July 2015]

any particular content",[9] formal claims that do not refer to any particular content are not alien to the humanities and social sciences, including research into the senses, hearing and sound—John Blacking's definition of listening as the ability "to distinguish and interrelate different patterns of sound" would be an example of this.[10]

As Sterne has also pointed out, in dealing with history it may seem relatively easy to elude the problem of working with two opposed sets of assumptions, since one can just "historicise" and "use the tools of cultural studies to critique" historical material, adopting—as he puts the matter—an "ironic stance" towards the past.[11] Indeed, since the publication of Thomas Kuhn's *The Structure of Scientific Revolutions* (1962) it has become common to think of past scientific theories as a collection of superseded paradigms.[12] Later on, constructivist views of scientific knowledge, which have gained acceptance among science philosophers, sociologists and historians since the 1980s, made those superseded paradigms more attractive to historians and humanists in making the case for an equal treatment of "winners" and "losers" in the history of science—what is called the "symmetry principle" or the "symmetry postulate". Besides, social constructivists have drawn attention to the situated nature of scientific practice, and have located scientific activities within a complex network of material, social and cultural resources, which make them possible.[13] As it is normally recognized today, sciences do not only develop through formal hypotheses (modelling) and experimental testing—or through other "internal" operations—, but involve particular social and political contexts, its practices include the manipulation of objects

[9] Sterne, "Being 'In the True' of Sound Studies", p. 165.

[10] John Blacking, *How Musical is Man?*, Seattle, University of Washington Press, 1973, p. 9.

[11] Sterne, "Being 'In the True' of Sound Studies", p. 165.

[12] Thomas Kuhn, *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1962

[13] For an introduction to constructivism, see Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science*, Chicago, Chicago University Press, 1998; on the "symmetry postulate" see pp. 7–9.

and images, and they depend on the formation of research communities, whose structure and dynamics also influence its development. This approach prompts us to read scientific activity as part of the culture of its time, and thus to consider scientific theories as potential conveyors of values and beliefs. In fact, this possibility stems from the simple fact that advocates of scientific theories are normally also social, political and aesthetic subjects; for example, as historian Benjamin Steege and Alexandra Hui have recently claimed 6, the physiological work of Hermann von Helmholtz on hearing cannot be separated from his own musical tastes or his passionate advocacy of just intonation.[14]

On the other hand, the emphasis on practice should not be incompatible with recognizing the importance of such notions as "models", "analogies", or "metaphors"[15] and their role in explaining how scientific theories are formed and change along time—that is, their *performative* role in practice.[16] As I argued in chapter 1, what George Lakoff and Mark Johnson have called "conceptual metaphors" may structure also scientific concepts and theories.[17] For instance, as Johnson and Diego Fernandez-Duque have observed, a series of cognitive metaphors (filter, spotlight, spotlight-in-the-brain) have not only been employed to explain the meaning of attention, but have effectively

[14] See Benjamin Steege, *Helmholtz and the Modern Listener*, Cambridge, Cambridge University Press, 2012, pp. 206–214; and also chapter 3 ("Sound Materialized and Music Reconciled: Hermann Helmholtz") of Alexandra Hui, *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840–1910*, Cambridge, MA, MIT Press, 2013, pp. 55–87.

[15] On the definitions of and the differences among models, metaphors and analogies, see for instance Daniela M. Bailer-Jones, "Models, Metaphors and Analogies", in Peter Machamer and Michael Silberstein (eds), *The Blackwell Guide to the Philosophy of Science*, Oxford, Blackwell, 2002, pp. 108–127.

[16] For a theoretical approach to this question, see for instance James J. Bono, "Why Metaphor? Toward a Metaphorics of Scientific Practice", in Sabine Maasen and Matthias Winterhager (eds), *Science Studies: Probing the Dynamics of Scientific Knowledge*, Bielefeld, Transcript, 2001, pp. 215-234, and Fernand Hallyn, *Les Structures rhétoriques de la science*, Paris, Seuil, 2004. See also some historical investigations into the role of particular metaphors in shaping specific fields, e.g. Donna J. Haraway, *Crystals, Fabrics and Fields: Metaphors that Shape Embryos*, foreword by Scott F. Gilbert, Berkeley, CA, North Atlantic Books, 2004 (originally published in New Haven, CT, Yale University Press, 1976), and Laura Otis, *Membranes: Metaphors of Invasion in Nineteenth-Century Literature, Science, and Politics*, Baltimore, MD, Johns Hopkins University Press, 1999.

[17] See George Lakoff and Mark Johnson, *Metaphors We Live by*, Chicago, University of Chicago Press, 1980.

guided cognitive research into the matter.[18] Also, the functioning of the ear—or more precisely, the perception of pitch—has often been modelled and interpreted in terms of other objects, processes or technologies, most frequently sound technologies, like musical instruments or the telephone. Thus, there is a "piano theory" of hearing that was formulated by Hermann von Helmholtz in the second half of the 19th century, and a later "telephone theory" of hearing authored by William Rutherford, where the piano and the telephone function as analogies for explaining audition, but have identified with those explanations to such an extent as to actually designating them. Also, current expressions like "music information retrieval", which refers to listening as a process that might be learnt by a machine (typically, a computer), bear witness to the constant reshaping of hearing/listening in terms of new technologies, social practices, and models of the senses.[19] At least in some cases, rather than just providing explanatory tools, analogies, models and metaphors shape and drive research.

4.1.1 Towards a history of the disciplines of hearing

In this and the following chapters I will consider the different disciplinary components of what we could call the "hearing sciences",[20] that is those "discourse formations" (in

[18] Mark L. Johnson and Diego Fernandez-Duque, "Attention Metaphors: How Metaphors Guide the Cognitive Psychology of Attention", *Cognitive Science*, vol. 23, n. 1, 1999, pp. 83–116, and Diego Fernandez-Duque and Mark L. Johnson, "Cause and Effect Theories of Attention: The Role of Conceptual Metaphors", *Review of General Psychology*, 2002, vol. 6, n. 2, pp. 153–165; see also David E. Leary (ed.), *Metaphors in the History of Psychology*, Cambridge, Cambridge University Press, 1990.

[19] For a similar point see Michael Rost, *Teaching and Researching Listening*, "Applied Linguistics in Action" Series, Harlow, UK, Longman, 2002, p. 1, though the author does not use the term "conceptual metaphors".

[20] The notion of "hearing science" applied to the history of audition appears in Penelope Gouk and Ingrid Sykes, "Hearing Science in Mid-Eighteenth-Century Britain and France", *Journal of the History of Medicine and Allied Sciences*, vol. 66, no. 4, 2010, pp. 507–545, esp. p. 516. Yet, so far I have not found any other instances either by Gouk or Sykes, or by other historians. I prefer to use it in the plural, "hearing sciences", to underline the heterogeneity of the discourses on audition, and the fact that they did not belong to a single disciplinary corpus.

Foucauldian terminology)[21] and research practices that have aimed at the understanding of audition, or of particular auditory phenomena. According to that definition, the hearing sciences would be principally six: natural philosophy or physics (specifically, since the 18th century, acoustics), music (understood at least until the early modern as applied mathematics, and since the 18th century as mainly an aesthetic practice), rhetoric (later, linguistics), medicine (including anatomy, physiology, otology, electrophysiology, and audiology), psychology (the psychology of hearing, the psychology of music, and psychoacoustics), and finally audio engineering, which resulted from the emergence of electroacoustics, at the beginning of the 20th century.[22] As I will argue later, it was precisely the integration of different expert discourses and research practices—electroacoustics, auditory psychophysics (better known as "psychoacoustics"), and physiological acoustics, basically—in some electroacoustic laboratories of the United States and Europe during the first decades of the 20th century what provided a historical model for a hearing science. In that context, audio technologies did not only function as experimental tools, but also contributed to shape the goals and development of auditory research.

Contemporary handbooks on hearing normally include chapters on physics, the physiology of the ear, the psychology of hearing, the perception of speech, the perception of music, and audio technologies.[23] However, the expression "hearing

[21] Here I use the term "discourse formation" in the sense defined by Foucault in his *Archaeology of Knowledge*, that is "as the group of statements that belong to a single system of formation; thus I shall be able to speak of clinical discourse, economic discourse, the discourse of natural history, psychiatric discourse" (Michel Foucault, *Archaeology of Knowledge*, translated by A.M. Sheridan Smith, London-New York, Routledge, 2002, p. 121; the original French edition, *L'archéologie du savoir*, was published by Gallimard in 1969).

[22] I am not including here philosophy, since hearing is not usually considered a properly philosophical topic: it has been addressed by philosophers mainly as one of the senses and only seldom separately. However, in this and the following chapters I will discuss notions and texts on the senses and hearing by authors like Descartes or Diderot, who are normally covered in courses and publications on the history of philosophy.

[23] See for instance W. Lawrence Gulick, George A. Gescheider and Robert D. Frisina, *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*, New York, Oxford University Press, 1989; and Brian C.J. Moore, *An Introduction to the Psychology of Hearing*, Bingley, Emerald Group, 2012 (6th ed.).

science" is employed—sometimes together with "speech", in the denomination "speech and hearing science"—to refer to a variable combination of otology, audiology, psychoacoustics and physics (also phoniatrics and linguistics, if speech is included) that is taught in some North-American and British universities, and which may be more or less oriented to clinical practice (i.e. the treatment of hearing loss and disorders) or to research (in education, communication sciences, etc.). An alternative term for auditory research would be "audiology", which seems to have appeared towards the mid-1940s, but has mainly been associated with auditory physiology. Also, since its first occurrences it has also referred to the services of hearing aid professionals, who are often called "audiologists"—an ambiguity that remains still today.[24] More recently, the name "auditory science" has appeared in such ambitious editorial efforts as the three-volume *Oxford Handbook of Auditory Science*,[25] though it is yet to be seen whether it will be generally adopted.

Each disciplinary approach to hearing has constructed the field of hearing in a different way: dealing with different objects (sound, music, speech), from different perspectives (the anatomy and physiology of the human body, the human psyche), and using different audio technologies (in the large sense explained above). Also, each discipline employs methodologies and technological mediations that are at least in part different, and vocabulary that is often specific, and it engages particular research communities, which are taught and trained accordingly.

I will now briefly discuss the main disciplinary traditions that are usually included in contemporary handbooks on hearing: physics (acoustics), music, medicine

[24] On the historical origins of this double meaning see Kenneth W. Berger, "Genealogy of the Words 'Audiology' and 'Audiologist'", *Journal of the American Audiology Society*, vol. 2, no. 2, 1976, pp. 38–44. Hallowell Davis, who was director of research at the Central Institute for the Deaf in St. Louis, Missouri, for forty years (1947-1987), also declared to have coined the term, what reinforces its link to auditory physiology; see Robert Galambos, *Hallowell Davis 1896-1992. A Biographical Memoir*, Washington D.C., National Academies Press, 1998, pp. 14–15.

[25] David R. Moore(chief ed.), *Oxford Handbook of Auditory Science*, 3 vols. (vol. 1: The Ear, vol. 2: The Auditory Brain, vol. 3: Hearing), Oxford, Oxford University Press, 2010.

and physiology, psychology, and finally the historical convergence of electroacoustics, electrophysiology and psychoacoustics in something close to a hearing science. I will not mention rhetoric and linguistics, though, since in this research they are only of interest in relationship to a very specific period of music history—they will be treated in due course. My purpose here will be to provide a short introduction to the history of these disciplines and the specificity of their approach to hearing. By stressing also their connections to music, where relevant, I will also try to offer some exploratory insights into the possibility of conceiving music listening as a particular instance of hearing.

a) Hearing as a research field for acoustics

Sound has been defined as "*a fluctuation in pressure around a null* (…) *propagated through an elastic medium*", which can be air, water or even matter.[26] In order to be classified as sound, this "fluctuation in pressure" must be in the hearing range of humans, or at least in the range that humans can detect using various technical means.[27] Though we tend to think of sound as a result of the vibration of bodies, and of acoustics as a subfield of vibrational mechanics, there are at least other three causes of sound: changes in airflow (which explain the functioning of sirens, for instance), time-dependent heat sources (e.g. the hiss of an electrical spark, or the rumble of thunders) and supersonic flow (for example, the bang caused by a jet breaking the sound barrier).[28] Therefore, acoustics is associated not only with mechanics, but also with

[26] Gulick, Gescheider and Frisina, *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*, p. 22 (emphasis in the original).

[27] Concerning their definition of sound, Gulick, Gescheider and Frisina have observed: "Those who also would take into account the normal sensitivity of the organ of hearing probably would add the phrase *and capable of giving rise to hearing*" (see again their *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*, p. 22). Yet, other scholars consider that acoustics must include hearing, but should not be limited to it, see for instance Peter J. Westwick, "Acoustics and Hearing", in Heilbron (ed.), *Oxford Companion to the History of Modern Science*, pp. 8-9, on p. 8; see also R. Bruce Lindsay, "The Story of Acoustics", in R. Bruce Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, Stroudsburg, PA, Dowden, Hutchinson and Ross, 1973, pp. 5–20, on p. 7 ("… modern acoustics far transcends the sounds that we can actually hear").

[28] Thomas D. Rossing, "Introduction to Acoustics", in Thomas D. Rossing (ed.), *Springer Handbook of Acoustics*, New York, Springer, 2007, pp. 1–6, on p. 1.

other subfields of physics, among which aerodynamics, hydrodynamics, thermodynamics and electromagnetism.

While acoustics is identified mainly with physical laws concerning the production and the propagation of sound in different media, the reception of sound, i.e. hearing, is also considered a part of it—this seems to be at least etymologically appropriate, as *acoustics* comes from the Greek verb *akouein*, which means "to hear". Contemporary acousticians regard the physiology and psychology of hearing (also known as physiological and psychological acoustics), musical acoustics and the psychology of music—besides many other disciplines, like architectural acoustics, underwater acoustics, bioacoustics, etc.—as subfields in the general field of acoustics.[29] However, as historian of acoustics Frederick Vinton Hunt has observed, this inventory of the disciplinary field of acoustics is "necessarily a modern concept", as the majority of the subdisciplines involved in acoustical research today acquired their independent status during the last two centuries.[30]

As I will explain in this chapter, theories of sound can be traced back to ancient times,[31] but as a scientific discipline acoustics is relatively recent. While we can find early occurrences of the term in the works of Francis Bacon (he mentioned its Latin name, *acoustica*, in 1623),[32] Gaspar Schott (1657-1659), Isaac Barrow (1664),

[29] This approach is represented by the so-called "Lindsay's Wheel", proposed by historian of acoustics Robert Bruce Lindsay, which is a graphic representation of all the branches dealing with sound, including also music. See the introduction to Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, p. 2.

[30] Frederick V. Hunt, *Origins in Acoustics. The Science of Sound from Antiquity to the Age of Newton*, with a foreword by Robert Edmund Apfel, Woodbury, NY, Acoustical Society of America-American Institute of Physics, 1992, p. 5.

[31] On the history of acoustics in ancient and medieval times, see again Hunt, *Origins in Acoustics*.

[32] As Robert T. Beyer has explained (see his short article "Acoustic, Acoustics", *Journal of the Acoustical Society of America*, vol. 98, no. 1, 1995, pp. 33–34) the term "acoustica" first appeared in Francis Bacon's *De dignitate et augmentis scientiarum* (1623), which is a Latin translation, produced by Bacon himself, of his book *Advancement of Learning* (1605)–the original English text referred only to "the Eare" (the ear). Later on, in 1640 the book was retranslated into English by Gilbert Watts and "acoustica" became "Acoustique Art", which is cited sometimes as the first English reference to acoustics, though normally it is incorrectly attributed to Bacon.

Narcissus Marsch (1684) and Samuel Reher (1693),[33] French physicist Joseph Sauveur is generally credited with having proposed the foundation of *acoustique* (French for *acoustics*) in 1701,[34] and the new science of sound was not recognised as a separate discipline until the 18th century. The relevance of musical subjects and instruments in the development of a physics of sound is attested by the fact that Sauveur introduced the new science of acoustics as "superior to music", since music dealt only with sounds "agreeable to the ear", whereas acoustics studied "sound in general".[35]

Physiological and psychological acoustics emerged in the second half of the 19th century, when knowledge of the auditory system reached a certain level of detail and thus it was feasible to apply the laws of mechanics to the functioning of the inner ear. As I will elucidate with more detail in chapter 6, it is conventionally accepted today that this point of maturity was reached with the publication of Hermann von Helmholtz's *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* in 1863 (translated by Alexander J. Ellis as *On the Sensations of Tone as a Physiological Basis for the Theory of Music* in 1875).[36] Helmholtz's collaboration with acoustician and instrument maker Rudoph Koenig, who produced in Paris fine instruments for acoustic research, attests to the flourishing of a specialized

[33] See Penelope Gouk, *Music, Science and Natural Magic in Seventeenth-Century England*, New Haven, Yale University Press, 1999, p. 157; Isaac Barrow's reference is mentioned by Jamie C. Kassler in her *The Beginnings of the Modern Philosophy of Music in England. Francis North's "A Philosophical Essay of Musick" (1677) with comments of Isaac Newton, Roger North and in the "Philosophical Transactions"*, Aldershot, Ashgate, 2004, p. 2.

[34] Joseph Sauveur, "Système général des Intervalles du son", *Mémoires de l'Académie royale des sciences*, 1701, pp. 297–300, and 347–355, translated by R. Bruce Lindsay as "General System of Sound Intervals and Its Application to Sounds of All Systems and All Musical Instruments" and reprinted in Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, pp. 87–94; in the same book see also R.B. Lindsay, "The Story of Acoustics", p. 7. The original French has been reprinted in Joseph Sauveur, *Principes d'acoustique et de musique ou, Système général des intervalles des sons*, Geneve, Minkoff, 1973.

[35] Sauveur, "General System of Sound Intervals", p. 88.

[36] See Julia Kursell, "Sound Objects", in Julia Kursell (ed.): *Sounds of Science - Schall im Labor (1800-1930)*, "Preprint 346", Berlin, Max-Planck-Institut für Wissenschaftsgeschichte, 2008, accessible online: http://www.mpiwg-berlin.mpg.de/Preprints/P346.PDF [last access: December 2013], pp. 29–38, on pp. 30–32.

industry at the time.[37] By contrast, as Alexandra Hui, Julia Kursell and Myles W. Jackson have argued, towards the end of the 19th century "music ceased to be the most important source of sound that could be subjected to investigation", [38] and questions that had formerly been considered part of acoustics, like the laws of consonance, were progressively recognized as, partially, matters of taste and style.

b) Hearing as a research field for music

As I will argue later in this chapter, hearing has been part of music theory since ancient times, when the Pythagorean school discovered the mathematical roots of the main harmonic consonances, linking these consonances to the harmony of the cosmos, which was also thought to be ruled by mathematical ratios. In line with this position, in medieval times music theory was part of the medieval *quadrivium*, and was considered a mathematical science until the 18th century, when it was included in the "modern system of the arts".[39] Indeed, as I will also discuss in this chapter, experiments in musical consonance and harmonics—some of them made on violin strings or on the monochord, which could be defined as a hybrid between a musical and an acoustic instrument—were key to the establishment of the experimental programme that is considered consubstantial with the so-called "Scientific Revolution". Questions of tuning and temperament, which implied certain ideas about what the human ear could distinguish or find pleasant, were also a common ground for acoustics and music theory

[37] See David Pantalony, *Altered Sensations: Rudolph Koenig's Acoustical Workshop in Nineteenth-Century Paris*, New York, Springer, 2009.

[38] See Alexandra Hui, Julia Kursell and Myles W. Jackson, introduction to *Osiris,* special issue on "Music, Sound, and the Laboratory from 1750 to 1980", vol. 28, 2013, pp. 1–11, on p. 1.

[39] See Paul Oskar Kristeller, "The Modern System of the Arts: A Study in the History of Aesthetics Part I", *Journal of the History of Ideas*, vol. 12, no. 4 (October 1951), pp. 496–527, and "The Modern System of the Arts: A Study in the History of Aesthetics Part II", *Journal of the History of Ideas*, vol. 13, no. 1 (January 1952), pp. 17–46.

at least until mid-19th century, when the current twelve-tone system of equal temperament was adopted in the main centres of musical life.[40]

Ancient Pythagorean and Platonic theories on the ethical dimensions of harmonics have also been the main source of those textual and practical traditions that seek to exploit the therapeutical "powers of music"—a practice that is in fact widespread in different communities around the world. These theories were echoed and elaborated further by the neoplatonists, and later on, in the Renaissance, were one of the main topics of Marsilio Ficino's *De vita libri tres* (1489, translated into English as *Three Books on Life*).[41] However, the first treatise dealing extensively with the healing properties of music seems to have been Athanasius Kircher's *Musurgia Universalis* (1650).[42] As Penelope Gouk, Peregrine Horden and other scholars have investigated,[43] references to the healing powers of music became a staple of music theory books well until 1800, while the 18th century saw a surge in the publication of books devoted to the subject. Whereas physicians, philosophers and musicians interested in the therapeutic effects of music had a good understanding of what we could call "the power of sound", they generally did not aim at explaining hearing, but considered music as a force that could affect the whole body, healing the sick physically and also spiritually. In the 19th century the decline of those theories seems to have favoured the notion that music could

[40] On the history of equal temperament see J. Murray Barbour, *Tuning and Temperament: A Historical Survey*, Mineola, NY, Dover, 2004 (originally published in East Lansing, Michigan State Press, 1951), and especially Ross W. Duffin, *How Equal Temperament Ruined Harmony (and Why You Should Care)*, New York, W.W. Norton, 2007.

[41] Marsilio, *Three Books on Life*, a critical edition and translation with introduction and notes by Carol V. Kaske and John R. Clark, Binghamton, Medieval & Renaissance Texts & Studies-The Renaissance Society of America, 1989. On Marsilio Ficino's thoughts on music see Gary Tomlinson, *Music in Renaissance Magic: Toward a Historiography of Others*, Chicago, University of Chicago Press, 1993.

[42] See Penelope Gouk, "Music and the Sciences", in Tim Carter and John Butt (eds), *The Cambridge History of Seventeenth-Century Music*, Cambridge, Cambridge University Press, 2005, pp. 132–157, on p. 148. There is a contemporary facsimile edition of Athanasius Kircher, *Musurgia universalis* (Rome, Corbelletti, 1650), Hildesheim, Olms, 1970. A brief excerpt of the work, translated into English, is included in Oliver Strunk and Leo Treitler (eds), *Source Readings in Music History*, New York-London, W.W. Norton and Co., 1998, pp. 707–711.

[43] Peregrine Horden (ed.), *Music as Medicine: The History of Music Therapy since Antiquity*, Aldershot, Ashgate, 2000, and Penelope Gouk (ed.), *Musical Healing in Cultural Contexts*, Aldershot, Ashgate, 2000. The collection *Music and Medicine*, edited by Dorothy M. Schullian and Max Schoen, New York, Henry Schuman, 1948, is an interesting historical precedent to those studies.

also be a dangerous activity—an idea that has also ancient roots, but which became very popular around that time.[44] During the first decades of the 20th century there were some attempts to explore the empirical effects of music, with particular attention to changes in mood and matters of taste. These attempts were mainly associated with the popularization of the phonograph and the radio, but after World War II quickly lost academic prestige.[45]

A third sense in which hearing has been (and still is) a research field for music has to do with the production and reception of musical works, and thus with what we could call "musical understanding" or "musical judgement"[46]—though, as Rob Wegman has argued, examples of appreciation of particular composers, styles or works, and observations about listening may also be found in the 15th and 16th centuries,[47] that is before the crystallization of the idea of musical work, around 1800.[48] The attempts to recreate the style of ancient Greek music, for instance by the members of the Florentine Camerata gathered around the count Giovanni Bardi during the last quarter of the 16th century,[49] also elicited reflections on the relationship between speech and music, and on the intelligibility of the text. As Enrico Fubini has argued, the *seconda prattica* and the creation of opera were associated with the emergence of a new public for music and the

[44] See James Kennaway, "From Sensibility to Pathology: The Origins of the Idea of Nervous Music around 1800", *Journal of the History of Medicine and Allied Sciences*, vol. 65, no. 3, 2010, pp. 396–426.

[45] Max Schoen (ed.), *The Effects of Music*, London-New York, Kegan Paul, Trench, Trubner & Co.-Harcourt, Brace & Company, 1927, is a fine example of this strand of thought, which is almost forgotten nowadays.

[46] "Musical judgement" is the term employed in Charles Burnett, Michael Fend and Penelope Gouk (eds), *The Second Sense: Studies in Hearing and Musical Judgement from Antiquity to the Seventeenth-Century*, London, Warburg Institute, 1991. "Musical understanding" (see next footnote) is preferred by Rob C. Wegman.

[47] Rob C. Wegman, "'Musical Understanding' in the 15th Century", *Early Music*, vol. 30, no. 1, February 2002, pp. 46–60 and 63–66, and also by him, *The Crisis of Music in Early Modern Europe, 1470-1530*, New York, Routledge, 2005.

[48] On the historicity of the concept of musical work see Lydia Goehr's classical (and controversial) study *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music*, Oxford, Clarendon Press, 1992, and also Michael Talbot (ed.), *The Musical Work: Reality or Invention?*, Liverpool, Liverpool University Press, 2000.

[49] On the Florentine Camerata see Claude V. Palisca (ed.), *The Florentine Camerata: Documentary Studies and Translations*, New Haven, CT-London, Yale University Press, 1989.

development of new resources for communicating affects[50]—therefore, also, with new ideas about hearing and listening. As I will argue in chapter 5, the claim that musical listening (the "musical ear") was an internal sense, devoted to the perception of harmony and beauty, and in contrast to the external senses and "sheer hearing" may be found already in the first half of the 18th century, but will only become part of common sense at the end of that century. This happened in parallel to the development of the ideal of "attention" to music, documented by Matthew Riley in his study of German music theorists.[51]

From the 19th century on, the development of an aesthetic discourse on music listening ultimately meant that it was not prevalently seen any more as a "hearing science"—that is, as a practice ultimately founded on auditory skills. Musical questions and practices had a continuing influence on auditory investigations by physicians and physiologists at least until the end of the century—as attested, for instance, by the collaboration among builders of acoustic and musical instruments, physiologists, and physicians[52] (see chapter 6). However, in the second half of the 19th century, when psychology was constituted as an experimental discipline, including also the study of hearing, models of concert listening were already part of classical music's etiquette and ideology, whereas the most notable propagandist of formalism, Eduard von Hanslick, had already published his influential *Vom Musikalisch-Schönen* (1854, translated into English as *The Beautiful in Music*, 1891).[53]

c) Hearing as a research field for medicine and physiology

[50] Enrico Fubini, *Musica e pubblico dal Rinascimento al Barrocco*, Torino, Einaudi, 1984.

[51] Matthew Riley, *Musical Listening in the German Enlightenment: Attention, Wonder and Astonishment*, Aldershot, Ashgate, 2004, p. 27.

[52] See Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany*, Cambridge, MA, and London, MIT Press, 2006.

[53] Eduard Hanslick, *The Beautiful in Music*, translated by Gustav Cohen; edited, with an introduction by Morris Weitz, New York, Liberal Arts Press, 1957.

In contrast to physics and acoustics, disciplines like anatomy, physiology—later, otology and the psychology of hearing—address hearing as an ability that is rooted in the materiality of the human body. Thus, as described by Western medicine, the auditory system comprises three components: the ears (conventionally divided into outer ear, middle ear, and inner ear), the peripheral neural pathways leading to the auditory cortex, and the auditory cortex itself, which is part of the brain. To put it briefly, audition is made possible by the transmission of sound waves inside the ear, through the eardrum and mechanisms of the middle ear to the fluid-filled cochlea, where acoustic vibrations are converted into nerve impulses. The conversion of mechanical impulses into electrical (nervous) ones takes place in the organ of Corti, which contains 15,000 to 20,000 hair cells, each of which corresponds to an auditory nerve receptor. Nervous impulses are then transmitted through the ca. 30,000 fibres of the auditory nerve (also known as "acoustic nerve" or "eighth cranial nerve"), which brings the sound signal to the thalamus, and then to the auditory cortex. Neural pathways connected to the auditory cortex form a very complicated structure, including many nuclei in which the fibres converge and diverge, and consisting not only in afferent pathways (that is, nerves leading to the brain), but also in efferent nerves that apparently provide feedback from the brain to the ear. The primary auditory cortex, located in the temporal lobe, corresponds approximately to Brodmann areas 41 and 42 of the cerebral cortex. Each side of the auditory cortex consists of 100 million auditory cells.[54] Yet, other areas of the brain, like the frontal and parietal lobes, seem to be also involved in processing sound.

[54] Explanations of the current status of the physiology of hearing abound, but for the purpose of writing this summary I have consulted three sources: chapters 2 and 3 of S.S. Stevens, Fred Warshofsky and the Editors of Time-Life Books, *Sound and Hearing*, Alexandra, VA, Time-Life Books, 1980, which includes some visual essays on the subject; Stephen Handel, *Listening*: *An Introduction to the Perception of Auditory Events*, Cambridge, MIT Press, 1989, chapter 12: "The Physiology of Listening", pp. 461–545 (pp. 462–463); and Max Matthews, "The Ear and How It Works" and "The Auditory Brain", which form chapters 1 and 2 respectively of Perry R. Cook (ed.), *Music,*

On the other hand, the auditory system is the main, but not the only site of audition, since other parts of the human body can have an effect on it. In particular, depending on the bodily position, the torso and the shoulders may reflect the sound towards the ears, and the head may cast an acoustic shadow, which would eventually move as the subject moves around.[55] Phonation and audition are also closely connected.[56] Besides, the localization of sound sources, which is one of the main functions of audition, normally involves other components of the human sensorimotor system, like vision.

This simplified description of the functioning of the auditory system is the result of medical studies that can be traced back in Europe at least to the second century AD, and that are still in progress.[57] In comparison to other medical specialities, medical research into the ear has historically been rather challenging because of the position of the organ, hidden in the temporal bone, its tiny size, and its anatomical and physiological complexity. For that reason, the study of the anatomy and physiology of the ear has benefitted enormously from the practice of corpse dissection, as well as from the dissection and comparative study of the auditory organs of different animal

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Cognition, and Computerized Sound. An Introduction to Psychoacoustics, Cambridge, MIT Press, 1999, pp. 1–10, and 11–20.

[55] See Matthews, "The Ear and How It Works", pp. 1–2, and also John Pierce, "Hearing in Time and Space", chapter 8 of Cook (ed.), *Music, Cognition, and Computerized Sound*, pp. 89–103, on p. 89.

[56] On the function of the ear as "sensor" (*capteur*) and controller in singing, see the writings of Alfred Tomatis, otolaryngologist and creator of the Tomatis Method, which aims at correcting vocal defects by training the ear with purpose-made tapes; see particularly chapter 4 of his *L'oreille et la voix*, Paris, Éd. Robert Lafont, 1987, pp. 157–181.

[57] For an overview of the history of otology, see Georg von Békésy and Walter A. Rosenblith, "The Early History of Hearing: Observations and Theories", *The Journal of the Acoustical Society of America*, vol. 20, no. 6, 1948, pp. 727–748; chapter 1 of Ernest Glen Wever, *Theory of Hearing*, New York, Dover Publications, 1949 (pp. 3–24); R. Scott Stevenson and Douglas Guthrie, *A History of Oto-Laryngology*, Edinburgh, E. & S. Livingstone, 1949, especially chapters V and VIII; Luis García-Ballester, Guillermo Olagüe and Miguel Ciges (eds), *Classics in Modern Otology*, Granada, University Press of Granada, 1978; Adam Politzer, *History of Otology*, translated by Stanley Milstein, Collice Portnoff and Antje Coleman, Phoenix, AZ, Columella Press, 1981; Joseph E. Hawkins, Jr., "Auditory Physiological History: A Surface View", in Anthony F. Jahn and Joseph Santos-Sacchi (eds), *Physiology of the Ear*, New York, Raven Press, 1988, pp. 1–28; chapter 8 ("The Ear and Theories of Hearing") of Finger, *Origins of Neuroscience: a History of Explorations into the Brain Function*, pp. 108–123; Dennis G. Pappas, "Otology through the Ages", *Otolaryngology – Head and Neck Surgery*, no. 114 (2), 1996, pp. 173–196; and C. Daniel Geisler, *From Sound to Synapse. Physiology of the Mammalian Ear*, New York-Oxford, Oxford University Press, 1998.

species.[58] However, as I will explain in chapter 6, otology, which deals with the anatomical and physiological study of the auditory system and the treatment of its diseases, was not established and recognized as a medical speciality until the second half of the 19th century, when it flourished mainly in German-speaking countries.

Generally speaking we can say that the interest of otologists has moved historically deeper and deeper inside the organ of hearing: from the eardrum and middle ear, to the cochlea, which in mid-19th century became the main subject of theories of hearing, to the auditory nerve and, at the present time, the auditory cortex and other areas of the brain.[59] Such questions as the details of the functioning of the neural pathways that bring electrical impulses to and from the brain, the specific role of each cerebral cortex area involved in audition, or the way in which the brain "decodes" the impulses from the auditory nerve are at the forefront of the auditory research agenda today.

d) Hearing as a research field for psychology

The range of frequencies audible to humans is normally 20 to 20,000 Hz (cycles per second), though there is considerable variation between individuals, especially at the high frequency end, where audibility tends to decline with age. In fact, most adults cannot hear tone frequencies above 15,000 Hz, whereas at the lower end most people can hear sounds below 20 Hz, though the sounds they hear do not normally have a continuous tonal quality. The auditory threshold, that is the minimum intensity at which each frequency is perceptible, also varies greatly, being much lower at the frequencies included in the maximum sensitivity range.[60] Variations in intensity are usually

[58] See for instance chapter 12 ("Wave Motion in the Cochlea") of Georg von Békésy, *Experiments in Hearing*, edited and translated by Ernest G. Wever, New York-Toronto-London, McGraw-Hill Book Company, 1960, pp. 496–510.

[59] The renaming, in 2001, of the *American Journal of Otology* as *Otology and Neurotology* could be considered as evidence of the current state of the discipline.

[60] Handel, *Listening*, pp. 64–66.

perceived if they are at least of 1 dB; in frequency, if they are of about 0,10 Hz—these figures are normally called "just noticeable differences".[61] Besides, we should also consider that our capacity to distinguish two sounds might be affected by the distance between their frequencies,[62] and that masking effects might also happen in audition.

Audibility, intensity, loudness, pitch perception, masking effects and localization—like temporal processing of sound, binaural hearing, etc.—are only some of the basic aspects studied by the psychology of hearing. While all these phenomena are necessarily based on knowledge of the structures of the ear and its physiology—indeed, psychological handbooks normally devote at least one chapter to the physiology of the ear—,[63] a proper psychological field could only emerge from auditory physiology when the univocal relationship between stimulus (sound) and sensation was questioned. Thus, the awareness of phenomena like individual differences in hearing, misjudgements, auditory illusions,[64] or the effects of auditory fatigue opened the way for psychological research in audition.

Before the emergence of experimental psychology, some physicians and physicists had already devoted attention to auditory sensations. Apparently, the first auditory measurements were made by Sauveur in 1700, but during the 18th and early 19th centuries other physicists tried to establish the limits of human audition using

[61] See Pierce, "Hearing in Time and Space", p. 102.

[62] See Matthews, "The Ear and How It Works", pp. 8–10.

[63] See for instance a classical example from the time in which a hearing science was first formed: S.S. Stevens and Hallowell Davis, *Hearing: Its Physiology and Psychology*, New York, Acoustical Society of America-American Institute of Physics, 1983 (originally published in 1938); and a later one: Gulick, Gescheider and Frisina, *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*.

[64] A standard example of auditory illusion would be the "missing fundamental", that is the fact that the harmonic overtones of a certain fundamental would make us hear that fundamental frequency even when it is absent, but many others have been described. On the history of the "missing fundamental" effect see Reinier Plomp, "Pitch of Complex Tones", *Journal of the Acoustical Society of America*, vol. 41, no. 6, 1967, pp. 1526–1533. As mentioned above, on auditory illusions see Diana Deutsch's website: http://deutsch.ucsd.edu/psychology/pages.php?i=201 [last access: October 2013], and her CD compilations: *Musical Illusions and Paradoxes* (1995),and *Phantom Words, and Other Curiosities* (2003) both published by Philomel.

sonorous pipes or stretched strings.[65] As I will explain in chapter 6, the 19th century was particularly productive of new acoustic instruments, like the siren or the various types of "Savart's wheels", which were employed to test auditory thresholds. At the end of the 19th century experimental psychology was established on the basis of a distinction between sensation and perception that was postulated as a condition for the emergence of a proper psychological field. Many of the reaction experiments that contributed to shape a new concept of sensation involved auditory stimuli, and the musical skills of researchers were indeed valued during the first decade in which Wilhelm Wundt's experimental psychological laboratory was active.[66] However, questions related to the perception of music soon evolved into an independent discipline, the psychology of music, which was developed by a student of Wundt, Carl Stumpf, and by other contemporary scholars, like Ernst Kurth and Ernst Mach (see chapter 6).

e) Hearing as a research field for electroacoustics, electrophysiology and psychoacoustics: towards a hearing science

Though the electrical reproduction of sound can be traced back to the first half of the 19th century, electroacoustics—based on transducers, that is on the ability of different materials and/or apparatuses to convert electric energy into sound (or vice versa)—developed in the first half of the 20th century,[67] Since the 1910s a movement towards the constitution of something like a hearing science, combining the efforts of

[65] Audrey B. Davis and Uta C. Merzbach, *Early Auditory Studies: Activities in the Psychology Laboratories of American Universities*, Washington D.C., Smithsonian Institution, 1975, p. 12; on sonorous pipes see Paolo Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", in Anna Giatti and Mara Miniati (eds), *L'acustica e i suoi strumenti: La collezione dell'Istituto Tecnico Toscano/ Acoustics and Its Instruments: The Collection of the Istituto Tecnico Toscano*, Firenze, Giunti, 2001, pp. 57–72, on pp. 60–61.

[66] See chapter 5 ("The Bias of *Musikbewusstsein* When Listening in the Laboratory, on the City Street, and in the Field") of Alexandra Hui, *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840-1910*, Cambridge, MA, MIT Press, 2013, pp. 123–148.

[67] See Frederick V. Hunt, *Electroacoustics: The Analysis of Transduction, and Its Historical Background*, Cambridge, MA, Harvard University Press, and New York, John Wiley and Sons, 1954.

physicists, physiologists, psychologists and electrical engineers—more specifically, involving electroacoustics, biophysics, electrophysiology, psychoacoustics and audio engineering—was detectable, particularly in some North American and European laboratories and research departments where scholars of different backgrounds had the chance to collaborate. The disciplines involved in those projects shared an experimental approach to the subject; many of them regarded the laboratory as the primary site for their research; they were also pulled together by the use of certain technologies and, in connection with those technologies, by the acceptance of some conceptual metaphors. However, collaboration among the disciplines, particularly between physiology and psychology, was never an effortless task: interdisciplinary research programmes were introduced in some institutions, but in many cases scientific exchanges did not go beyond personal interest.

We can consider that there were two phases in this collaboration. A first phase, roughly since the 1910s until World War II, was characterized by the importance of electrical metaphors, a close collaboration between physiologists and psychologists, the emergence of psychoacoustics, and the virtual exclusion of the social dimension of hearing. The second phase, from the end of World War II until the 1980s, saw a certain division between the research activities of physiologists and psychologists, since—as Earl D. Schubert has remarked—the latter started to feel increasingly out of touch with the complexities of auditory physiology.[68] During this period psychoacoustics was reformulated within the emerging paradigm of information theory and cognitivism, which was related to mathematics and computer science and originally had little to do with physiology. Psychologists, computer scientists, linguists and audio engineers collaborated in auditory research, which was mostly formalized according to cognitivist

[68] See Schubert, "History of Research on Hearing", in Edward C. Carterette and Morton P. Friedman (eds), *Handbook of Perception, vol. IV: Hearing*, New York-San Francisco-London, Academic Press, 1978, pp. 41–78, on p. 43.

and information theory models. Since the 1960s, these models favoured an increasing interest in hearing as a component of auditory and audiovisual communication, and a range of new communicative contexts were considered, e.g. in performance studies, radio studies, cinema and media studies, etc., though in many cases the question of hearing mingled with the question of audiences.

4.1.2 Theoretical and methodological issues

Nevertheless, as I will try to argue in the course of this research, the study of hearing cannot be reduced to a succession of different disciplinary approaches to various aspects of an invariable scientific object. On the contrary, the development of the hearing sciences has accompanied the transformation of the hearing conditions—shortly, the transformation of hearing—both within the contexts of scientific experimentation and without. This is easily understood if we consider how acoustics has evolved from the study of natural sounds, speech, and frequencies produced by mechanical instruments, to the perception of synthetized tones, created to meet specific experimental requirements and to be used in controlled environments. Changes in technological instruments and in the conditions under which sounds are produced, transmitted, manipulated, tested, measured and stored for research imply that what is being investigated, hearing, also changes in each case. However, these crucial discontinuities have not always been accounted for in some attempts to historicize the sciences of hearing.

The convergence of disciplines that gave birth to a hearing science in the 20th century—particularly, as I have mentioned above, in some laboratories of the United States and Europe—also led to the establishment of a synthetic narrative of past efforts to understand audition, including anatomical, physiological, psychological and

acoustical discourses. The most significant proponents of this narrative were two American psychologists: Edwin G. Boring, who wrote about the subject in *Sensation and Perception in the History of Experimental Psychology* (1942),[69] and Ernest Glen Wever, author of the pioneering *Theory of Hearing* (1949),[70] who had studied under Boring at Harvard University. Wever's narration, in particular, was very well received at the time, especially but not exclusively by fellow psychologists. Despite its date of publication, it is often mentioned in more recent manuals on hearing as a standard history of the field.[71]

Predictably, though, considering also that they never trained as historians, Boring and Wever are representatives of the kind of historical approach that has been criticized since the 1980s by the representatives of a new generation of historians of science, and more specifically by advocates of a "new" history of psychology.[72] Boring and Wever's is, to begin with, an example of "whig" history, based on a firm belief in the inexorability of scientific progress, and thus an example of "presentism", that is of history constructed using current conceptual schemes, as a justification of the present. On the other hand, according also to the historiographical standards of the time, Boring and Wever conceive the history of auditory research as a succession of competing "theories", leaving no space for the examination of research practices or contexts. Thus, broadly speaking, they coincide in dividing the history of "theories of audition"—

[69] See chapter 11 ("Auditory Theory") of Edwin G. Boring, *Sensation and Perception in the History of Experimental Psychology*, New York, Appleton-Century-Crofts, 1942, pp. 399–436.

[70] Ernest Glen Wever, *Theory of Hearing*, New York, Dover Publications, 1949.

[71] See for instance Gulick, Gescheider and Frisina, *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*, pp. 54–72; and Gelfand, *Hearing: An Introduction to Psychological and Physiological Acoustics*, New York, Marcel Dekker, 1990.

[72] This approach has engaged such notable historians of psychology as Kurt Danziger, Laurel Furumoto and Mitchell Ash, among others; see William R. Woodward and Mitchell G. Ash (eds), *The Problematic Science: Psychology in Nineteenth-Century Thought*, New York, Praeger, 1982; Laurel Furumoto, "The New History of Psychology", in Ira S. Cohen (ed.), *The G. Stanley Hall Lecture Series*, vol. 9, Washington DC, American Psychological Association, 1989, pp. 9–34; Kurt Danziger, *Constructing the Subject: Historical Origins of Psychological Research*, Cambridge, Cambridge University Press, 1990.

basically, theories of pitch perception—into two blocks: firstly, a historical period (roughly, from ancient times to Helmholtz) when the facts of audition were established—i.e. the structures of the ear were described and named, their functionalities were explained, etc.—and some theories of audition, which those scholars value mainly as antecedents to later research, were formulated; secondly, a period (from Helmholtz to mid-20th century) of properly scientific (though controversial) theorization based on the established facts. Thus, Boring and Wever conceive the first period in the history of audition as a dialogue between well-delineated theories: for Boring, the so-called "resonance theory of hearing" (culminating in Helmholtz's research) and "other theories" (resulting from criticism of Helmholtz's), and for Wever, two "classical theories", that is "resonance (or place) theories" and "frequency (or telephone) theories".

In substance, Boring and Wever's accounts of pre-Helmholtz theories diminish their theoretical weight and blend them under a concept, "resonance", which functions as a retrospective projection of the resonance theory par excellence: the one introduced by Hermann von Helmholtz in his *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* (1863; *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, 1875). In this way, they interpret modern advances in the understanding of hearing, from the Renaissance to mid-19th century, in the light of future developments, as preparations for Helmholtzian theories. By contrast, Boring and Wever present 20th-century (post-Helmholtzian) auditory research, in particular that developed in the field of psychoacoustics, as a competition among various theories. While Boring analyses a mixed lot comprising "place-resonance theories", "frequency-non-resonance theories", "place-non-resonance

theories", and "frequency-resonance theories", [73] Wever measures his own "volley principle theory" against "modern developments" of classical theories.[74] While they distinguish two moments in auditory research—in the terms employed by Boring in a much earlier paper: a first moment for "theories" and a second one for "theorizing"[75]—, they fail to relate them to changes in concepts and research practices in the various "hearing sciences", pre- and post-Helmholtz, and particularly to the transformations brought about by the use of electromechanical instruments in 20th-century auditory research. As I have argued above, this use not only changed research notions and procedures—more measurements and new experiments on hearing were possible—, but transformed also the very object of study, since now experimental subjects were required to hear (or rather, listen to) audio signals produced by electrical and electronic instruments. Also, the social context in which hearing was practiced and conceived in Europe and the United States transformed itself enormously during the first decades of the 20th century, as a result of the spread of audio technologies like the radio and the phonograph.

The obvious (though predictable) shortcomings of Boring and Wever's narratives of the history of audition raise a more general question about the historicization of hearing. There is a difficulty in tracing lines of historical continuity, since they cannot be established solely on the basis of the recurrence of concepts, for example that of resonance. As I have just argued, the notion of resonance—i.e in its current sense, the ability of a system or object to vibrate at a higher volume at some

[73] Boring, *Sensation and Perception in the History of Experimental Psychology*, pp. 411–419.

[74] Wever, *Theory of Hearing*, pp. 97–441.

[75] Edwin G. Boring, "Auditory Theory with Special Reference to Intensity, Volume, and Localization", *The American Journal of Psychology*, vol. XXXVII, no. 2, April 1926, pp. 157–188, on p. 157; for a similar argument see the preface to Stevens and Davis, *Hearing: Its Physiology and Psychology*, p. x.

frequencies than at others—[76] has been associated with one of the two "classical" theories of audition (borrowing Wever's terms), i.e. "resonance (or place) theories" vs "frequency (or telephone) theories", and has also been presented as a thread running through and tying together all the theoretical efforts preceding (and leading to) Helmholtz's *On the Sensations of Tone*. However, resonance has appeared through Western history in such a variety of textual and cultural contexts that deducing continuity in meaning from its repeated occurrence becomes problematic.

For instance, Wever and other later historians of hearing affirm that the "first resonance theory" of hearing was the one formulated by Caspar Bauhin in his *Theatrum anatomicum*, published as early as 1605. In this book Bauhin, so Wever argues, discussed the "selective resonance" of different cavities of the ear, including the deeper cavities where the auditory nerve purportedly lied.[77] However, as Békésy and Rosenblith have pointed out, Bauhin was only vaguely familiar with the phenomenon of resonating strings, which would be explored by Galileo Galilei three decades later. Instead, Békésy and Rosenblith consider that he might have tried to explain hearing by "something akin to resonance", an "echo theory".[78] Also, Francis Bacon used a particular case of resonance, sympathetic vibration, to explain the relationship between sound and "spiritus" in audition. Today we would interpret this explanation as

[76] For instance, the Wikipedia gives the following definition of "resonance"(http://en.wikipedia.org/wiki/Resonance; [last access: January 2013]): "In physics, *resonance* is the tendency of a system to oscillate with greater amplitude at some frequencies than at others. Frequencies at which the response amplitude is a relative maximum are known as the system's *resonant frequencies*, or *resonance frequencies*. At these frequencies, even small periodic driving forces can produce large amplitude oscillations, because the system stores vibrational energy."

[77] See Wever, *Theory of Hearing*, pp. 10–11, and also Finger, *Origins of Neuroscience*, p. 111. Unfortunately, I have not been able to consult Bauhin's *Theatrum anatomicum* to develop this point further. Adam Politzer's *History of Otology* devotes an entry to Bauhin, but does not mention either "resonance" or "echo"; see Politzer, *History of Otology*, p. 75.

[78] Békésy and Rosenblith, "The Early History of Hearing", p. 736. Veit Erlmann has also mentioned Bauhin with reference to resonance, although he has mainly underlined the role of echoes ("which also contain an element of selective resonance") inside the tympanic cavity (see Veit Erlmann, "Descartes' Resonant Subject", *differences: A Journal of Feminist Cultural Studies*, 2011, vol. 22, no. 2–3, pp. 10–30, on p. 21). However, here Erlmann seems to use "selective resonance" as a synonym for "selective reverberation", and so he deviates from the usual scientific meaning of "resonance".

metaphorical, but according to Penelope Gouk at the beginning of the 17th century it was intended quite literally.[79] Resonance acquired different connotations at different historical moments depending on which parts of the ear were considered as resonators: the eardrum, the middle ear, the cochlea, or other parts of the inner ear, and also on which conceptual metaphors hearing was modelled (for instance, if the ear was imagined as a string instrument or as a piano). In contrast, Helmholtz's acoustic investigations did not only involve a more detailed knowledge of the anatomical structures of the inner ear and the behaviour of sound, but were also associated with testing procedures and tools (Helmholtz's resonators, notably) that created an acoustic projection of the silent functioning of the ear, and thus produced an experience of resonance inside the investigator's ear.[80]

This criticism is also applicable to Veit Erlmann's book *Reason and Resonance* (2010), which presents a collection of episodes for an "auditory history of knowledge"—which the author, somewhat idiosyncratically, denominates "otology".[81] His investigation focuses on the historical phase going from the beginning of the 17th century until the early decades of the 20th century, in which audition (or more precisely, the perception of pitch) was purportedly conceived in terms of "resonance". While in his ambitious research Erlmann effectively shows how the notion of resonance has taken different shapes and meanings in different historical moments, and how it has been entangled in shifting cultural contexts, it does not treat these changes as problematic, neither discusses them specifically.

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[79] See Penelope Gouk, "Music in Francis Bacon's Natural Philosophy", in Paolo Gozza (ed.), *Number to Sound: The Musical Way to the Scientific Revolution*, Dordrecht, Kluwer Academic Publishers, 2000, pp. 135–149, on pp. 140–141.

[80] See Steege, *Helmholtz and the Modern Listener*, pp. 58–72.

[81] Veit Erlmann, *Reason and Resonance: A History of Modern Aurality*, New York, Zone Books, 2010. I consider "otology" a peculiar denomination, since it is at the same time too restrictive (it refers to a notion that is not just medical, and not just about the ear) and too wide (it includes the historical period previous to the constitution of otology as a medical especiality, in mid-19th century; see chapter 6 of this work).

4.2 Hearing, music and the senses in Antiquity and the Middle Ages

While hearing was implicit in ancient Greek theories of music, it was not normally treated as a separate subject. Thus, the most significant of ancient music theory traditions, that of the Pythagoreans, connected hearing—in particular, the appreciation of consonances—to mathematical ratios. According to Pythagorean harmonics, the main musical consonances (the octave, the fifth, the fourth) corresponded to ratios formed combining the first four simple numbers (1, 2, 3, 4: the musical tetractys), what paved the way for music to be considered part of mathematics. Since mathematical ratios were thought to be the foundation of the cosmos and the key to the harmony of the soul, the Pythagorean theories had also cosmological and ethical dimensions, on which subsequent theories of the powers of music would be built.[82] Echoes of Pythagoreanism resonate, for instance, in Plato's description of the motion of the soul in the *Timaeus*, though the Athenian philosopher seems to have been mainly concerned with the moral and political effects of music education—that is, education in music, poetry and dance, as it was costumary at the time—as attested mainly in the *Republic* and the *Laws*.[83] In contrast to the Pythagorean tradition, the *Elementa Harmonica* and *Elementa Rhythmica* of Aristoxenus of Tarentum, a disciple of Aristotle, stressed the importance of the ear over mathematical ratios in judging consonances, though in Aristoxenian texts *akoé*

[82] As it is known, the Pythagorean tradition refers to the teachings of Pythagoras, a philosopher who is thought to have lived in the second half of the 6th century. Even if his theories on music can only be traced in a series of fragments and allusions by later authors, they have been enormously influential; see André Barbera, "Pythagoras", in Stanley Sadie (ed.), *New Grove Dictionary of Music and Musicians*, London, Macmillan, 2001 (2nd ed.), and the excerpts and fragments included in chapter 1 ("Pythagoras and early Pythagoreanism") of Andrew Barker (ed.), *Greek Musical Writings, II: Harmonic and Acoustic Theory*, Cambridge, Cambridge University Press, 1989, pp. 28–52.

[83] Key fragments of the *Republic* and the *Timaeus* are included in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 9–22, and in Barker (ed.), *Greek Musical Writings, II: Harmonic and Acoustic Theory*, pp. 53–65. See also Warren Anderson and Thomas J. Mathiesen, "Plato", in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

(hearing) was discussed together with *diánoia* (intellect) and *xy'nesis* (comprehension).[84]

On the other hand, for ancient Greek philosophers hearing was also a question of natural philosophy. In that sense, the most influential treatment of sound and hearing was that of Aristotle's *De Anima* (*On the Soul*), whose second book deals with the senses. Secondarily, hearing is also discussed by Aristotle in *De Sensu et sensibili* (*Sense and Sensibilia*) from *Parva Naturalia*, which does not add much to the discussion of hearing, and often refers to the *De Anima*.[85] In the *De Anima* Aristotle discussed both the production and the reception of sound, which were for him two aspects of the same phenomenon—as Alan Towey has summarized the matter, for Aristotle "the sounding and the hearing are a single activity".[86] Regarding the reception of sound, the philosopher claimed that the sensation of sound was not produced by immediate contact with the organ of sensation, since "the object sets in movement only what lies between [normally air, or water], and this in turn sets the organ in movement".[87] He also argued that there was a continuous mass of air connecting the ear and external air, that is that "[t]he organ of hearing is physically united with air, and because it is in air, the air inside is moved concurrently with the air outside".[88] The particularly subtle kind of air located in the middle ear cavity would later be known by physicians as *aer internus sive implantatus*, that is "internal or implanted air", or *aer ingenitus*. However, it was not clear how this air conduction worked, since the anatomy

[84] See Andrew Barker (ed.), *Greek Musical Writings, II: Harmonic and Acoustic Theory*, Cambridge, Cambridge University Press, 1989, pp. 119–189. On the Aristoxenian and Pythagorean traditions, see Thomas J. Mathiesen, "Greek Music Theory", in Thomas Christensen (ed.), *The Cambridge History of Western Music Theory*, Cambridge, Cambridge University Press, 2002, pp. 109–135.

[85] Aristotle, *DA* II.8, and *Sense and Sensibilia*, in *The Complete Works of Aristotle, vol. 1*, the revised Oxford translation, edited by Jonathan Barnes, Princeton, NJ, Princeton University Press, 1984, pp. 667–670 and 693–713.

[86] Alan Towey, "Aristotle and Alexander on Hearing and Instantaneous Change: A Dilemma in Aristotle's Account of Hearing", in Burnett, Fend and Gouk (eds), *The Second Sense*, p. 12.

[87] Aristotle, *DA* II.8, 419a25–31, and 419b18–22.

[88] Aristotle, *DA* II.8, 420a3–5.

of the ear was roughly known at the time, but the details of its internal structure were yet to be explored.[89] The hypothesis of the "implanted air" was based instead on the belief that sound (air) must be perceived by sound (internal air), since—as Aristotle seems to assume—"like is affected only by the like".[90] Besides, Aristotle also dealt with the political and social dimension of music, in particular in the *Politics*, where he tried to dilucidate whether music should be included in the education of the young.[91] Like Plato, Aristotle conceived poetry, music, dance (usually considered together), painting, sculpture, and occasionally other arts as forms of mimesis or imitation[92]—an idea that will become key to the formation of the modern system of the arts in the 18th century, as well as to the modern reshaping of music listening (see next chapter).

In ancient Rome music was one of the disciplines considered essential to the formation of free citizens: the *artes liberales*, and thus was part of the education of orators. Yet, the study of music—meaning theoretical speculations on music, what we would now call "music theory"— was not oriented to musical practice; it aimed rather at providing future orators with some facts and theories that they could employ in their speeches.[93] Besides, Latin treatises on oratory occasionally referred to hearing and audiences in various contexts, for instance in reflections about the parts of the speech or about delivery style in court hearings. Parallels between music and speech were also drawn; the most notable example is Quintilian's *Institutio Oratoria* (*The Orator's*

[89] On the importance of the theory of *aer implantatus* in the history of otology, see Békésy and Rosenblith, "The Early History of Hearing", pp. 729–730, and also Stanley Finger, *Origins of Neuroscience: A History of Explorations into the Brain Function*, New York, Oxford University Press, 1994, pp. 108–109, which associates this theory also with Empedocles and Plato.

[90] Aristotle, *DA* II.5 417a1.

[91] See Aristotle, *Politics: Pol.*8 1337b4–1338b8 and 1339a11–1342b34, in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 24–34.

[92] See mainly Aristotle, *Poet*., in English in in *The Complete Works of Aristotle, vol. 2*, the revised Oxford translation, edited by Jonathan Barnes, Princeton, NJ, Princeton University Press, 1984, pp. 2316–2340.

[93] Calvin M. Bower, "The Transmission of Ancient Music Theory into the Middle Ages", in Christensen (ed.), *The Cambridge History of Western Music Theory*, pp. 136–167, on p. 137.

Education), whose first book stresses the advantage that future orators may obtain from the study of music, not only for voice training but also the practice of gesture and expression, and even discourages them from reading the poets before learning music.[94] At least since the 1st century CE the corpus of musical knowledge followed mainly the Platonic and Pythagorean tradition, as attested by Cicero's description of the music of the spheres in his *Somnium Scipionis*, part of *De re publica* (*The Republic*), as well as by Ptolemy's *Harmonics* (2nd century) and later by Aristides Quintilianus' *De Musica* (*On Music*, 3rd century), both of which deal with human and cosmic harmony.[95]

Among Christian philosophers, Augustine advocated the importance of *artes liberales*, including music, for Christian education, in his *De Musica* (*On Music*, 4th century), and music was also granted a place of honour among the arts in Martianus Capella's *De nuptiis Philologiae et Mercurii* (*The Marriage of Philology and Mercury*, early 5th century), which established the number of liberal arts at seven: grammar, rhetoric, dialectic, arithmetic, geometry, astronomy and music.[96] However, the most important music theory treatise of the Middle Ages was Boethius's *De institutione musica* (6th century, in English as *Fundamentals of Music*), which became the most

[94] See Book 1 of Quintilian, *The Orator's Education*, vol. I, edited and translated by Donald Russell, Cambridge, MA, Harvard University Press, 2001; see also Book 4 of *The Orator's Education*, vol. II; and Aristotle, *Rhet.* II.2–11, in *The Complete Works of Aristotle, vol. 2*, which deals with the means of persuasion of the speaker and the emotions of the audience. Ciarán McMahon has identified and commented some Latin treatises on oratory, which he considers examples of "projective attention", see chapter 4 of his The Prehistory of the Concept of 'Attention', Ph.D. thesis, College of Human Sciences, School of Psychology, University College Dublin, December, 2007, pp. 92–114.

[95] Cicero, *De Re Publica* VI.XVIII, in *De Re Publica. De Legibus,* with an English translation by Clinton Walker Keyes, Cambridge, MA, Harvard University Press, 1928. English translations of Ptolemy's *Harmonics* and Aristides Quintilianus' *De Musica* are included in Barker (ed.), *Greek Musical Writings, II: Harmonic and Acoustic Theory*, pp. 270–391 and pp. 392–535.

[96] See Augustine, "On Music", translated by Robert Catesby Taliaferro, in *The Writings of Saint Augustine*, *vol. 2*, edited by Ludwig Schopp, New York, CIMA, 1947, pp. 153–379; and Martianus Capella, "The Marriage of Philology and Mercury", translated by William Harris Stahl and R. Johnson, in William Harris Stahl, with E.L Burge, *Martianus Capella and the Seven Liberal Arts*, *vol. 2*, New York, Columbia University Press, pp. 345–382. On Martianus Capella's sources see the Italian translation: *Le Nozze di Filologia e Mercurio*, with Latin text; introduction, traduction, comment and appendixes by Ilaria Ramelli, Milan, Bompiani, 2001. See also Bower, "The Transmission of Ancient Music Theory into the Middle Ages", pp. 138–141, and Kristeller, "The Modern System of the Arts: A Study in the History of Aesthetics Part I", p. 505.

authoritative music text up to the 16th century and includes considerations on hearing.[97] Clearly influenced by Pythagorean and Neoplatonic traditions, in the first chapter Boethius identifies three types of music: *musica mundana*, which refers to musical consonances as the silent harmony of the world; *musica humana*, which bounds body and soul in man; and music made with instruments or *musica instrumentalis* (also called *musica in instrumentis constituta*), which is the only type of music that could undoubtedly be heard.

Klaus-Jürgen Sachs has maintained that the invocation of sensation and cognition, *sensus* and *ratio*, is key to Boethius, who in the treatise alludes repeatedly to the *iudicium aurium*, i.e. the criteria or judgement of the ears.[98] According to Sachs, Boethius generally joined the Pythagorean tradition in believing that musical consonances "are first demonstrated by *ratio*, then empirically tested by the sense of hearing".[99] However, the contrast between sensation and cognition must be interpreted within the framework of another, stronger opposition: that between reason and physical action, or science vs. work. Indeed other scholars, like Joseph Dyer, have invoked Boethius' several translations and commentaries of Aristotelian works on logic and natural science, and have interpreted his references to the senses and hearing in *De institutione musica* as an endorsement of the Aristotelian position that sense perception can provide the basis for intellectual comprehension.[100]

In any case, as Calvin Bower has underlined, for Boethius music was a compendium of "*a priori* principles grounded in abstract thought, not principles

[97] Anicius Manlius Severinus Boethius, *Fundamentals of Music*, translated with introduction and notes by Calvin M. Bower, edited by Claude V. Palisca, New Haven, CT, Yale University Press, 1989; see also the fragments included in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 137–143.

[98] Klaus-Jürgen Sachs, "Boethius and the Judgement of the Ears: A Hidden Challenge in Medieval and Renaissance Music", in Burnett, Fend and Gouk (eds), *The Second Sense*, pp. 167–198.

[99] Ibid., p. 171.

[100] Joseph Dyer, "The Place of *Musica* in Medieval Classifications of Knowledge", *The Journal of Musicology*, vol. 24, no. 1, 2007, pp. 3–71, on p. 9 and 12–13.

grounded in experience of actual music".[101] For that reason he classified musicians into three classes: those that play instruments, those that invent songs (poets), and a third class that "judges the work of instruments and the song", and which for him were the only ones deemed to be properly musical. Besides, the definition of music (meaning, again, "music theory") as mainly a rational science was in line with its classification, along with arithmetic, geometry and astronomy, as one of the disciplines of the medieval *quadrivium*, which Boethius himself contributed to establish. The *quadrivium* and the *trivium* (grammar, logic, rhetoric) were the two subdivisions of the seven arts that formed the curriculum on which non-theological education was based during the Middle Ages, roughly until the 13th century.[102]

Following Boethius' example, other medieval music theorists covered also the question of the *iudicium aurium* in their writings, often presenting it as a debate between the Pythagorean and the Aristoxenian tradition, and normally backing Boethius' notion that there was no contradiction between reason and sensation in musical consonances, though these were to be established primarily by reason. However, traces of an increasing concern with musical practice may be found already in the third book of Isidore's *Etymologies*, where music is not defined as a science, but as *peritia*, skill.[103] Later on, in the 9th century references to liturgical chant may be found in the commentaries to Boethius' treatise made by monastic scholars, or in the treatise *Musica enchiriadis*, where, as Bower has argued, a new preoccupation with the

[101] Bower, "The Transmission of Ancient Music Theory into the Middle Ages", p. 147.

[102] Dyer, "The Place of *Musica* in Medieval Classifications of Knowledge", p. 16; and Kristeller, "The Modern System of the Arts: A Study in the History of Aesthetics Part I", p. 506.

[103] Bower, "The Transmission of Ancient Music Theory into the Middle Ages", pp. 148–149; a fragment of Isidore's *Etymologies* is included in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 149–156.

beautiful singing of the liturgy, which played such an important role in monastic life, may be perceived.[104]

As Sachs has pointed out, since the 10th century we can find examples of music theorists that defended the primacy of the ear in musical matters, for example Gerbert d'Aurillac, who wrote a treatise on the measurement of organ pipes. Boethius' position became problematic later, in the 12th and 13th centuries, when polyphony developed and new consonances were progressively accepted.[105] Another important factor was the rediscovery of the Aristotelian tradition, which, as it is known, in medieval times was mainly continued by Arabic commentators, like Avicenna, Algazel and Averroes, whose commentaries were translated into Latin later, roughly from mid-12th century into the 13th century. The *De anima* was translated directly from Greek into Latin circa 1150, by James of Venice: though it had a delayed repercussion among scholars,[106] the currency of Aristotelian terms and notions in thinking about hearing is attested by the reflections on the subject included in Albertus Magnus' *Summa de creaturis* (13th century).[107] The availability of Latin translations of the Aristotelian corpus brought to light tensions between his approach to hearing as a question of natural philosophy, that is as a matter to be judged by the ears, and the Pythagorean and Boethian definition of music as mainly a mathematical science that appealed to reason.

On the other hand, tensions between the Aristotelian and Pythagorean approaches to hearing must be interpreted in connection with the morally ambiguous status of the senses in the Middle Ages: while philosophers and theologians often

[104] Bower, "The Transmission of Ancient Music Theory into the Middle Ages", pp. 149–158; a fragment of the anonymous *Musica enchiriadis* is included in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 189–195.

[105] Sachs, "Boethius and the Judgement of the Ears", p. 177.

[106] Charles Burnett, "Sound and its Perception in the Middle Ages", in Burnett, Fend and Gouk (eds), *The Second Sense*, pp. 43–69, on p. 44.

[107] Ibid., p. 62.

considered them as gateways to the soul and instruments for the contemplation of God and his Creation, they also accused them of confusing the intellect and steering away devotees from higher concerns.[108] To the extent that it depended on the exercise of the senses, music was also affected by these moral suspicions. Even as late as the 15th century these suspicions inspired such eloquent defences as Johannes Tinctoris' *Complexus effectuum musices*, a treatise on the effects of music from the early 1480s. Both Rob Wegman and Philip Vendrix have underlined the interest of this work, particularly its 13th chapter, on the joy of singing, where Tinctoris explains the difference between those that perceive in music "nothing more than sound, and who are indeed delighted only through the external sense", and those that perceive it "[i]nwardly through the intellective faculty, through which one understands proper composition and performance". Although Wegman has interpreted this chapter as evidence of the emergence of a notion of musical understanding among 15th-century musicians—a notion that, he claims, would have been linked to an incipient concept of authorship—Tinctoris' dissertation ultimately develops a theological discourse on music, which most probably had its origin in the writings of Augustine and Thomas Aquinas.[109]

[108] These contradictions were elaborated, for instance, by Augustine in his *Confessions*; see Eugene Vance, "Seeing God: Augustine, Sensation, and the Mind's Eye", in Nichols, Kablitz and Calhoun (eds), *Rethinking the Medieval Senses*, pp. 13–29. However, the question of the medieval senses deserves a much deeper analysis; besides Nichols, Kablitz and Calhoun (eds), *Rethinking the Medieval Senses*, see also Suzannah Biernoff, *Sight and Embodiment in the Middle Ages*, New York, Palgrave Macmillan, 2002, and C.M. Woolgar, *The Senses in Late Medieval England*, New Haven, CT, Yale University Press, 2006.

[109] See Rob C. Wegman, "'Musical Understanding' in the 15th Century", *Early Music*, vol. 30, no. 1, February 2002, pp. 46–60, on p. 51, and also the English translation of chapter 13th of Johannes Tinctoris' *Complexus effectuum musices* as "Appendix: Tinctoris on the effects of music", pp. 63–66; see also Philip Vendrix, "La place du plaisir dans la théorie musicale en France de la Renaissance à l'aube de l'Âge baroque", in Thierry Favier et Manuel Couvreu (eds), *Le plaisir musical en France au XVIIe siècle*, Paris, Mardaga, 2006, pp. 29–47, on pp. 30–33. For an earlier treatment of similar questions also by Wegman see "Sense and Sensibility in Late-Medieval Music: Thoughts on Aesthetics and 'Authenticity'", *Early Music*, vol. 23, no. 2, May 1995, pp. 298–304+306–308+310–312.

4.3 Studying hearing and music from 1500 to 1700

Towards the end of the Middle Ages, Aristotelian psychology, so as it had been elaborated during centuries by Latin and Arabic commentators, was the predominant philosophical tradition. As Katharine Park has argued, between 1350 and 1600 a broad consensus was formed on a series of notions regarding the "organic soul", that is the principle of life functions, including the senses and passions. According to that Aristotelian *koiné*, the organic soul was divided into a series of faculties ranging from nutrition to intellection, and comprising actually three souls: the "vegetative soul", which took care of nutrition, growth and reproduction; the "sensitive soul", which included the vegetative soul, plus the motive faculties (actions and passions) and the so-called "external" and "internal senses"; and the "intellective soul", which included the vegetative and the sensitive ones, plus the higher powers of the intellect, intellectual memory and will.[110]

Whereas the external senses corresponded to the traditional five senses, the internal senses evolved from Aristotelian reflections on the role of "common sense" (the Latin *sensus communis*) in perception, which, in Daniel Heller-Roazen's summary definition, alluded to "the difference and unity of the five senses as a whole: the perception of the simultaneous conjunction and disjunction of sensations in the common sensible, the complex sensation, and, finally, the self-reflexive perception".[111] Yet, as Heller-Roazen has remarked, the term "internal sense" or "inner sense" cannot be found in the Aristotelian corpus; it apparently stems from the Galenic tradition and was used

[110] Katharine Park, "The Organic Soul", in Charles B. Schmitt, Quentin Skinner, Eckhard Kessler and Jill Kraye (eds), *The Cambridge History of Renaissance Philosophy*, Cambridge, Cambridge University Press, 1988, pp. 464–484, on pp. 466–467.

[111] Daniel Heller-Roazen, "Common Sense: Greek, Arabic, Latin", in Nichols, Kablitz and Calhoun (eds), *Rethinking the Medieval Senses*, pp. 30–50, on p. 35. The classical Aristotelian explanation of common sense appears in *DA*.III.1 and III.2; see *The Complete Works of Aristotle, vol. 1*.

also by the Stoics.[112] Following successive elaborations by Greek, Latin, Hebrew, and Arabic commentators, in the 11th century Avicenna set the number of internal senses to five, namely estimation, memory, fantasy, imagination and common sense, and so it passed to scholastic philosophy—it is mentioned, for instance, in Thomas Aquinas' *Summa Theologica*.[113] According to Avicenna and other later medieval scholars the internal senses were located in the ventricles of the brain.[114] Regarding the external senses, medieval theorists employed in their complex explanations the concept of "species", which referred to sensorial images that objects would emit in order to be perceived by the senses, since the senses could deal directly neither with the materiality of objects, nor with their substantial forms.[115]

However, according to Park, from 1500 on this structuring of the organic soul received increasing criticism, also as a result of the Renaissance re-reading of Aristotle, and evolved in two directions. The first one was the simplification of psychological vocabulary, which caused the gradual disappearance of some internal senses and the notion of species from Aristotelian accounts of sensation. The second one was the preference for concrete physiological explanations over philosophical theories in the understanding of the organic soul.[116] Indeed, during the 16th century, so Park argues, there were "signs that anatomy and physiology were beginning to replace demonstrative Aristotelian natural philosophy, at least temporarily, as the prime models of scientific explanation".[117] In early modernity the conceptual metaphor of the body-as-machine would ultimately supersede the Aristotelian vegetative soul. As Alistair Crombie has

[112] Heller-Roazen, "Common Sense: Greek, Arabic, Latin", p. 37.

[113] Ibid., pp. 40–41.

[114] Simon Kemp and Garth J.O. Fletcher, "The Medieval Theory of the Inner Senses", *American Journal of Psychology*, vol. 106, no. 4, 1993, pp. 559–576, on pp. 562–564.

[115] Park, "The Organic Soul", pp. 470–472.

[116] Ibid., pp. 480–481.

[117] Ibid., p. 482.

argued, the idea "was first successfully exploited in the experimental and theoretical inquiries made during the 17th century into the mechanisms of the sense organs, particularly the eye and the ear."[118] Thus, within the framework of what Crombie denominated the "mechanistic programme", the new physics of sound was meant to converge with knowledge of the anatomy and physiology of the ear, in a joint effort to formulate a valid theory of audition.[119] As I will explain in this and later sections, modern accounts of the functioning of the ear often oscillated between anatomy and physics: they were typically formulated either by natural philosophers who also had a knowledge of the structures of the ear (the name of Descartes comes promptly to mind), or by anatomists who were familiar with advances in physics (17th-century French anatomist Guichard Joseph Duverney would be a case in point).

As Paolo Mancosu has pointed out, during the 16th and 17th centuries the study of sound could not be considered yet as a single discipline, but was rather "found at the intersection of several fields, including music theory, mechanics, anatomy, and natural philosophy", and its practitioners were a mixed lot including musicians, but also schoolteachers, friars, and scholars of very different backgrounds.[120] Musicians, musical knowledge and musical questions—in particular the problem of consonance and dissonance, which related sound production to perception—were not only at the core of the nascent science of sound, but also at the forefront of the so-called "Scientific Revolution".

[118] A.C. Crombie, "Early Concepts of the Senses and the Mind", *Scientific American*, vol. 210, no. 5, May 1964, pp. 108–116, on p. 108.

[119] A.C. Crombie, "The Study of the Senses in Renaissance Science", in his *Science, Optics and Music in Medieval and Early Modern Thought*, London-Ronceverte, The Hambledon Press, 1990, pp. 379–398, on p. 384.

[120] Paolo Mancosu, "Acoustics and Optics", in Katharine Park and Lorraine Daston (eds), *The Cambridge History of Science, vol. 3: Early Modern Science*, Cambridge, Cambridge University Press, 2006, pp. 597–631, on pp. 596–597.

4.3.1 The "anatomical Renaissance" and the anatomy of the ear

Contrary to traditional views of the so-called "Scientific Revolution" as based almost exclusively on physics and mathematics, "physic" (the ancient name for theoretical medical knowledge, from which the word "physician" derives) also underwent its own revolution between the 16th and 17th centuries. By the beginning of the 16th century medical humanists promoted the collection, editing and printing of ancient medical works—like the treatises by Dioscorides and Galen, or the Hippocratic corpus—stimulating in this way the comparison of those sources with what they could observe. A key element of this comparison was the development of a culture of anatomical dissection, which tried to understand the structure and functioning of normal bodies in order to explain the possible causes of disease.[121] This practice flourished roughly from 1540 to 1640—a period known as "anatomical Renaissance"—[122]particularly in some universities in North Italy, where public (and also, in many cases, private) anatomy lessons were increasingly regarded as an acceptable and even valuable part of the training of physicians. As it is widely acknowledged, the key figure of anatomical Renaissance was physician Andreas Vesalius, who had studied in Louvain and Paris and later taught in Padua. There he conducted the studies that were later published in the book *De humani corporis fabrica* (1543, translated as *On the Fabric of the Human Body*), where texts and layer-by-layer illustrations of the examined corpse combined exemplarily.[123] One of the aspects that Vesalius discusses in the book is the anatomy of

[121] See Harold J. Cook, "Medicine", in Park and Daston (eds), *The Cambridge History of Science, vol. 3: Early Modern Science*, pp. 407–434, on pp. 411–413.

[122] According to Andrew Cunningham, the expression "anatomical Renaissance" was first used in 1962 in an essay by Loren C. McKinney; see Andrew Cunningham, *The Anatomical Renaissance: The Resurrection of the Anatomical Projects of the Ancients*, Aldershot, Scolar Press, 1997, p. 9. On the importance of dissection and the uses of anatomical knowledge in Renaissance Europe, see also Roger French, *Dissection and Vivisection in the European Renaissance*, Aldershot, UK-Brookfield, USA-Singapore-Sidney, Ashgate, 1999.

[123] The first English translation of Vesalius' main work, still in progress under the direction of Daniel Garrison and Malcolm Hast (Northwestern University, Evanston, IL), with a historical introduction by Vivian Nutton, can be consulted online: http://vesalius.northwestern.edu/ [last access: May 2015]. See also Cook, "Medicine", pp. 413–415.

the human brain, where he found details that contradicted Avicenna's description of the cerebral ventricles and thus disproved the scholastic theory of the internal senses.[124] English physician William Harvey, who had studied in Padua between 1590 and 1604, published in 1628 *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* (1628, translated as *On the Motion of the Heart and Blood in Animals*), where he explained for the first time the circulation of blood, raising so awareness of the functional complexity of the human body.[125]

There is consensus among historians that during the "anatomical Renaissance" the human body, hitherto imagined as a microcosm that reflected the macrocosm, and hence as part of the divine creation, was experienced as a new continent to be discovered and mapped.[126] However, as Andrew Cunningham has argued, the new anatomical explorations did not follow a single path, neither were they necessarily the result of a shared vision. There were different "anatomical projects", which often also implied contrasting evaluations of the ideals incarnated by the ancient medical authorities (mainly, Aristotle and Galen).[127] Indeed, at the end of the 16th century many anatomists still conceived public dissections mainly as demonstrations of the natural philosophical theories of the ancients, particularly of the Aristotelian corpus on living

[124] Kemp and Fletcher, "The Medieval Theory of the Inner Senses", p. 566.

[125] A translation of Harvey's work by Robert Willis, titled *On The Motion Of The Heart And Blood In Animals*, was included in the compilation *Scientific Papers: Physiology, Medicine, Surgery, Geology*, with introductions, notes and illustrations, New York, P. F. Collier & son, 1910, and is now available online: http://www.fordham.edu/halsall/mod/1628harvey-blood.asp [last access: October 2015]. On Harvey's importance for early modern medicine, see Cook, "Medicine", pp. 425–427.

[126] Jonathan Sawday, *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture*, London, Routledge, 1995, pp. 23–28. However, on the importance of Andreas Vesalius' *De humani corporis fabrica* (*On the Fabric of the Human Body*, 1543) for the construction of a new image of man see Georges Canguilhem, "L'homme de Vesale dans le monde de Copernic: 1543", in *Études d'histoire et de philosophie des sciences concernant les vivants et la vie*, Paris, J. Vrin, 1994, pp. 27–35, where the author goes beyond the commonplace parallel between Copernicus and Vesalius as in different ways and different fields, brought the medieval theory of man as microcosmos to an end.

[127] See Cunningham, *The Anatomical Renaissance*.

beings, though more and more physicians and surgeons aimed instead at discovering and explaining new anatomical details.

The practice of anatomical dissection offered new possibilities for exercising the senses, in particular sight, not only during public demonstrations, but also with the occasional use of visual charts as new pedagogical tools, what was normally appreciated by medical students. The sense of touch was also involved, as dissections required manual expertise and new professional forms of *peritia*.[128] However, anatomical dissection was even more important because it gave physicians access to some parts of the body that, like the ear, have many hidden parts, while also helping the understanding of other sense organs that, like the eye, are more accessible. At the end of the 17th century the number of anatomical and physiological discoveries made mainly by physicians was enormous, and physic, which at the beginning of the 16th century was still generally conceived as the theoretical investigation of natural causes, had succeeded in redefining itself as an empirical knowledge of bodily conditions.[129]

On the other hand, it was the anatomical and physiological knowledge that resulted from the practice of dissection that allowed the formulation of early modern theories of the senses within the conceptual framework of mechanicism. The emerging 17th-century mechanical philosophy assumed that there was only one kind of matter in the universe, and that it was not governed by Aristotelian forms, qualities and causes, but by universal laws concerning the size, shape and motion of its parts.[130] As it is known, many advocates of the new mechanicist philosophy, including Descartes, shared

[128] See Cynthia Klestinec, "Practical Experience in Anatomy", in Charles T. Wolfe and Ofer Gal (eds), *The Body as Object and Instrument of Knowledge: Embodied Empiricism in Early Modern Science*, Dordrecht-Heidelberg-London-New York, Springer, 2010, pp. 33–57, which deals with medicine students at the important university of Padua at the end of the 16th century. On anatomical observation see Rafael Mandressi, *Le Regard de l'anatomisme. Dissections et invention du corps en Occident*, Paris, Seuil, 2003.

[129] See Cook, "Medicine".

[130] On the rise of mechanical and corpuscular philosophy at the time, see Daniel Garber, "Physics and Foundations", in Park and Daston (eds), *The Cambridge History of Science, vol. 3: Early Modern Science*, pp. 21–69, esp. 43–47.

an interest in anatomical and medical questions and took part in contemporary physiological debates.[131] According to Jonathan Sawday, it was precisely Descartes' intense dedication to the practice of dissection that made him aware of the divisibility of the human body: ultimately, dissection means to break the body into its constituent parts, as one would do with the pieces of a machine, what may have inspired the image of the body as working machine.[132] Thus, in his *Discours de la méthode* (1637, translated as *Discourse on Method*), and especially in *Traité de l'homme* (*Treatise on Man*, published posthumously in Latin in 1662, and in French in 1664, but finished much earlier, around 1633) Descartes likened the operations of the human body to those of an automaton or moving machine.[133] This image conveys notions that were also familiar to many other 17th-century philosophers and physicians like Thomas Hobbes, William Harvey, Marin Mersenne, Nicolas Malebranche or Pierre Gassendi, and which would also persist in later centuries.

While the anatomy of the ear was roughly known in ancient times, historian of otology Adam Politzer observed that at the end of the 14th century the available

[131] See René Descartes, *Écrits physiologiques et médicaux*, notes, présentation, textes, traduction, notes et annexes par Vincent Aucante, Paris, PUF, 2000. On Descartes' interest in physiology see also Gary Hatfield, "Descartes' Physiology and Its Relation to His Psychology", in John Cottingham (ed.), *The Cambridge Companion to Descartes*, Cambridge, Cambridge University Press, 1992, pp. 335–370, esp. 340–344; Steven Shapin, "Descartes the Doctor: Rationalism and Its Therapies", *British Journal for the History of Science*, 33/2, 2000, pp. 131–154, accessible on line: http://dash.harvard.edu/handle/1/3219884 [last access July 2012]; and Vicent Aucante, *La philosophie médicale de Descartes*, Paris, PUF, 2006.

[132] Sawday, *The Body Emblazoned*, pp. 146–158. In these pages Sawday also underlines some interesting connections between Descartes' theories and Rembrandt's contemporary dedication to depicting dissection scenes (his famous "anatomy lessons") during the time in which both men were living in Amsterdam. On the association of the practice of dissection and mechanicism, see also Renato G. Mazzolini, "Schemes and Models of the Thinking Machine (1662–1762)", in Pietro Corsi (ed.), *The Enchanted Loom: Chapters in the History of Neuroscience*, New York-Oxford, Oxford University Press, 1991, pp. 68–143 (on pp. 68–69).

[133] The *Discours de la méthode* is included in *Oeuvres de Descartes, VI*, edited by Charles Adam and Paul Tannery [henceforth *AT*], Paris, J. Vrin, 1996; *Traité l'homme* is in *AT XI*. Both are published in English in *The Philosophical Writings of Descartes*, *vol. 1*, edited by John Cottingham, Robert Stoothoff and Dugald Murdoch [henceforth *CSM*], Cambridge, Cambridge University Press, 1985, pp. 111–151 (*Discourse on Method*) and pp. 99–108 (*Treatise on Man*); an English translation of the *Treatise on Man* is also included in René Descartes, *The World and Other Writings*, translated and edited by Stephen Gaukroger, Cambridge, Cambridge University Press, 1998, pp. 99–169. The mechanistic programme developed by Descartes in the *Treatise on Man* is commented by Stephen Gaukroger in *Descartes: An Intellectual Biography*, Oxford, Oxford University Press, 1995, pp. 269–282.

information about it was scarce and hardly went beyond the eardrum.[134] However, the "anatomical Renaissance" also brought about a better understanding of the structures of the ear. In contrast to premodern discussions of hearing, those early modern physicians took important steps towards explaining hearing as an ability that was rooted in the materiality of the human body. As Georg von Békésy and Walter A. Rosenblith have pointed out, successive technical developments were key to the early history of ear studies, since they granted physicians easier access to hidden parts of the organ, allowing them closer inspection of its details. Thus, before the 16th century physicians would have to shatter the temporal bone of corpses to study the middle and inner ear. Later on, files, forceps, dental burrs and other anatomical instruments were progressively adopted to examine those minute internal parts.[135] The knowledge that was gathered in those anatomical examinations was not only presented in public, but was also explained through descriptive illustrations and diagrams.

In the 16th century a series of anatomists and physicians were able to offer accurate descriptions of the fine bones that constitute the middle ear (the malleus, the incus and the stapes), the muscles of the middle ear, the eardrum, and even a few elements of the inner ear. The majority of these notable anatomists—men like Berengario da Carpi, Andreas Vesalius, Giovanni Filippo Ingrassia, Gabriele Falloppio, Bartholomeo Eustachio, Fabricius ab Aquapendente, Girolamo Capivacci (who first realized the importance of bone conduction of sound for the diagnosis of hearing loss) and Giulio Casserio, to name just the most prominent among them—studied or taught in

[134] Politzer, *History of Otology*, p. 43. For a detailed survey of otology among Ancient peoples of the Orient, the Greeks and Romans, and also during the Middle Ages, see the first chapters of the book.

[135] Békésy and Rosenblith, "The Early History of Hearing", pp. 727–728. Actually, these authors declare that "it is possible to distinguish five rather definite periods in the history of auditory physiology: (1) The period of pure speculation in the absence of systematic observations; (2) The period in which observation of the ear was based upon the shattering of the temporal bone; (3) The period in which a forceps and a file were used in anatomical investigations; (4) The period in which progress in auditory physiology was linked most directly with microscopic observations; and (5) The latest period, characterized by the use of the dental blurr, experiments with living animals, and recordings of electrical effects." (pp. 727–728).

Italian universities, in Padua, Bologna, Rome or Naples.[136] This was also the case of Dutch anatomist Volcher Coiter, author of *De auditus instrumento* (1572), a compendium of contemporary knowledge on the subject that is considered the first monograph on the ear.[137] As was usual among 16th-century physicians, Coiter assumed the Aristotelian hypothesis of "internal or implanted air", though he contested the notion that implanted air could be "pure", considering that the middle ear was connected to the nasopharynx through an open channel, the Eustachian tube.[138] Successive anatomical discoveries would lead physicians to question other aspects of the *aer implantatus* theory, until its definitive dismissal in the 18th century.[139]

On the other hand, early modern physiologists of the ear often made use of musical analogies. For example, Vesalius compared the ossicles of the middle ear with "numerous musical instruments made with great and astonishing care",[140] and Coiter thought that the inner ear reinforced incoming sound in the same way as a musical instrument did.[141]

4.3.2 Rhetoric and music in Renaissance humanism

In contrast to Renaissance anatomy, architecture or literature, which could look up to ancient models, Renaissance musicians and theorists "were inspired by only the *idea* of

[136] See Politzer, *History of Otology*, pp. 43–73; see also A.C. Crombie, "The Study of the Senses in Renaissance Science", p. 387; and chapter 8 ("The Ear and Theories of Hearing") of Finger, *Origins of Neuroscience*, pp. 108–123, on pp. 109–111. On Capivacci's experiments in bone conduction hearing, see Harald Feldmann, "A History of Audiology: A Comprehensive Report and Bibliography from the Earliest Beginnings to the Present", *Translations of the Beltone Institute for Hearing Research*, no. 22, January 1970, pp. 15–16.

[137] Békésy and Rosenblith, "The Early History of Hearing", p. 734.

[138] On Coiter see Politzer, *History of* Otology, pp. 62–65, and also Crombie, "The Study of the Senses in Renaissance Science", pp. 385–386. On the Aristotelian formulation of the theory of *aer implantatus*, see Békésy and Rosenblith, "The Early History of Hearing", pp. 729–730; Finger, *Origins of Neuroscience*, pp. 108–109, mentions this theory in connection also with Empedocles and Plato.

[139] Mazzolini, "Schemes and Models of the Thinking Machine (1662-1762)", p. 83.

[140] Crombie, "The Study of the Senses in Renaissance Science", p. 387.

[141] Ibid., p. 386. On the fortune of the metaphor of the musical instrument to explain not only audition, but many other human abilities, like speech, reason, etc., see Jamie C. Kassler, "Man-A Musical Instrument: Models of the Brain and Mental Functioning Before the Computer", *History of Science*, vol. 22, no. 1, 1984, pp. 59–92.

Greek music as the ancient authors described it, not its sound".[142] As Claude Palisca has convincingly argued, the revival of antiquity in music could not even be based on any written musical works, since only a few examples of notated Greek music had survived, and the interpretation of notation posed a problem until the 1580s. Renaissance humanists took inspiration instead from the ancient corpus of writings on music. While the categories and schemes attributed to ancient music often influenced musical works, particularly those created in Italy, the renewed interest in ancient learning brought about a transformation of musical thought that went beyond any changes in musical style.[143]

The rediscovery of ancient sources began with the recognition, towards mid-15th century, that Boethius' *Fundamentals of Music* (printed for the first time in 1492) was in fact a compilation of ancient Greek sources.[144] By the end of that century almost the entire corpus of ancient writings on music had been read and commented by Italian scholars. Within another century they were translated into Latin, though most of the translations remained unpublished and in private collections.[145] (Aristoxenus' *Harmonic Elements*, though, had a particularly late reception, since it was not translated until mid-16th century, and it did not gain the attention of music theorists until a few decades later.)[146] Also, though music did not belong within the *studia humanitatis*, in the 15th century it started to be taught in some Italian learning institutions, and it was also seriously studied outside academic circles. Italian courts and churches became patrons

[142] Claude V. Palisca, *Music and Ideas in the Sixteenth and Seventeenth Centuries*, edited and with a foreword by Thomas J. Mathiesen, Urbana-Chicago, University of Illinois Press, 2006, p. 1.

[143] See chapter 1 ("Introduction: An Italian Renaissance in Music?") of Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought*, New Haven, CT-London, Yale University Press, 1985, pp. 1–22, on pp. 4–5.

[144] Palisca, *Music and Ideas in the Sixteenth and Seventeenth Centuries*, pp. 5–6 and pp. 30–31, and also chapter 6 ("Boethius in the Renaissance") of his *Studies in the History of Italian Music and Music Theory*, Oxford-New York, Oxford University Press, 1994, pp. 168–188.

[145] On this subject see chapter 2 ("The Recovery of the Ancient Sources") of Palisca, *Humanism in Italian Renaissance Musical Thought*, pp. 23–50.

[146] See chapter 7 ("Aristoxenus Redeemed in the Renaissance") of Palisca, *Studies in the History of Italian Music and Music Theory*, pp. 189–199.

of many Italian, French and northern European musicians, and music publishing flourished in Venice. The 15th and 16th centuries also saw an increase in theoretical production, which often involved the treatment of new subjects or the reappraisal of old ones. All this created, as Palisca has observed, "a complex of social conditions, intellectual states of mind, attitudes, aspirations, habits of performers, artistic support systems, intracultural communications, and many other such ingredients, which add up to a thriving matrix of musical energy."[147]

On the other hand, Renaissance interest in musical subjects must be understood within the framework of the revival of rhetoric, prompted by the rediscovery of Quintilian's *Institutio Oratoria* (*The Orator's Education*, rediscovered in 1416), Cicero's *De Oratore* (*On the Orator*, in 1422) and Aristotle's *Rhetoric*. Other ancient treatises on rhetoric, like Cicero's *De inventione* and Pseudo-Cicero's *Rhetorica ad Herennium*, were already known and taught during the Middle Ages.[148] Yet, while medieval rhetoric was mainly oriented to the structuring of texts or speeches, in the Renaissance—as Blake Wilson has underlined—access to ancient treatises accompanied a reorientation of rhetoric towards persuasion, emphasizing "the orator's strategies of *inventio* and delivery in affective speech that moved others to action". [149] Therefore, moving the affections, as orators and rhetors were supposed to do, became "a new goal for composers".[150] Whereas these strategies of *inventio* and delivery could involve particular notions of hearing, music and audiences, what is more important is that they

[147] Palisca, *Humanism in Italian Renaissance Musical Thought*, pp. 5–9 (quotation is on pp. 5–6). On music education in the Renaissance see also Paul Otto Kristeller, "Music and Learning in Early Italian Renaissance", in *Renaissance Thought and the Arts: Collected Essays*, Princeton, NJ, Princeton University Press, 1980 (originally published by Harper & Row, 1965), pp. 142–162.

[148] See Blake McDowell Wilson, "*Ut Oratoria Musica* in the Writings of Renaissance Music Theorists", in Thomas J. Mathiesen and Benito V. Rivera (eds), *Festa Musicologica: Essays in Honor of George J. Buelow*, Stuyvesant, NJ, Pendragon Press, 1995, pp. 341–368.

[149] See the section "1.Middle Ages and Renaissance" by Blake McDowell Wilson, in the entry "Rhetoric and Music", in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

[150] Palisca, *Humanism in Italian Renaissance Musical Thought*, p. 15.

created a structure of address within which musical events acquired meaning. This structure of address—what Martin Kaltenecker has called *musique adressée*—will make possible the emergence of the model (or models) of the listener in the second half of the 18th century, extending its influence almost until the 20th century.[151]

The notion of the *ethos* of music and the ancient theory of modes, which explained how music could produce moral and political effects on listeners were brought to focus again by different scholars. As Palisca has pointed out, modes were appealing to Renaissance musicians and music theorists not only on account of their ancient pedigree, but also because "they were thought to unlock the powers of music over human feelings and morals".[152] While the question of the appropriateness of musical tones was discussed notably in Plato's *Republic* and *Laws*, in Aristotle's *Politics*, and in Plutarch's *De Musica*, there was a wealth of ancient stories and legends about the marvelous effects of music, and many of them were associated with Pythagoras.[153] Indeed, in the 15th and 16th centuries the concern with rhetorical aspects of music seemed to be compatible with the Pythagorean-Platonic tradition and the idea of universal harmony based on numerical ratios, which most scholars still accepted.[154] For instance, in his *Practica musicae* (1496) Franchinus Gaffurius, one of the earliest and most productive Italian music theorists, discussed questions that were characteristic of humanist discourse, like the relationship between poetry and music, which had been

[151] Martin Kaltenecker, *L'Oreille divisée. Les discours sur l'écoute musicale au XVIIIe et XIXe siècles*, Paris, Éditions MF, 2010, esp. pp. 29–44.

[152] Palisca, *Humanism in Italian Renaissance Musical Thought*, pp. 11–13, on p. 12. On the complicated relationship between the ancient Greek modes and the medieval church modes, with which the former were sometimes confused, see chapter 5 ("Humanist Revival of the Modes and Genera"), in Palisca, *Music and Ideas in the Sixteenth and Seventeenth Centuries*, pp. 71–98.

[153] See for instance Frances A. Yates, *The French Academies of the Sixteenth Century*, London, The Warburg Institute-University of London, 1947 (Nendeln, Liechtenstein, Kraus Reprint, 1973), pp. 36–38.

[154] On the persistence and crisis of this notion in 16th and 17th centuries see chapter 2 ("Universal Harmony") of Palisca, *Music and Ideas in the Sixteenth and Seventeenth Centuries*, pp. 13–28. On the other hand, the compatibility of the Pythagorean tradition with the rhetorical approach to music in key 15th-century music treatises contradicts John Neubauer's position in his *The Emancipation of Music from Language: Departure from Mimesis in Eighteenth-Century Aesthetics*, New Haven, CT-London, Yale University Press, 1986.

so close in ancient times, the concept of *decorum*, or the question of modes. A later, speculative work by him, *De Harmonia* (1518, though it was completed in 1500), explored the harmonies of the universe and the harmony of human soul and body.[155][156]

In some cases the reconstruction of ancient ideals of music brought about bold stylistic innovations, like in the case of Nicola Vicentino's influential treatise *L'Antica musica ridotta alla moderna prattica* published in Rome in 1555 (in English as *Ancient Music Reduced to Modern Practice*), where he attempted to recreate the ancient Greek enharmonic and chromatic genera (though in his compositions he actually used intervals beloning to diatonic, enharmonic and chromatic tetrachords). As Maria Rika Maniates has explained, Vicentino was convinced that microtones were more apt to reproduce the emotional inflections of the human voice, and hence could be more effective in touching listeners.[157] Indeed, in the treatise the composer repeatedly invokes the listener as the ultimate arbiter in matters of composition and advocates an enlarged notion of *varietas* that embraces novelty.[158] In 1558 the Venetian composer Gioseffo Zarlino, *maestro di cappella* at St. Mark's cathedral, published *Le istitutioni harmoniche* (The Harmonic Institutions), whose title was inspired by Quintilian's *Institutio Oratoria*, and which was also clearly influenced by the stylistic ideals of ancient oratory, particularly

[155] See Wilson, "*Ut Oratoria Musica* in the Writings of Renaissance Music Theorists", pp. 347–349; see also the entry "Gaffurius [Gafurius], Franchinus [Lanfranchinus] [Gafori, Franchino]" by Bonnie J. Blackburn, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed. There is a modern English translation of Gaffurius' *Practica musicae*, translation and transcription by Clement A. Miller, Dallas, American Institute of Musicology, 1968.

[156] In his study of Neoplatonic scholar Marsilio Ficino Gary Tomlison has also argued that his "auralism" may have been absorbed by such leading humanists as Pietro Bembo, and other champions of ancient poetic models. Thus, the magical power that Ficino attributed to words and music may be perceived in Bembo's explorations of the persuasive force of vernacular words. See Tomlinson, *Music in Renaissance Magic*, pp. 140–144; see also the entry "Pietro Bembo" by James Haar, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

[157] See her Introduction to Nicola Vicentino, *Ancient Music Adapted to Modern Practice*, edited by Claude V. Palisca, translated with introduction and notes by Maria Rika Maniates, New Haven, CT, Yale University Press, 1996, pp. xi–lxiii, on p. xxxix.

[158] See Wilson, "*Ut Oratoria Musica* in the Writings of Renaissance Music Theorists", pp. 362–363; and also Jonathan Wild, "Genus, Species and Mode in Vicentino's 31-tone Compositional Theory", *MTO: A Journal of the Society for Music Theory*, vol. 20, no. 2, 2014, accessible online at: http://www.mtosmt.org/issues/mto.14.20.2/mto.14.20.2.wild.php [last access: October 2015].

Cicero, which he had probably absorbed through his teacher, the composer Adrian Willaert.[159]

The Greek ideal reconstructed by contemporary humanists was sometimes compared with modern practice, resulting in a critique of contemporary polyphony. Thus, in his *Dialogo della musica antica, et della moderna* (1581, in English as *Dialogue on Ancient and Modern Music*) Vincenzo Galilei—lutenist, father of Galileo—argued for a music style of greater simplicity and clarity.[160] The book is considered the main manifesto of the Florentine Camerata or Camerata de' Bardi, a group of musicians and theorists (including Galilei and Giulio Caccini, among others) that gathered around count Giovanni de' Bardi between ca. 1573 and 1592.[161] Another important figure associated with the Camerata was Girolamo Mei, an Italian humanist to which Galilei turned in 1572 looking for answers to his perplexities about ancient musical sources. Mei's ideas on ancient theory and modern music, and on the separation between musical science and musical practice may be found in the latter's *Dialogue*.[162]

The Florentine Camerata seems to have provided inspiration for the foundation, in 1570, of the first French academy: the Académie de poésie et musique, also known as Baïf's Academy of Poetry and Music from the name of one of its founders, the poet Antoine de Baïf (the other one was the musician Joachim Thibault de Courville). Baïf,

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[159] Gioseffo Zarlino, *Le istitutioni harmoniche*, with introductory essays by Iain Fenlon and Paolo Da Col, and critical edition and index by Paolo Da Col, Bologna, Arnaldo Forni, 1999, esp. parts 3 and 4 ; some fragments, translated into English, are included in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 436–461. See also the entry "Zarlino, Gioseffo [Gioseffe]" by Claude V. Palisca in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed, and also Wilson, "*Ut Oratoria Musica* in the Writings of Renaissance Music Theorists", pp. 361–362.

[160] Vincenzo Galilei, *Dialogue on Ancient and Modern Music*, translated, with introduction and notes by Claude V. Palisca, New Haven, CT, Yale University Press, 2003.

[161] See chapter 1 ("The Florentine Camerata") of Claude V. Palisca (ed.), *The Florentine Camerata: Documentary Studies and Translations*, New Haven, CT-London, Yale University Press, 1989, pp. 1–12. See also "The 'Discourse Addressed to Giulio Caccini, Called the Roman, on Ancient Music and Good Singing' by Giovanni Bardi", ibid., pp. 78–131.

[162] See chapter 3 ("The Letter [to Vincenzo Galilei] of 8 May 1572 from Girolamo Mei") of Palisca (ed.), *The Florentine Camerata*, pp. 45–77, and see the entry "Mei, Girolamo [Peretola, Decimo Corinella da]" by Claude V. Palisca in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

who requested and obtained the protection of the French monarch, Charles IX, for the new institution, aimed at developing musical pieces, sung in vernacular language, that were able to produce the marvelous effects commonly attributed to ancient music. For that purpose, as Frances Yates has argued, the French academicians tried to re-establish the close relationship between words and music by composing *vers et musique mesurés à l'antique*, that is measured poetry and music that reproduced the long and short syllables typical of Greek and Latin poetry, in a style similar to that developed by the Pléiade poets.[163] Being a highly especialized project, an aesthetic experiment, the Academy gathered not only musicians and singers, but also *auditeurs*, whom it was forbidden to talk, make noise or approach the singers during their performances. Also, the doors of the place where the academicians met could only be open at the end of each song.[164] Though the Academy did not survive the century, the rich production of *airs de cour*, the genre of strophic songs favoured by the institution, and the references to Baïf's theories found in Marin Mersenne's *Quaestiones in Genesim* (more on Mersenne below) bear witness to its significance for 17th-century music theory.[165]

Theories on the parallelism of music and speech and concepts borrowed from classical rhetoric also found favourable conditions in German-speaking countries, initially under the influence of Italian theorists like Gaffurius and Zarlino.[166] However, probably the most decisive agent in the development of musical rhetoric north of the Alps was Martin Luther, whose writings offered a Christian reinterpretation of Greek

[163] See Yates, *The French Academies of the Sixteenth Century*, esp. chapter 3 ("The Measured Poetry and Music"), pp. 36–76.

[164] See Appendix I: "Letters Patent and Statues of Baïf's Academy", ibid., pp. 319–322, on p. 321.

[165] On Mersenne's relationship to Baïf's Academy see ibid., pp. 284–290, and also Appendix III: "Mersenne on Baïf's Academy", ibid., pp. 325–326. See also the entry "Air de cour" by John H. Baron, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

[166] See Wilson, "*Ut Oratoria Musica* in the Writings of Renaissance Music Theorists", pp. 349–350, and see also the section "1.Middle Ages and Renaissance" by the same Wilson, in the entry "Rhetoric and Music", in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed. On Listenius see the entry "Listenius, Nikolaus" by Klaus Wolfgang Niemöller and Egbert Hiller, ibid.

theories of *ethos*, praised music as a spiritual gift and embraced its potential as a pedagogical and spiritual tool. Luther's views took shape in the curriculum of the Lutheran *Lateinschulen* (Latin schools), which combined mathematics with classical rhetoric and music. As Dietrich Bartel has argued, Lutheran cantors and generally Lutheran musicians and composers were seen as preachers that employed rhetorical means to affect and convince listeners.[167] Nikolaus Listenius, who taught at a Latin school for some time, introduced the notion of *musica poetica* (translatable as "musical composition") in his treatise *Musica* (1537). The term was adopted by later authors like Gallus Dressler, author of *Praecepta musicae poeticae* (1563), and Joachim Burmeister, author of *Musica poetica* (1606), to refer to that practice of composition that paid close attention to the relationship between music and text, and thus it was associated with musical rhetoric.[168] Though I cannot elaborate further here on the importance of German theorists for the development of a rhetoric of music, and particularly of musical-rhetorical figures, I wanted to just briefly review their early modern contributions as a prelude to the considerations on 18th-century musical rhetoric that I will make in the next chapter.[169]

4.3.3 Music and sound at the beginning of the "Scientific Revolution"

[167] See Dietrich Bartel, *Musica Poetica: Musical-Rethorical Figures in German Baroque Music*, Lincoln-London, University of Nebraska Press, 1997, esp. pp. 3–12 (the reference to Lutheran composers as preachers is on p. 8).

[168] See Wilson, "*Ut Oratoria Musica* in the Writings of Renaissance Music Theorists", pp. 350–351; and see also the section "1.Middle Ages and Renaissance" by the same Wilson, in the entry "Rhetoric and Music", in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed. On Listenius see the entry "Listenius, Nikolaus" by Klaus Wolfgang Niemöller and Egbert Hiller, ibid. Other important 16th-century German works that elaborated rhetorical notions were Sebald Heyden's *De arte canendi* (1540) and Heinrich Glarean's *Dodecachordon* (1547). Fragments from Glarean's *Dodecachordon* and from Joachim Burmeister's *Musica poetica* are included in Strunk and Treitler (eds), *Source Readings in Music History*, pp. 428–435 and 467–470.

[169] For further details on 17th-century musical rhetoric, particularly in Germany, see Patrick McCreless, "Music and Rhetoric", in Christensen (ed.), *The Cambridge History of Western Music Theory*, pp. 847–879, esp. 854–867. For a thorough treatment of 16th- and 17th-century rhetoric see Marc Fumaroli, *L'Âge de l'éloquence: rhétorique et "res literaria", de la Renaissance au seuil de l'époque classique*, Paris, Albin Michel, 1994, though it practically does not discuss musical rhetoric.

In the 16th century the contradictions among Greek music theorists started to emerge, and some scholars even perceived them as an insurmountable obstacle for the understanding of music. According to Palisca, Lodovico Fogliano was the first theorist to break with the Pythagorean tradition by invoking Aristotelian physics and the primacy of the ear in judging sound in his book *Musica theorica*, published in 1529.[170] Vicentino's *Ancient Music Reduced to Modern Practice* also began with a denunciation of the old sterile debate between reason and the senses, and the determination to leave it behind—a stand similar to that taken by Spanish theorist and composer Francisco de Salinas in his *De musica libri septem* (1577).[171]

Besides, some theoretical problems related to current musical practice became pressing, like the problem posed by imperfect consonances—thirds and sixths—, which were commonly used in polyphony but had no place within the Pythagorean system, became pressing. In *Le istitutioni harmoniche* Zarlino also attempted to reconcile the use of thirds and sixths with the Pythagorean assumption that some musical ratios were "more natural" (and thus more acceptable) than others. He observed that all the integers of which the main consonance ratios are composed were contained in what he called the *senario*, the first six positive integers—though this theory left the minor sixth (ratio 5:8) out. These consonances were based on a tuning system known as "just intonation", where harmonic consonances were tuned pure, but which singers could only apply when they sang unaccompanied.[172] In spite of the speciousness of its arguments, Zarlino's

[170] Palisca, *Humanism in Italian Renaissance Musical Thought*, pp. 20–21, and also by him *Music and Ideas in the Sixteenth and Seventeenth Centuries*, pp. 32–34.

[171] See Nicola Vicentino, *Ancient Music Adapted to Modern Practice*, edited by Claude V. Palisca, translated by Maria Rika Maniates, New Haven, CT, Yale University Press, 1996, p. 6; and a recent facsimile edition of Francisco Salinas, *De musica libri septem*, edited by Amaya García Pérez and Bernardo García-Bernalt Alonso, Salamanca, Ediciones Universidad de Salamanca, 2013.

[172] Gioseffo Zarlino, *Le istitutioni harmoniche*, with introductory essays by Iain Fenlon and Paolo Da Col, and critical edition and index by Paolo Da Col, Bologna, Arnaldo Forni, 1999; also the entry "Zarlino, Gioseffo [Gioseffe]" by Claude V. Palisca in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed. For a critical explanation of Pythagoras and Zarlino's theories of consonance, see H.F. Cohen, *Quantifying Music: The Science of Music at the First Stage of the Scientific Revolution, 1580-1650*, Dordrecht-Boston-Lancaster, D.Reidel Publishing Company, 1984,

treatise became the subject of a heated debate, which started with the question of the intonation used by *a cappella* singers, and where major issues of Renaissance music theory and practice converged. His opponent was a former student, the aforementioned Galilei, author of *Dialogue on Ancient and Modern Music*, and also of *Discorso intorno alle opere di messer Gioseffo Zarlino* (1589). The other text at the heart of the controversy was Zarlino's *Sopplementi musicali* (1588).[173]

On the other hand, in his correspondence with Mei Galilei expressed doubts about the legitimacy of the corrections introduced by Zarlino to the Pythagorean theories of consonance, arguing that the intonation sponsored by him did not correspond to the current practice of polyphonic singers. He was then encouraged by the scholar to test the arithmetic ratios of musical tones empirically, using two strings stretched over a lute, marking the frets according to the two possible tuning systems that were in question, and comparing the notes sung by singers with those played on the lute. Vincenzo Galilei performed the test suggested by Mei in the late 1580s, and concluded that the singers employed a mixed intonation that did not match any of the tunings described by Ptolemy or Aristoxenus. However, he did not stop here, but went on experimenting with strings of different lengths, materials and weights, and found out that the Pythagorean ratios did only apply if other physical factors (the tension of the strings, their material) were equal.[174] This was one of the arguments that he raised,

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pp. 1–10, and see also by him "Music as a Test-Case", *Studies in History and Philosophy of Science*, vol. 16, no. 4, 1985, pp. 351–378, on pp. 353–356.

[173] For a more detailed explanation of this controversy, see Claude V. Palisca, "Scientific Empiricism in Musical Thought", in Hedley Howell Rhys (ed.), *Seventeenth Century Science and the Arts*, Princeton, NJ, Princeton University Press, 1960, pp. 91–137, on pp. 113–132 (an expanded version of this essay has later been published as chapter 8 of Palisca's *Studies in the History of Italian Music and Music Theory*, pp. 200–235); see also Stillman Drake, "Renaissance Music and Experimental Science", *Journal of the History of Ideas*, vol. 31, no. 4, October-December 1970, pp. 483–500, on pp. 492–497; D.P. Walker, *Studies in Musical Science in the Late Renaissance*, London, The Warburg Institute-University of London / Leiden, E.J. Brill, 1978, pp. 14–26; and Cohen, *Quantifying Music*, pp. 75–85.

[174] See Palisca, *Humanism in Italian Renaissance Musical Thought*, pp. 265–279; Drake, "Renaissance Music and Experimental Science", pp. 495–497; Mancosu, "Acoustics and Optics", pp. 603–604; and Penelope Gouk, "Music and the Emergence of Experimental Science in Early Modern Europe", *SoundEffects. An Interdisciplinary Journal of*

against Zarlino, to make the case for the "naturalness" of all harmonic coincidences, since there seemed to be no reason to prefer some numbers or arithmetical ratios (based only on length) to others (based on other parameters).[175](According to Palisca and Stillman Drake, Italian mathematician Giovanni Battista Benedetti had conducted the first experiments into harmonic consonances earlier, around the 1560s, though he reached only a limited audience at the time.)[176] Galilei's "A Special Discourse Concerning the Unison", part of a series of three essays that he wrote after the publication of the *Discorso*, reviews the physical parameters (material, length, thickness, quality, etc.) that two strings must ideally share to play a unison, and it is a good example of the author's experimental enthusiasm, and of the close relationship between his experimental and musical practice.[177]

It is generally agreed that experiments with harmonics like those performed by Benedetti and Galilei, and music generally, played an important part in the so-called "Scientific Revolution".[178] As scholars like Palisca, H. Floris Cohen and Gouk have underlined, many of the main protagonists of the new era, like Vincenzo Galilei, his son Galileo, Marin Mersenne or René Descartes, were trained musicians and/or wrote on

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Sound and Sound Experience, vol. 2, no. 1, 2012, pp. 6–21, http://www.soundeffects.dk [last access: November 2012], pp. 12–13.

[175] On the complexities of this particular argument, and the different meanings of "naturalness" in this case, see Walker *Studies in Musical Science in the Late Renaissance*, pp. 19–25.

[176] Palisca, "Scientific Empiricism in Musical Thought", pp. 104–110, and Drake, "Renaissance Music and Experimental Science", pp. 493–495. Benedetti may have also proposed for the first time a "coincidence theory" of consonance (see later in this chapter for an explanation of the notion), though apparently he was not aware of the importance of his discovery, see Cohen, *Quantifying Music*, pp. 75–78.

[177] Galilei's "A Special Discourse Concerning the Unison" and the other two essays ("Discourse Concerning the Various Opinions that the Three Most Famous Sects of Ancient Musicians had Concerning the Matter of Sounds and Tunings" and "A Special Discourse Concerning the Diversity of the Ratios of the Diapason") form chapter 6 "Three Scientific Essays of Vincenzo Galilei") of Palisca (ed.), *The Florentine Camerata*, pp. 152–207 (the discourse on the unison is on pp. 181–207).

[178] For a critical approach to the notion see Steven Shapin, *The Scientific Revolution*, Chicago-London, University of Chicago Press, 1996.

musical subjects,[179] and as I have just commented regarding Galilei's essay on the unison, in some cases musical skills apparently played a role in the conception and conduction of particular experiments.[180] Musical questions became a major concern for the proponents of a new approach to natural philosophy, who intended to replace the corpus of received knowledge on harmonics with a new science based on the experimental method and modelled after mechanics. Thus, within the framework of the historical transition described by Paolo Gozza as "from the 'sonorous number' to the 'sonorous body', from number to sound",[181] experiments with "sonorous bodies", that is with vibrating strings, and particularly with musical instruments, contributed to the formation of a new notion of sound, and provided the base for the formulation of new hypotheses on the transmission of sound inside the ear.

While there is wide consensus on that approach, it is also important to bear in mind that protocols of experimentation were not yet defined at the time, and the notion of experiment was sometimes closer to that of "thought experiment" than to its current meaning. For instance, accounts of experiments (by Galileo or Mersenne, among others) were only rarely accounts of single instances; they were oftener the result of repeated experiences.[182] Besides, as D.P. Walker has rightly observed, the mathematical scheme of perfect consonances "had been empirically verified by the use of the monochord" right from the start, that is from pre-Platonic times.[183] In that sense, the experimental

[179] See Palisca, "Scientific Empiricism in Musical Thought", pp. 91–93; Cohen, *Quantifying Music*, pp. xi–xvi; and also Gouk, *Music, Science and Natural Magic in Seventeenth-Century England*, pp. 7–10.

[180] This has also been argued by Stillman Drake with reference to Galileo Galilei's discovery of the law of falling bodies, see Stillman Drake, "Music and Philosophy in Early Modern Science", in Victor Coelho (ed.), *Music and Science in the Age of Galileo*, Dordrecht, Kluwer Academic Publishers, 1992, pp. 3–16.

[181] See his preface to Gozza (ed.), *Number to Sound*, pp. xi–xiii.

[182] On this see Peter Dear, "The Uses of Experience", in *Discipline and Experience. The Mathematical Way in the Scientific Revolution*, Chicago, Chicago University Press, 1995, pp. 124–150.

[183] Walker, *Studies in Musical Science in the Late Renaissance*, p. 14. Walker has questionned that Vincenzo Galilei did any experiments, or at least not all of those that he claimed to have done (p. 24), and he has qualified as "thought-experiments" some of those reported by his son Galileo (p. 30); on this see also Cohen, *Quantifying Music*, pp. 93–94.

programme that was set in motion by Benedetti and Galilei's practices could also be understood as an extension and escalation of the range of musical parameters, materials and objects that deserved the attention of natural philosophers.

Vincenzo Galilei's son, Galileo, a member since 1611 of the Roman learned society Accademia dei Lincei or Lincean Academy—the first Italian learned society devoted primarily to mathematics and natural philosophy—, set forth the laws of acoustic resonance of vibrating strings, and also studied the resonance phenomenon called "sympathetic vibration", which happens when a string is plucked and an unplucked string vibrates spontaneously, either at the fundamental frequency of the plucked string, or at some higher frequencies (its "harmonics"). Galileo's last work, *Discorsi e dimostrazioni matematiche, intorno a due nuove scienze* (1638, *Two New Sciences*), contains his most significant experiments in acoustics, dealing not only with resonance, but also—among other questions—with the relation of pitch to frequency, or the relation of the vibratory frequency of a string to its length, diameter, density and tension. Drawing on his studies on the oscillation of pendulums, Galileo also introduced there his "coincidence theory of consonance", which in spite of not being completely original, circulated widely and became dominant in the 17th century.[184] According to this theory, consonance refers to periodic, regular coincidences in the pulses caused by two different tones striking the eardrum, whereas dissonance results from non-regular coincidences in vibration.[185] Besides providing an explanation for consonance and

[184] Stillman Drake has argued that Galileo may have had the idea of applying his knowledge on the motion of pendulums to the physics of vibrating strings while helping his father with his experiments about the effects of weight on different strings. These experiments would typically involve hanging different weights on strings; suspended weights would then act like pendulums; see Drake, "Renaissance Music and Experimental Science", p. 498. On the other hand, according to Patrizio Barbieri, "coincidence theories" of consonance like the one formulated by Galileo had been known at least since Greek and Roman antiquity, see his "'Galileo's' Coincidence Theory of Consonances, from Nicomachus to Sauveur", *Recercare*, XIII, 2001, pp. 201–232. See also Mancosu, "Acoustics and Optics", pp. 605–606.

[185] Galileo, *Two New* Sciences, pp. 104–107. For a critical account of the theory of consonance see Walker, *Studies in Musical Science in the Late Renaissance*, 27–33; and Cohen, *Quantifying Music*, pp. 85–97.

dissonance, Galileo's coincidence theory paved the way for the conception and quantification of pitch as vibrational frequency.[186] However, as Jamie C. Kassler has noticed, Galileo stopped short of explaining how the listener can be pleasantly or unpleasantly affected by the tones striking the eardrum, since he understood consonance mainly in terms of the mechanics of vibration.[187]

In parallel to Galilei's investigations, natural philosophers Isaac Beeckman, Descartes and Marin Mersenne also undertook systematic experiments on music and sound. They all endorsed the coincidence theory of consonance, which—as Cohen has pointed out—until mid-18th century became the most accepted explanation for the phenomenon, in spite of its practical and conceptual flaws.[188] Cohen has also noticed that Descartes tried to explain the connection between the tones regularly striking the eardrum and the appreciation of consonance within the mechanistic framework, "as part of his general solution to the body-mind problem".[189] This intention was not manifest, though, in the early *Compendium Musicae* (1618, published posthumously in 1650, and dedicated to Beeckman), which is basically an exposition of the properties of musical intervals based on the theories of Zarlino. Even if in the very first sentence Descartes declared sound (not number) to be the object of music,[190] in the *Compendium*, "the Cartesian ear is mental, not physical", as Gozza has observed.[191] Later on, in the *Treatise of Man* (written between 1630 and 1633, though published posthumously in

[186] See the first section ("To Mersenne", by Sigalia Dostrovsky and Murray Campbell) of the entry "Physics of Music", in Saide (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

[187] Kassler, *The Beginnings of the Modern Philosophy of Music in England*, pp. 3–4.

[188] For a concise analysis of all the difficulties created (or not solved) by the coincidence theory see Cohen, "Music as a Test-Case", pp. 360–364.

[189] See Cohen, *Quantifying Music*, p. 116.

[190] René Descartes, *Abrégé de musique. Compendium musicae*, translated by Frédéric de Buzon, Paris, PUF, 1987, and in *AT X*; in English as *Compendium of Music*, translated by Walter Robert, notes by Charles Kent, Rome, American Institute of Musicology, 1961, p. 11.

[191] See Gozza's introduction to his *Number to Sound*, p. 53. Vendrix makes the same remark in "La place du plaisir dans la théorie musicale en France de la Renaissance à l'aube de l'Âge baroque", p. 34. Stephen Gaukroger discusses the work along similar lines in *Descartes: An Intellectual Biography*, pp. 74–80.

1662) Descartes gave a summary anatomical description of the ear, whose details he had gathered in works by Vesalius, Fabricius ab Aquapendente and Bauhin,[192] as well as through the practice of dissection. According to him, ideas of sound are caused by little blows that push the eardrum and then move the filaments inside the ear, which at their turn bring the sensation of sound through the auditory nerves to the brain.[193] However, this mechanism did not explain how the regular coincidences produced in the ear could be transferred to the brain to create an impression of consonance.[194] On the other hand, Descartes' ideas on audition, especially the ones that he developed since the 1630s in relationship to music, are better understood within the general framework of his mechanistic theories of the senses and the passions, which I will address in more detail in the next section.

Mersenne, who organized the Academia Parisiensis, a forerunner of the Académie des sciences (later known as Académie royale des sciences) was also the author of *Harmonie universelle* (1636-1637; translated into English as *Harmonie Universelle: The Books on Instruments*, 1957), which was intended as a compendium of all what a contemporary musician should know, and which many scholars consider the founding text of acoustics *avant la lettre*: besides considerations on music and on the structure, properties and tuning of musical instruments, it collects a wealth of knowledge on many physical aspects of sound.[195] As Peter Dear has pointed out, in Mersenne's writings and investigations it is impossible to separate those subjects that

[192] On the importance of the anatomical work of these physicians for Descartes, see Annie Bitbol-Hespériès, "Cartesian Physiology", in Stephen Gaukroger, John Schuster and John Sutton (eds), *Descartes' Natural Philosophy*, London, Routledge, 2000, pp. 349–382, on pp. 354–362.

[193] See Descartes, *AT XI* 149–151.

[194] See Cohen, "Music as a Test-Case", p. 361.

[195] See Marin Mersenne, *Harmonie universelle contenant la théorie et la pratique de la musique*, Paris, Sebastien Cramoisy, 1636, facsimile edition of the copy annotated by the author, edited by F. Lesure, Paris, Éditions du CNRS, 1965, 3 vols.; though some interesting excerpts of Mersenne's *Harmonie Universelle* are included in the collection *Contemplating Music: Source Readings in the Aesthetics of Music, vol. 2*, edited by Carl Dahlhaus and Ruth Katz, New York, Pendragon Press, 1987, pp. 100–112. See also Gouk, "Music and the Emergence of Experimental Science in Early Modern Europe", pp. 14–15, and Mancosu, "Acoustics and Optics", p. 606.

we would classify today as "properly musical" from those others related to the physics of sound. Actually, by referring to "universal harmony" in the title of his major work, Mersenne was invoking the relationship of music, which he considered as both mechanical and numerical, to the whole structure of the created world. [196]

Mersenne heard of the coincidence theory of consonance from Beeckman, in 1629, and seems to have embraced it as an occasion for developing a mechanical explanation that would privilege a particular parameter of sound: frequency.[197] In line with his intellectualistic inclinations, he maintained the mathematical foundation of musical consonances by turning arithmetical ratios related to the length of vibrating strings into ratios of vibrational frequencies, whose relationship to other physical parameters of sound had to be established.[198] To that end he pursued Galileo's and Beeckman's experimental research into the behaviour of vibrating strings: he tuned pairs of strings that differed in one or two properties, and concluded that, other factors being equal, the frequency of vibration of a string was inversely proportional to its length and directly proportional to the square root of the cross-sectional area (this is known as "Mersenne's Law"). Mersenne was the first to investigate harmonic overtones, that is the higher tones that can be heard simultaneously when a tone is played, even though he claimed that he could only hear four of them, plus the basic tone. At the time it seemed surprising that a string could produce vibrations of different frequencies at the same time—in fact, the question would continue to puzzle philosophers and physicists for a while. He also studied the movement of pendulums

[196] See Peter Dear, *Mersenne and the Learning of the Schools*, Ithaca, NY, Cornell University Press, 1988, pp. 139–140.

[197] Ibid., pp. 151–152.

[198] Ibid., p. 158.

and measured the speed of sound, as Pierre Gassendi had done before, although their measurements turned out to be inaccurate.[199]

4.3.4 Mechanistic theories of the senses and the passions, and their impact on 17th-century discourses on music

The mechanistic hypothesis was key to investigations into the subject of perception, since it transformed the way in which problems were formulated. As Crombie has argued, it allowed that the perceptual process be divided into two different phases: first, what we could describe as a physical and physiological phase, which would explain how external physical motions became internal physical motions of the sense organs, the nerves and the brain; and second, a physiological and psychological one, which would explain how internal physical motions of the sense organs, the nerves and the brain produced sensations.[200] However, early modern theories of the senses, which often did not deal with all the senses, but only with the two "major senses" of vision and hearing, tended to avoid the question of how physical objects (which were considered matter, that is *res extensa*) could *cause* sensations or judgements (*res cogitans*), focusing instead "on the correlation of sensations and perceptions with states both of the external world and of the nervous system".[201] While other early modern philosophers—

[199] See R. Bruce Lindsay , "The Story of Acoustics", in R. Bruce Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, Stroudsbourg, PA, Dowden, Hutchinson and Ross, 1973, pp. 5–20, on p. 7; and Sigalia Dostrovsky and Murray Campbell , "1. To Mersenne" in the entry "Physics of Music", in Saide (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed. For a more extended treatment of Mersenne's contribution to acoustics, and particularly to musical acoustics, see Cohen, *Quantifying Music*, pp. 97–114.

[200] Crombie, "Early Concepts of the Senses and the Mind", p. 108; and also by Crombie, "The Study of the the Senses in Renaissance Science" (1964), in *Science, Optics and Music in Medieval and Early Modern Thought*, London-Ronceverte, The Hambledon Press, 1990, pp. 379–398. About the differences between the historical and contemporary meaning of "physiology" and "psychology", see Hatfield, "Descartes' Physiology and Its Relation to His Psychology", pp. 338–340.

[201] A.C. Crombie, *Styles of Scientific Thinking in the European Tradition: The History of Argument and Explanation Especially in the Mathematical and Biomedical Sciences and Arts,* vol. II, London, Duckworth, 1994, p. 1153, and generally see chapter 13 ("The Modelling of the Senses"), pp. 1106–1166.

like Hobbes, Gassendi or Mersenne—are also representative of this approach, its advantages and complications are most apparent in Descartes' writings on the senses.

As it has often been underlined, Descartes placed the mistrust of the senses right at the centre of two of his most relevant works, the *Discourse on Method* and the *Meditationes de prima philosophia* (1641, translated as *Meditations on First Philosophy*),[202] where he posed the "clear and distinct idea" of the *cogito* ("I think") as the basis of his method and of all knowledge. Within the *cogito*, or the conscious mind, sensations were apparently presented as just one of the possible contents of consciousness—thus, not only as an epistemological instance, but also as a (proto)-psychological category where, as Gary Hatfield has argued, sensation and intellection (and willing and feeling) were grouped together as thinking matter. Though this interpretation has some basis in Descartes' texts, it was elaborated and brought to the fore by many of his subsequent followers and advocates, within the context of what Hatfield has called "Cartesian textbook philosophy".[203]

However, in the first of the three treatises to which the *Discourse on Method* served as an introduction, *La Dioptrique* (1637, in English usually as *Optics*), Descartes offered a contrasting approach to the subject. This essay, which combines mathematics and experiments in physics, includes also an explanation of vision and some general considerations on the physiology of the senses.[204] Later on, in the last of his published works, *Les Passions de l'âme* (1649, in English as *The Passions of the Soul*), in the *Treatise on Man*, and in his correspondence with princess Elisabeth of Bohemia (1643-

[202] René Descartes, *Meditationes de prima philosophia*, in *AT VII*; English translation in *CSM 2*, pp. 1–62.

[203] See Gary Hatfield, "Remaking the Science of Mind. Psychology as Natural Science", in Christopher Cox, Roy Porter and Robert Wokler (eds), *Inventing Human Science. Eighteenth-Century Domains*, Berkeley, California University Press, 1995, pp. 184–231, on p. 194. For a similar, more personal stance on the matter, see the Introduction to Daniel Garber, *Descartes Embodied: Reading Cartesian Philosophy Through Cartesian Science*, Cambridge, Cambridge University Press, 2001.

[204] René Descartes, *La Dioptrique*, in *AT VI*; in English as *Optics* in *CSM 1*, pp. 152–176.

1650) Descartes turned again to the physiology of human sensations and passions.[205] For him, as for other advocates of mechanicism, sensations must be understood as the result of violence—that is, mechanical forces and movement—from external objects on the senses,[206] though this mechanical violence may be applied either directly to the senses, or through a medium, like in the cases of smell, hearing and vision.[207] However, as Descartes observed in the *Optics*, whereas sensations start in the external senses, we do not properly feel with the senses, but with the soul, that is with the brain. According to him, the process of perception takes place when the impressions left by external objects on the organs of the senses travel from the organs through the small fibres of the nerves to the brain. Departing from the brain, the small particles of the animal spirits—the *esprits animaux*, a notion derived from Galenic medicine—run like a subtle air through the nerves and the muscles to the rest of the body, triggering action.[208] Following French physician Jean Fernel, Descartes believed that animal spirits were produced in the brain out of blood, as a result of a complex process of filtering.[209] He also believed that the pineal gland (also called *glande h* or *conarion*), located at the

[205] René Descartes, *Les Passions de l'âme*, in *AT XI*; in English as *The Passions of the Soul*, in *CSM 1*, pp. 325–404. Descartes' correspondence with Princess Elisabeth of Bohemia is included in AT *III, IV and V*, covering his correspondence with different addressees from January 1640 until February 1650; in English in *CSM 3*, and also as *The Correspondence between Princess Elisabeth of Bohemia and Rene Descartes*, edited and translated by Lisa Shapiro, Chicago, University of Chicago Press, 2007.

[206] See Descartes, *Les Passions de l'âme* (*AT XI* 336–337). On the Cartesian notion of *sensation*, see Erec R. Koch, *The Aesthetic Body: Passion, Sensibility, and Corporeality in Seventeenth-Century France*, Cranbury, NJ, Associated University Presses, 2008, pp. 36–37; and also Daniel Heller-Roazen, *The Inner Touch: Archaeology of a Sensation*, New York, Zone Books, 2009, pp. 164–168.

[207] Crombie, "The Study of the the Senses in Renaissance Science", p. 380.

[208] Descartes, *La Dioptrique*, *AT VI* 109–111, and also *Traité de l'Homme*, *AT XI* 165–166. A succint summary of how objects are perceived can also be found in Descartes, *Les Passions de l'âme*, *AT XI* 346. Regarding the historical context of Descartes' theories on the structure of the nerves see Edwin Clarke, "The Doctrine of the Hollow Nerve in the Seventeenth and Eighteenth Centuries", in Lloyd G. Stevenson and Robert P. Multhauf (eds), *Medicine, Science and Culture: Historical Essays in Honor of Owsei Temkin*, Baltimore, MD, The Johns Hopkins University Press, 1968, pp. 123–141. On the role of the notion of animal spirits in the history of medicine see C.U.M. Smith, Eugenio Frixione, Stanley Finder and William Clower, *The Animal Spirit Doctrine and the Origins of Neurophysiology*, Oxford-New York, Oxford University Press, 2012.

[209] Descartes, *Traité de l'homme, AT XI* 165–166, where he compared the circulation of animal spirits in cases of automatic movement to the functioning of a church organ; and *Les Passions de l'âme*, *AT XI* 334–335. See also Aucante, *La philosophie médicale de Descartes*, pp. 230–236.

centre of the brain, acted as the site of the soul in the body: it was the point where the sensations of the nerves were received and the action of animal spirits was initiated. Yet, the Cartesian explanation of the functioning of the pineal gland was criticized at the time by anatomists like Bauhin, who observed that it was not compatible with the anatomy of the brain.[210]

On many occasions Descartes described the action on the brain as an imprint, or as the formation of an inner image or figure of the object.[211] Indeed, it is safe to say that visual vocabulary, visual metaphors, and the analysis of the sense of sight determined the Cartesian understanding of the senses. On the other hand, Descartes also pointed out that this image should not be conceived as a perfect reproduction of the object, and observed that the senses could also be excited by things that were not an image, and which did not bear any resemblance to the things they meant, like it is the case of signs or words.[212] As Vicent Aucante has remarked, in the Cartesian explanation of the functioning of the senses such terms as "image" or "figure" work only by analogy, since it is difficult to imagine how the soul may actually "see" them.[213] In his biography of Descartes Stephen Gaukroger refers to a "structural isomorph of the impression made on the sense organ".[214]

A brief description of the mechanism of audition may be found in the *Treatise on Man*, where the author referred to the "little blows with which the external air pushes against a certain very fine membrane stretched at the entrance to these cavities [the tympanic membrane]". These "little blows", Descartes argued, then passed to the brain

[210] See Descartes, *Traité de l'homme, AT XI* 172–173, and *Les Passions de l'âme*, *AT XI* 351–353. See also Aucante, *La philosophie médicale de Descartes*, pp. 239–243.

[211] Descartes, *Traité de l'homme, AT XI* 174–176, and *Les Passions de l'âme*, *AT XI* 355–357.

[212] Descartes, *La Dioptrique*, *AT VI* 112.

[213] Aucante, *La philosophie médicale de Descartes*, p. 282.

[214] Gaukroger, *Descartes: An Intellectual Biography*, p. 272.

"through the intermediary of these nerves", though the author did not make clear how this happened. In this passage he also explained the relationship between pitch and vibratory frequency and included a very summary explanation of the coincidence theory of consonance, as well as a closing remark on the difference between smoothness and agreeableness in music (more on this below).[215]

Descartes did not only try to understand the perceptions and affections caused by the action of external objects on the body, and the affections that we normally attribute to the body (like hunger, thirst and other natural appetites), but he also considered those caused by the soul, which he explored in *The Passions of the Soul*. Into that category he included the perceptions triggered by human will and fantasy, as well as the feelings (like anger, or joy) that cannot always be reported to an external cause, and which the subject perceives as coming from the soul. However, Descartes affirmed that the passions of the soul are also the result of the movement of (animal) spirits, and that the soul is united to each and every part of the body.[216] As Susan James has observed, here Descartes "strives to combine his metaphysical division between body and soul with the view that there are states 'which cannot be referred to the body alone or to the soul alone'", but to a compound of both.[217] His theoretical considerations in *The Passions of the Soul*, and in his correspondence with princess Elisabeth, bear witness to a much more complex understanding of human nature than contemporary critics of the Cartesian separation body-mind are usually willing to acknowledge. Some historians, like Renato Mazzolini and Frédéric de Buzon, have underlined the fact that

[215] Descartes, *Traité de l'Homme*, *AT XI* 149–151; English translation in Descartes, *The World and Other Writings*, pp. 122–124 (quotation is on p. 122).

[216] Descartes, *Les Passions de l'âme*, *AT XI* 343–351. For a review of Descartes' theory of passions see Gaukroger, *Descartes: An Intellectual Biography*, pp. 394–405.

[217] See Susan James, *Passion and Action: The Emotions in Seventeenth-Century Philosophy*, Oxford, Clarendon Press, 1997, p. 106 (on Cartesian soul generally, see pp. 87–198). James' defense of an anti-dualist Descartes is discussed by Steven Shapin in his essay "Descartes the doctor", pp. 147–149.

for Descartes there are only two substances (*res extensa*, *res cogitans*), but three principles or notions (the body, the soul, and the union or mixture of the two).[218] As Erec Koch has argued, Descartes believed that there was some kind of material link between what affected the body (or particular parts of it) and the sensations and feelings that the subject experimented, which were "examples of this interaction".[219] Brigitte Van Wymeersch has also observed that for Descartes the passions—including, she contends, the passion for music—were the main way in which humans could experiment the union of body and soul.[220]

The passions were also at the centre of Descartes' reflections on music. In the *Compendium* he had declared that the aim of music was "to please and to arouse various emotions in us", and that even the saddest melodies could be enjoyable.[221] Though the notion was not properly new at the time—as I have discussed above, it had inspired the formation of the Baïf's Academy in mid-16th century—, in the second half of the 17th century it was set to become central to the understanding of music and its relationship to language. With reference to this Van Wymeersch has argued that Descartes placed passions and music within a new conceptual framework, which hinted at the separation of musical practice from the natural philosophy on which it had been based since ancient times. According to her, the philosopher did not develop this conceptual framework in the *Compendium*, where he followed Zarlino's theories in demonstrating the arithmetical ratios of the most common musical consonances and endorsing the

[218] Mazzolini, "Schemes and Models of the Thinking Machine (1662–1762)", pp. 71–72, and Frédéric De Buzon, "L'esprit. Le dualisme en questions: sur la troisième notion primitive et la glande pinéales chez Descartes", *Philopsis*, 2004, http://www.philopsis.fr/spip.php?article204 [last access: June 2015].

[219] See the first chapter ("Physiology: Corporeality and Descartes' (Aesth)Ethics") of Koch, *The Aesthetic Body*, pp. 22–85, on p. 50.

[220] Brigitte Van Wymeersch, "Descartes et le plaisir de l'émotion", in Thierry Favier et Manuel Couvreu (eds), *Le plaisir musical en France au XVIIe siècle*, Paris, Mardaga, 2006, pp. 49–59, on p. 57.

[221] Descartes, *Compendium of Music*, p. 11.

natural basis of musical pleasure.[222] While this is basically correct, in my opinion the seventh point of the preliminary remarks, where Descartes observes that "[a]mong the sense-objects the most agreeable to the soul is neither that which is perceived most easily nor that which is perceived with the greatest difficulty",[223] may be interpreted as a suggestion of a path for musical judgement that would be different from the laws of harmonics based on the simplicity of arithmetic ratios.

On the other hand, similar suggestions may be found in Descartes' correspondence with Mersenne during the 1630s, and in his later writings up to *The Passions of the Soul* (1649). Thus, in a letter to Mersenne, in January 1630, Descartes introduced a difference between the perfection of a consonance and the fact that it be more or less agreeable to the ear, referring thus the matter to the subjective field of taste. He declared that "in order to determine what is more agreeable, one must suppose the capacity of the listener, which changes in the same way as the taste does".[224] He developed this point in other letters to Mersenne (dated in 1630 and 1631), where he linked the pleasure of consonances (and dissonances) to the context in which they were used.[225] Also, in a passage of the *Treatise on Man* (written around 1633) he stated with reference to musical consonances that "it is not simply the smoothest things that are most agreeable to the senses, but those that stimulate them in the most even-tempered way", just as vinegar or salt may be more appreciated than fresh water some times. While it might be excessive to deduce from these allusions, as Van Wymeersch does,

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[222] See Brigitte Van Wymeersch, "L'esthétique musicale de Descartes et le cartésianisme", *Revue Philosophique de Louvain. Quatrième série*, vol. 94, no. 2, 1996, pp. 271–293, and also by her "Descartes et le plaisir de l'émotion".

[223] Descartes, *Compendium of Music*, p. 11.

[224] Descartes' letter to Mersenne, January 1630, in *AT I*, p. 108: "*Mais pour déterminer ce qui est plus agréable, il faut supposer la capacité de l'auditeur, laquelle change comme le goût*". English translation is mine, since unfortunately the passage is not included in the English translation of Descartes' correspondance, in *CSM 3*.

[225] Descartes' letters to Mersenne, dated on 4th March 1630 and in October 1631, in *AT I*, p. 126 (letters not included in the English translation of Descartes' correspondance, in *CSM 3*). See Van Wymeersch, "L'esthétique musicale de Descartes et le cartésianisme", pp. 280–285, and also by her "Descartes et le plaisir de l'émotion", pp. 53–55.

that pleasure became for Descartes a new principle of evidence for beauty, in the same way as clear ideas were a principle of evidence for truth, [226] it is interesting to notice the appearance of a new, still undefined criterium to talk about musical consonances that resembles what in the following century will be called "taste".[227] As a matter of fact, several scholars have traced the emergence of a properly aesthetic criterion to decide about the validity of musical consonances and dissonances at the end of the 17th century. Théodora Psychoyou and Philip Vendrix have pointed out that the increasing importance of *le jugement de l'oreille* in musical matters may be considered a characteristic trait of late 17th-century reflections on music, both among philosophers and musicians, particularly in Italy and France.[228]

Mechanicist vocabulary was also pervasive in Mersenne's *Harmonie universelle* (1636-1637), particularly in the first book ("De la nature des sons"), which was devoted to the production of sound, and to hearing. Thus, in the first two propositions the author defined sound in terms similar to those employed by Descartes in the *Treatise on Man*, that is as the result of strikes or beats that trigger the movement of air particles, which would finally impact on the ear. The force of these impacts was then applied to the auditory nerve, which carried it to the brain, originating in this way auditory

[226] See again Brigitte Van Wymeersch, "L'esthétique musicale de Descartes et le cartésianisme", *Revue Philosophique de Louvain. Quatrième série*, vol. 94, no. 2, 1996, pp. 271–293, and also by her "Descartes et le plaisir de l'émotion".

[227] However, other authors, among which Fubini, Annie Becq and Downing Thomas, had brought about the same and other similar passages of Descartes' correspondence to argue for the persistence of the mind/body duality, and to comment on the refusal of the philosopher to consider further the pleasure of music; see Enrico Fubini, *Gli enciclopedisti e la musica*, Torino, Einaudi, 1971, p. 63, Annie Becq, *Genèse de l'esthétique française moderne, 1680-1814. De la Raison classique à l'Imagination créatrice*, Paris, Albin Michel, 1994, p. 78, and Downing A. Thomas, *Music and the Origins of Language: Theories from the French Enlightenment*, Cambridge, Cambridge University Press, 1995, pp. 25–26. Stephen Gaukroger represents a third position, since he prefers to speak of "two complementary levels of description" of one and the same act of perception: as a "causal-mechanical process" ("sensory stimulation"), or as a "significatory process" ("perceptual understanding"), projecting thus the contemporary notions of sensation and perception back on the past; see Gaukroger, *Descartes: An Intellectual Biography*, pp. 286–287.

[228] Théodora Psychoyou, "Plaisirs de l'esprit, plaisirs de l'oreille: anatomie et paradoxes d'un nouveau critère théorique", in Favier et Couvreu (eds), *Le plaisir musical en France au XVIIe siècle*, pp. 61–78; see also (in the same edited collection) Vendrix, "La place du plaisir dans la théorie musicale en France de la Renaissance à l'aube de l'Âge baroque".

impressions.[229] Mersenne addressed the passions in the fifth book ("De la voix"), where he traced a continuity between natural cries and music (particularly, vocal music), based on the assumption that they are both natural expressions of the passions, natural languages—an assumption that will become central to 18th-century discourses on music (see next chapter). In the last propositions of the fifth book Mersenne distinguished between the action of hearing and the action of discerning and knowing sound, which would be effected by the soul.[230] In book twelth ("De l'art de bien chanter") he dealt with the different accents of the human voice, and the different passions that corresponded to them, by giving vague physiological explanations of how a certain passion transformed the soul and caused the emission of a certain vocal tone or accent. The natural connection between the passionate body and the accents of the voice found a parallel in the natural connection between the heard voice and the passions that it may trigger in the hearer.[231]

Ultimately, Mersenne's *Harmonie universelle* bears witness of a historical moment in which the physical and mathematical exploration of musical harmonics did not seem incompatible with a rhetorical approach to music. Actually, only *Musurgia universalis* (1650), compiled by German Jesuit Athanasius Kircher, dealt with a variety of subjects—e.g. the healing effects of music, universal harmony, descriptions of musical instruments, the analogy of rhetoric and music, etc.—that was comparable to that of Mersenne's work.[232]

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[229] Mersenne, *Harmonie universelle*, vol. 1, pp. 1–5; see also Erec R. Koch, "Perfect Pitch: Sound, Aurality, and Rhetoric from Marin Mersenne's *Harmonie Universelle* to Bernard Lamy's *La Rhetorique, ou l'art de parler*", *EMF: Studies in Early Modern France*, vol. 12: Perfection (editor: Anne L. Birberick), 2008, pp. 185–213, on pp. 186–187.

[230] Mersenne, *Harmonie universelle*, vol. 2, pp. 8–11, and 79–81; see also Koch, "Perfect Pitch: Sound, Aurality, and Rhetoric", pp. 187–190.

[231] Mersenne, *Harmonie universelle*, vol. 3, pp. 365–372; and also Koch, "Perfect Pitch: Sound, Aurality, and Rhetoric", pp. 190–193.

[232] See Kircher, *Musurgia universalis* (Rome, Corbelletti, 1650).

4.4 Towards a new science of acoustics: sound, hearing and music in late 17th-century academies

Through the 17th century rhetoric consolidated its position in French culture: it was included in the curricula of the main educational organizations, and was also protected and cultivated by the Académie française (French Academy), founded by Cardinal Richelieu in 1635. Besides, during that period practically all the classical rhetorical treatises were translated or re-translated into French. In view of the developments that would reshape the relationship between music and speech in the 18th century, it is interesting to notice the publication, during the last decades of the preceding century, of a series of essays that, as Jonathan Gibson has argued, focused particularly on the voice and the delivery of speech (what classical theorists called *pronuntiatio*), and combined rhetorical concerns with mechanicist explanations of the senses and the passions. Among them we can place the essays of two notable Cartesian authors: Géraud de Cordemoy and Bernard Lamy.[233] De Cordemoy's *Discours physique de la parole* (1668) offered a physiological account of speech that did not only include the articulation of the voice, but also the process of hearing. Regarding the latter, de Cordemoy distinguished between the cases in which sound may cause an almost immediate, unreflexive physical response—for instance, the action of escaping from loud noise—and those other cases in which the vibrations originated by sound in our ears were accompanied by perceptions, which we could either enjoy or resist—a possibility that, according to him, was typically human and belonged to the soul. While the meaning and ideas conveyed by speech were related to the soul, de Cordemoy

[233] See Jonathan Gibson, "'A Kind of Eloquence Even in Music': Embracing Different Rhetorics in Late Seventeenth-Century France", *The Journal of Musicology*, vol. 25, no. 4, Fall 2008, pp. 394–433, on p. 402–403. However, Gibson does not consider Géraud de Cordemoy's *Discours physique de la parole* (1668); and, besides Bernard Lamy's *La Rhétorique ou l'art de parler*, he discusses briefly René Bary's *Rhétorique françoise* (1653) and *Méthode pour bien prononcer un discour et pour le bien animer* (1679), Michel le Faucheur's *Traité de l'action de l'orateur* (1657), René Rapin's *Reflexions sur l'éloquence* (1671) and François Fénelon's *Dialogues sur l'éloquence* (1679?).

considered that the voice came from the body and—like gestures and bodily attitude—expressed the passions of the speaker.[234]

Bernard Lamy's *La Rhétorique ou l'art de parler* (published originally in 1675 as *De l'art de parler*, and in 1688 under its current title) dedicated ample space to style and rhetorical figures, though the author seemed more inclined to present figures as natural expressions of the orator's passions than as elements of a codified system.[235] In one of its five books, the third, on the materiality of the voice, Lamy apparently took as a model Descartes' preliminary remarks in the *Compendium musicae*, which had appeared in French translation (by Nicolas Poisson, an Oratorian like Lamy) in 1668. He followed the Cartesian arguments on the conditions for the agreeability of sounds, though he applied them to speech, drawing thus an implicit parallel between music and speech.[236] Besides, in the fifth book, on persuasion, Lamy devoted a chapter to the importance of keeping the audience attentive during the speech and the means to achieve it. As Matthew Riley has pointed out, this was a deviation from the usual role assigned to attention in classical treatises, where it was normally considered only in relationship to the beginning of the speech or *exordium*.[237] Cordemoy and Lamy's focus on the orator's passions also anticipated a conception of music as the natural language of the passions—conception that in the 18th century would often be based on the natural expressivity of the voice.

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[234] Géraud de Cordemoy, *Discours physique de la parole* (1704), facsimile edition, Paris, Presses du Copèdith, 1970, pp. 50–53. See Koch, "Perfect Pitch: Sound, Aurality, and Rhetoric", pp. 194–198, which stresses the mechanicist vocabulary employed by de Cordemoy in describing speech and hearing.

[235] Bernard Lamy, *La Rhetorique ou l'art de parler*, critical edition by Benoît Timmermans, with an introduction by Michel Meyer, Paris, PUF, 1998; and Gibson, "'A Kind of Eloquence Even in Music'", pp. 490–410.

[236] See Sonia Ghidoni, "Bernard Lamy e le parole musicali. Un caso di ricezione del *Compendium musicae* di Descartes", *Dianoia*, no. 18, 2013, pp. 191–210, and Koch, "Perfect Pitch: Sound, Aurality, and Rhetoric", pp. 198–205, esp. 202–204.

[237] Matthew Riley, *Musical Listening in the German Enlightenment: Attention, Wonder and Astonishment*, Aldershot, Ashgate, 2004, p. 27. Riley interprets Lamy's treatise as a precedent for the development of models of dynamic attention to music in the second part of the 18th century, which will be discussed in the next chapter.

On the other hand, mid-17th century was also the time in which two important European scientific societies were founded: the Royal Society of London was established in 1660, and the French Académie royale des sciences in 1666 (it would be suppressed in 1793).[238] During the first decades of activity the members of both societies presented a number of papers related to the physics of sound, on such subjects as the speed of sound, which Isaac Newton had predicted in his *Principia Mathematica* (1687),[239] or its propagation in the void. Acoustical questions gained public relevance, though they were far from constituting a coherent field—comparatively, optics was more consolidated.[240] Besides, as a mathematical science and part of the *quadrivium* music was also of interest to some society members, both in London and Paris; for instance, four of the founding members of the French Académie (Gilles Personne de Roberval, Claude Perrault Christian Huygens, and La Voye-Mignot) had written about music.[241] Musical questions like theories of consonance, tuning systems, or proposals for new instruments were discussed during societal meetings, and as Katherine Butler has argued, even subjects that are now not considered as properly scientific—like music in classical mythology, its miraculous powers, or the comparison between ancient and modern music—would occasionally be addressed in academic discussions.[242] As I will

[238] Other contemporary academies dealing with acoustic issues were the post-Galilean Accademia del Cimento, established in Florence in 1657, and the Berlin Academy, founded in 1700 by prince-elector Frederick I of Brandenburg, upon advice from Gottfried Leibniz. The Lincean Academy has been mentioned above in this chapter as the first learned society devoted to mathematics and natural sciences, but it was a small institution and it did not survive the death of its founder, Roman nobleman Federico Cesi. On the role of scientific societies in the early modern history of acoustics see Hunt, *Origins in Acoustics*, pp. 100–108; on studies in acoustics and music in the early years of the Royal Society see Gouk, *Music, Science and Natural Magic in Seventeenth-Century England*, pp. 184–191, and Katherine Butler, "Myth, Science, and the Power of Music in the Early Decades of the Royal Society", *Journal of the History of Ideas*, vol. 76, no. 1, January 2015, pp. 47–68. On music (and sound) in the Paris *Music in the French Royal Academy of Sciences: A Study in the Evolution of Musical Thought*, Princeton, NJ, Princeton University Press, 1981.

[239] On the various attempts to calculate the speed of sound at the time, see Hunt, *Origins in Acoustics*, pp. 109–112.

[240] Mancosu, "Acoustics and Optics", p. 597.

[241] See Albert Cohen, *Music in the French Royal Academy of Sciences: A Study in the Evolution of Musical Thought*, Princeton, NJ, Princeton University Press, 1981, esp. pp. 6–7.

discuss below, the anatomy of the ear and the understanding of the process of hearing were also among the subjects investigated by the members of the academies.

Robert Hooke, who became curator of experiments at the Royal Society, helped Robert Boyle, a member of the Royal Society's council, with his air-pump experiments, one of which proved that sound could not be transmitted in the void.[243] As Gouk has reported, Hooke was very much interested in musical consonances and developed a theory of matter that was based on the principles of sympathy and antipathy, and where harmonic vibration accounted for the relationship among particles.[244] In 1673 two English scholars, William Noble and Thomas Pigot, proved experimentally the association of a particular property of vibrating strings, sympathetic vibration, with harmonic overtones. Another contemporary scholar, John Wallis, recognized the importance of their experiments, which would be confirmed by Joseph Sauveur in the following century.[245] In 17th-century England theories of audition took different shapes according to the conceptions of sound and sound propagation on which they were based, which at the time were basically two: sound as a movement of particles or corpuscles, and sound as a wave. Yet, as Jamie C. Kassler has aptly summarized, until Newton's discovery of attractive and repulsive forces the collision of particles was the

[242] See Katherine Butler, "Myth, Science, and the Power of Music in the Early Decades of the Royal Society", *Journal of the History of Ideas*, vol. 76, no. 1, January 2015, pp. 47–68. On the role of scientific societies in the early modern history of acoustics see Hunt, *Origins in Acoustics*, pp. 100–108; on studies in acoustics and music in the early years of the Royal Society see Gouk, *Music, Science and Natural Magic in Seventeenth-Century England*, pp. 184–191, and on music (and sound) in the Paris Académie royale des sciences see Cohen, *Music in the French Royal Academy of Science*s, pp. 3–16.

[243] On the theoretical controversies surrounding Boyle's air-pump experiments, see Steve Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, Princeton, Princeton University Press, 1985.

[244] See Penelope Gouk, "Some English Theories of Hearing in the Seventeenth Century: Before and After Descartes", in Burnett, Fend and Gouk (eds), *The Second* Sense, pp. 95–113, on pp. 110–112 (a slightly abridged version of this essay is included in Mark M. Smith (ed.), *Hearing History. A Reader*, Athens, University of Georgia Press, 2004, pp. 136–150).

[245] See Palisca, "Scientific Empiricism in Musical Thought", pp. 98–100.

basic fact of physics,[246] and so hearing was generally conceived as the result of some kind of mechanical impact on the eardrum that was transferred (usually, by "animal spirits") through the nerves and impressed on the soul.

Also, in the 17th century medical interest in the ear spread beyond Italy, in particular among English, Danish, Dutch, German and French physicians, while the organ of hearing was included in virtually all the anatomical treatises published thereafter. That was the case, for instance, of Helkiah Crooke's *Microcosmographia* (1615), which referred to the work of several earlier scholars, from Berengario da Carpi to Caspar Bauhin.[247] Thomas Willis, a physician and a founding member of the Royal Society, dealt with the ear and hearing mainly in *De anima brutorum* (1672, in English as *Two Discourses concerning the Soul of Brutes*, 1683), where he contributed to the understanding of the role of the ossicles in the middle ear, and noticed that the cochlea, and not "implanted air", was the actual site of hearing. While Willis described audition as an impression and employed "animal spirits" to account for the functioning of the nerves, he differed from Descartes in the use of iatrochemical and corpuscular terms. Yet, Willis is mainly celebrated today for his *Cerebri anatome* (1664, translated into English as *The Anatomy of the Brain and Nerves*, 1681), a systematic research into the anatomy of the brain that followed in the footsteps of Harvey's research on the heart. In it Willis provided an unprecedented number of observations and descriptions of the central and peripheral system, and tried to associate the anatomical structures of the brain with their specific functions. As Penelope Gouk has remarked, in chapter 17 of *Cerebri Anatome* Willis offered a treatment of hearing that was remarkably detailed for the time, and where he speculated about how the brain could memorize sound, and on

[246] *The Beginnings of the Modern Philosophy of Music in England: Francis North's "A Philosophical Essay of Musick" (1677) with comments of Isaac Newton, Roger North and in the "Philosophical Transactions"*, Aldershot, Ashgate, 2004, p. 16.

[247] On Helkiah Crooke see Gouk, "Some English Theories of Hearing in the Seventeenth Century", pp. 96–97.

the roles of the cerebrum and the cerebellum in music perception and memory. He also argued that having "musical ears" depended on having a softer cerebellum.[248]

Towards the end of the century French architect, physicist and physician Claude Perrault, a founding member of the French Académie, gave one of the best contemporary descriptions of the organ of hearing, based on his studies of comparative anatomy, in *Du Bruit*, published in the second volume of his *Essais de physique* (1680). In the third part of this work, in line with the Cartesian description of the action of the senses, he explained hearing as the "impression" of "images" of the external objects on the organ of hearing.[249] While Perrault conceived his observations on the functioning of the ear within the framework of mechanicism, he still included in *Du Bruit* the notion of *aer implantatus*, though he located it in the labyrinth or inner ear, not in the middle ear.[250] Besides, he was convinced that the actions of humans and animals could not be explained by mechanism alone, and that what he called *sentiment* was necessarily a part of the explanation,[251] what has been interpreted by some scholars as an anticipation of

[248] Thomas Willis, *Two Discourses Concerning the Soul of Brutes*, translated by Samuel Pordage, London, 1683, reprinted facsimile edition by Scholars' Facsimiles and Rreprints, Gainsville, FL, 1971; the original Latin edition of *Cerebri anatome*, London, 1664, is accessible online: https://archive.org/details/cerebrianatomecu00will [last access: October 2015]. On Willis see Politzer, *History of Otology*, p. 107–109; Békésy and Rosenblith, "The Early History of Hearing", p. 734–735; Finger, *Origins of Neuroscience*, p. 111; also Gouk, "Some English Theories of Hearing in the Seventeenth Century", pp. 108–109; and also by Gouk, "Music and the Nervous System in Eighteenth-Century Britain", in James Kennaway (ed.), *Music and the Nerves, 1700–1900*, Basingstoke, UK, Palgrave Macmillan, 2014, pp. 44–71, on pp. 53–55. For a more detailed analysis of the theoretical and practical aspects of Willis' research, see Robert G. Frank, Jr., "Thomas Willis and His Circle: Brain and Mind in Seventeenth-Century Medicine", in George S. Rousseau (ed.), *The Languages of Psyche: Mind and Body in Enlightenment Thought*, Berkeley, University of California Press, 1990, pp. 107–146, accessible online: http://ark.cdlib.org/ark:/13030/ft638nb3db/ [last access: October 2015].

[249] Unfortunately the facsimile edition of Claude Perrault, *Du Bruit et De la Musique des anciens*, *extrait des Oeuvres diverses de physique et de mécanique (tome 2) et préface manuscrite du Traité de la musique*, préface de François Lesure, Geneve, Minkoff, 2003, does not include the part on audition.

[250] On Perrault see also Politzer, *History of Otology*, pp. 111–115; Békésy and Rosenblith, "The Early History of Hearing", pp. 737–739; Finger, *Origins of Neuroscience*, pp. 112–113; Cohen, *Music in the French Royal Academy of Sciences*, pp. 9–10; and see also chapter 2 ("Point of Audition: Claude Perrault's *Du Bruit* and the Politics of Pleasure in the Ancien Régime") of Erlmann, *Reason and Resonance*, pp. 69–109

[251] See Psychoyou, "Plaisirs de l'esprit, plaisirs de l'oreille", p. 67. However, see also Koch, "Perfect Pitch: Sound, Aurality, and Rhetoric", pp. 185–213, on pp. 195–196, where Perrault's understading of hearing is presented as an example of mechanicism, and any references to *sentiment* are omitted.

18th-century medical vitalism and culture of sensibility.[252] On the other hand, Perrault was also the author of the treatise *De la Musique des anciens*, also included in the second volume of *Essais de physique*, which deals with the aesthetic debates on the value of ancient and modern music (the famous *querelle des Anciens et des Modernes*), where he, like his brother Charles, defended the moderns (on the various musical *querelles* that developed in 18th-century France, see next chapter).[253]

While advocates of "implanted air" can be found well into the 18th century,[254] this hypothesis was ultimately going to be displaced by others based, as I anticipated above, on the notions of the new physics of sound, particularly on the concept of resonance, as well as on mechanicist conceptions of the functioning of the ear. In the 17th century the most solid exponent of this approach was French anatomist Guichard Joseph Duverney, author of a *Traité de l'organe de l'ouïe* (1683, *A Treatise of the Organ of Hearing*, 1737), who explicitly aimed at completing Perrault's work. His treatise included a first part on the anatomy of the ear, a second part on the functioning of the ear, and a third one on the pathologies of hearing, and was illustrated with sixteen plates, most of them life-size, which not only described the ear in minute detail, but also showed it from different perspectives, in anatomical context. For the description of the functioning of the ear Duverney drew from the investigations of physicist and fellow academician Edme Mariotte. Thus, in trying to explain how the eardrum works Duverney compared it to the unplucked string of a lute, which would only vibrate in sympathy with a plucked string if its frequency were in resonance with it. On the basis

[252] See John P. Wright, "The Embodied Soul in Seventeenth-Century French Medicine", *Canadian Bulletin of Medical History / Bulletin canadien d'histoire de la médecine*, 1991, vol. 8, pp. 21–42; also by Wright, "Perrault's Criticisms of the Cartesian Theory of Soul", in Gaukroger, Schuster and Sutton (eds), *Descartes' Natural Philosophy,* pp. 680–696; and see also Erlmann, *Reason and Resonance*, pp. 81–84.

[253] Perrault, *Du Bruit et De la Musique des anciens*.

[254] Békésy and Rosenblith ("The Early History of Hearing", p. 742) have given an interesting explanation of the resilience of the "aer implantatus" theory. They argue that "even during the 17th century it was still rather difficult to get hold of fresh cadavers; usually only old, fairly dried-out specimens were available. When these were cut open the arteries and the inner ear were, in most cases, filled with air."

of this explanation, Duverney supposed that the muscles of the middle ear are able to "tune" the eardrum, that is to adapt its tension (and thus its resonance frequency) to the incoming sounds.[255] Duverney also resorted to resonance to explain the functioning of the cochlea, the vestibule and the semicircular canals. In fact, his description of how the spiral lamina (inside the cochlea) receives acoustic vibrations and responds to them differently (according to both their frequency and the various areas of the lamina), though wrong in many aspects, is usually considered a crucial antecedent of later developments, in particular of Hermann von Helmholtz's theses on the functioning of the cochlea.[256]

Another important treatise on the ear was Guillaume Lamy's *Explication mécanique et physique des fonctions de l'âme sensitive* (1681), which analysed in great detail the nervous relationship between the labyrinth and the cochlea and included an explanation of the auditory function by a member of the Académie, Jean Méry.[257] Perrault, Duverney and Lamy elaborated mechanistic explanations of hearing, where the ear receives sounds passively, but in the following decades physicians will focus particularly on peripheral receptors, increasingly seen as sensitive parts of the hearing process.[258]

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[255] Guichard Joseph Duverney, *Traité de l'organe de l'ouïe contenant la structure, les usages et les maladies de toutes les parties de l'oreille*, Paris, Estienne Michallet, 1683, pp. 79–82; available on Google Books: http://books.google.es/books/ucm?vid=UCM5323755763&printsec=frontcover&redir_esc=y#v=onepage&q&f=false [last access: October 2015]. The English translation, *A Treatise of the Organ of Hearing* (1737), was reprinted in New York, AMS Press, 1973.

[256] Duverney, *Traité de l'organe de l'ouïe*, pp. 96–97. On Duverney see Crombie, "The Study of the Senses in Renaissance Science", pp. 394–396; Békésy and Rosenblith, "The Early History of Hearing", pp. 739–741; Politzer, *History of Otology*, pp. 117–124; Wever, *Theory of Hearing*, pp. 12–14; Cohen, *Music in the French Royal Academy of Sciences*, pp. 10–12; and also Gouk and Sykes, "Hearing Science in Mid-Eighteenth-Century Britain and France", pp. 527–528.

[257] Guillaume Lamy, *Explication mécanique et physique des fonctions de l'âme sensitive*, Paris, Lambert Roulland, 1681, accessible online on Gallica.fr: http://gallica.bnf.fr/ark:/12148/bpt6k75787f.r=explication+m%C3%A9canique+et+physique+lamy.langFR [last access: September 2015]. On Lamy see Gouk and Sykes, p. 529.

[258] This historical passage was undelined by Wever in his *Theory of Hearing*, p. 4.

When in 1701 Sauveur, who had entered the Académie in 1696, proposed the foundation of a new science of acoustics, he presented it as "higher than music", since music dealt only with sounds "agreeable to the ear", whereas acoustics studied "sound in general".[259] While reminiscent of Descartes' definition of the aim of music as "to please and to arouse various emotions in us", Sauveur's proposal—as Psychoyou has observed—pointed to an enlargement of the physics of sound, with the inclusion in it of both music, understood as a particular kind of (agreeable, harmonious) sound, and noise (*bruit*), that is those sounds that are not pleasant to the ear.[260] Indeed, Sauveur expected that acoustics would be able to explain not only the nature of sound, the organ of hearing and the properties of sound, but also properly musical subjects like consonance and dissonance and musical instruments.[261]

Continuing Mersenne's research into the properties of vibrating strings and harmonic overtones, Sauveur noticed—like Noble, Pigot and Wallis had done a few decades earlier—that a vibrating stretched string may not vibrate as a whole, but in aliquot divisions: it may have points of maximum vibration, called "loops", and points of no vibration, called "nodes". While the simple vibration of a string produced its "fundamental" tone, the vibration of its loops produced one or several higher tones (overtones), which Sauveur denominated "harmonic tones". However, he could offer neither a mechanical explanation nor a mathematical formula for calculating all the resulting tones. As I have mentioned above, Sauveur also made the first measures of auditory sensitivity in 1700, using organ pipes, although the audibility thresholds that he established differed considerably both from current standards and from the

[259] Sauveur, "General System of Sound Intervals", p. 88.

[260] Théodora Psychoyou, "Du *psophos* au bruit: sur les origines et les transformations de l'objet au XVIIe siècle", *Musurgia*, vol. XIII, no. 4, 2006, pp. 17–31, on p. 18. However, as Psychoyou also recognizes (pp. 26–27), Claude Perrault had already argued for the study of sound in general, though he employed *bruit* as the most inclusive term; see Perrault, *Du Bruit et de la musique des anciens*, p. 161.

[261] Sauveur, "General System of Sound Intervals", p. 88.

measurements that other physicists made in subsequent years.[262] As his experiments with vibrating strings and organ pipes show, some musical instruments still played an important role in scientific practice at the time.[263]

[262] Békésy and Rosenblith, "The Early History of Hearing", p. 745.

[263] On Sauveur see Lindsay, "The Story of Acoustics", pp. 7–8; see also Cohen, *Music in the French Royal Academy of Sciences*, pp. 24–29; and Thomas Christensen, *Rameau and Musical Thought in the Enlightenment*, Cambridge, Cambridge University Press, 1993, pp. 136–138.

CHAPTER 5

Inventing the Musical Ear in the 18th century

5.1 Emergence of the concept of sensibility in the 18th century

As I explained in the previous chapter, the Cartesian reflections on the senses are paradigmatic of what Alistair Crombie called the "new empirical programme for the science of the senses", which tried to establish clear correlations between sensory states and physiological states—correlations that ideally should be testable by observation. According to Crombie, this approach to the understanding of the senses opened two questions, which would be developed in the following decades. The first one was the specificity of the senses, namely what exactly determined it, if it was the nature of the external motion, as Thomas Willis and Pierre Gassendi thought, or the part of the brain that received the sensation, as Descartes maintained. The second one was the coordination of the senses, whether it was innate (Descartes' position) or acquired by experience, as Nicolas Malebranche argued.[1]

After Descartes, the relationship of sensations to external objects and ideas or representations, and in general the validity of the senses featured principally in the epistemological controversies that dominated European intellectual circles from mid-17th century well into the 18th century, where Locke's *An Essay Concerning Human Understanding* (1690) played an important role. In that book Locke argued that perception was the ultimate source of all ideas and also of human passions, even if he distinguished between two types of knowledge, both originated in perception: sensations and reflections. Borrowing Stephen Gaukroger's expression, knowledge was

[1] A.C. Crombie, *Styles of Scientific Thinking in the European Tradition*: *The History of Argument and Explanation Especially in the Mathematical and Biomedical Sciences and Arts,* vol. II, London, Duckworth, 1994, pp. 1153–1154.

for him "simply successful sensation";[2] conversely, sensation and the senses were conceived fundamentally in epistemological terms. Locke's sensationism was at the origin of the main intellectual trends in the 18th century, including not only the so-called "British empiricists" (George Berkeley, David Hume), but also the British philosophers and literary writers that are commonly associated with the mid-18th century "age of sensibility" (the same David Hume, Adam Smith, Laurence Sterne, Samuel Richardson, among others),[3] as well as the most notable exponents of the French Enlightenment (Étienne Bonnot de Condillac, Jean Le Rond d'Alembert, Denis Diderot, Julien Offray de La Mettrie, Destutt de Tracy, Georges Cabanis, Voltaire, etc.), many of whom declared themselves champions and interpreters of Locke's work, particularly of *An Essay Concerning Human Understanding*.[4]

Nevertheless, the way in which 18th-century advocates of sensationism conceived sensations was fundamentally different from the way in which they had been conceived in the previous century. Some contemporary philosophers tried to resolve what they perceived as shortcomings of Locke's sensationism, what would lead, in the course of the century, to a more nuanced understanding of sensations. As Condillac summarized the matter in his *Traité des sensations* (1754, *Treatise on the Sensations*, 1930), it was not enough to declare, as Locke did, that all knowledge came from the senses; it was also important to understand how this happened, since not all the impressions that a person received gave rise to ideas. There was a difference, he argued,

[2] See John Locke, *An Essay Concerning Human Understanding*, edited with a foreword by Peter H. Nidditch, Oxford, Clarendon Press, 1975, esp. book II, chapter 9; and Stephen Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility: Science and the Shaping of Modernity, 1680–1760*, Oxford, Clarendon Press, 2010, p. 410.

[3] On the origin of the term "age of sensibility" and the emergence, in the 1990s, of a historiography on it, see above, chapter 3, section "The question of periodization: three historical moments", which also includes bibliography on the subject.

[4] For an introduction to sensationism and the senses in the 18th century, see John C. O'Neal, *The Authority of Experience: Sensationist Theory in the French Enlightenment*, University Park, Pennsylvania State University Press, 1996; and Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*. See also chapter 6 ("Philosophical Sensualism in the Age of Sensibility") of Robert Jütte's *A History of the Senses*, translated by James Lynn, Oxford, Polity Press, 2005, pp. 126–141.

between just having an impression, and having an impression accompanied by an idea, or analysing that impression: *voir* ("to see") did not mean the same as *regarder* ("to look", or rather "to watch").[5] Condillac, like other 18th-century philosophers—Charles Bonnet, notably—, tried to explain knowledge as a process, and thus focused on the question of the origin of sensations and ideas (and memories, imaginations). As I will argue later in this chapter, the notion of attention also emerged as an important element for understanding the sensorial economy of the soul.

On the other hand, while for Locke (like for Descartes) sensations—or perceptions, since the difference between them was not always clear in the *Essay*—[6] were a kind of imprint, the result of the action of external objects on the senses, and of these on the mainly passive mind[7]—what Karl M. Figlio called the "simple model"—,[8] during the 18th century sensations were increasingly regarded as products of living bodies, blurring thus the opposition body-soul. This confusion also had consequences for the passions, which 17th-century mechanicist conceptions of the body normally aspired to control and regulate. In contrast, as Downing Thomas has observed, for many 18th-century authors "it was increasingly difficult to distinguish between the body and the soul, the soul itself remaining always hidden and inaccessible"; some writers even discarded the soul altogether.[9] Thinkers like Condillac conflated the categories of the

[5] Étienne Bonnot de Condillac, *Traité des sensations*, Paris, Librairie Arthème Fayard, 1984, p. 142–144; in English as *Condillac's Treatise on the Sensations*, translated by Geraldine Carr, London, Favil Press, 1930. On the origin of Condillac's theories in a critique of the Locke's *Essay Concerning Human Understanding*, see O'Neal, *The Authority of Experience*, pp. 13–24.

[6] Actually, the unknown author of the entry "Sensations" for the *Encyclopédie* (1751-1772) did not make that difference either, since he defined *sensations* as a kind of *perception*; see the entry "Sensations", unknown author, in Denis Diderot and Jean Le Rond d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: September 2015].

[7] See for instance Locke, *An Essay Concerning Human Understanding*, p. 105.

[8] See Karl M. Figlio, "Theories of Perception and the Physiology of Mind in the Late Eighteenth Century", *History of Science*, 13 (3), September 1975, pp. 177–212, on p. 196.

[9] Downing A. Thomas, *Music and the Origins of Language: Theories from the French Enlightenment*, Cambridge, Cambridge University Press, 1995, p. 144.

sensations and the passions, defining the passions as a variety of sensations, and leaving virtually no space for a category like the Cartesian "passions of the soul".[10] Contrary to 17th-century concerns with the control of the self, many 18th-century writers favoured an almost naturalistic approach to the passions, emphasizing—as Downing Thomas has argued—their "centrality and usefulness … rather than their danger".[11]

As many authors have pointed out, Newton's *Philosophiae Naturalis Principia Mathematica* (1687, published in English as *Mathematical Principles of Natural Philosophy*, 1728) was a critical factor in the transformation of the notion of sensation, since it introduced gravitational forces, which being non-contact forces were not fully compatible with Cartesian mechanicism.[12] According to Shirley Roe, it would be inaccurate to equate gravitational forces with living forces or with some kind of vitalism; still, Newton's theories prompted a reappraisal of the relationship between matter and activity, and—I would add— that reappraisal necessarily included sensation.[13] Another key element in the reshaping of sensation were contemporary medical theories of sensibility, i.e. the ability of living bodies to react to external stimuli, which set organic matter apart from deadly matter or *res extensa*. In the words of Renato Mazzolini, sensations ceased to be "images or facsimiles of external objects" and became instead modifications of the state of the nerves that were transmitted by the nerves themselves.[14] As I will discuss in the next section, 18th-century physiological research into the reactivity of the nerves (and muscles) converged with the critical reception of Locke's sensationism, both in England and in France, providing a

[10] Condillac, *Traité des sensations*, p. 11.

[11] Thomas, *Music and the Origins of Language*, p. 150.

[12] See Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 83–96.

[13] See Shirley A. Roe, "The Life Sciences", in Roy Porter (ed.), *The Cambridge History of Science, vol. 4: Eighteenth-Century Science*, Cambridge, Cambridge University Press, 2003, pp. 397–416, on p. 398.

[14] Renato G. Mazzolini, "Schemes and Models of the Thinking Machine (1662–1762)", in Pietro Corsi (ed.), *The Enchanted Loom: Chapters in the History of Neuroscience*, New York-Oxford, Oxford University Press, 1991, pp. 68–143, on p. 82.

foundation for a new concept of sensation. While many scholars have stressed the meaning of that historical moment, characterizing it as a shift from mechanism to vitalism, it is also worth to bear in mind—as Roe has remarked—that mechanist conceptions of the human body not only did not disappear completely, but were actually dominant in the first decades of the 18th century.[15]

5.1.1 Sensibility, from physiology to morals

As George Rousseau has argued, the first steps towards the transformation of the concept of sensation were taken in the second half of the 17th century, with Thomas Willis' research into the brain, published as *Cerebri anatome* (1664, in English as *The Anatomy of the Brain and Nerves*, 1681),[16] which was actually a collective project, involving other scholars, among which his collaborator Richard Lower, and Christopher Wren, author of the illustrations.[17] Willis distinguished between the "rational soul" and the "animal (or corporeal) soul", and divided the last one into "vital soul" (seated in the blood) and "sensitive soul" (lodged in the brain and nerves, but connected to the vital soul through the "animal spirits", which originated in the blood). He investigated the sensitive soul by conducting a systematic research into the anatomy of the brain, whose functionalities he tried to deduce from the morphology of the various sections, and the nervous system, and tried also to deduce the functions of the various brain sections.[18] Though it contradicted Descartes' theories about the pineal gland as the site of the soul,

[15] Roe, "The Life Sciences", p. 397.

[16] George S. Rousseau, "Nerves, Spirits and Fibres: Towards Defining the Origins of Sensibility" (1975), in his *Nervous Acts: Essays on Literature, Culture and Sensibility*, Basingstoke, Palgrave Macmillan, 2004, pp. 160–184, on pp. 165–166.

[17] See Robert G. Frank, Jr., "Thomas Willis and His Circle: Brain and Mind in Seventeenth-Century Medicine", in George S. Rousseau (ed.), *The Languages of Psyche: Mind and Body in Enlightenment Thought*, Berkeley, University of California Press, 1990, pp. 107–146, on p. 129, accessible online: http://ark.cdlib.org/ark:/13030/ft638nb3db/ [last access: October 2015].

[18] Ibid., pp. 130–133.

the impressive ambition of Willis' anatomical research into the brain—together with other outstanding medical works on the brain that were published at the time, in particular Marcello Malpighi's *De cerebro* (1665)—had far-reaching consequences, since it brought the nervous system to the forefront of psychic life and of philosophical concerns. Besides, Willis was a strong influence on Locke during his formative years, when he studied and practiced as a physician at Oxford.[19]

A second element in the transformation of the notion of sensation were the teachings of Georg Ernst Stahl and Herman Boerhaave. Stahl, a German physician and chemist, questioned mechanicism and focussed instead on the intrinsic causes that should explain the conservation and persistence of living matter. According to him, the persistence of matter depended on a kind of conscious will. Stahl was the first to formulate the notion of organism, which would become key to 18th-century physiology.[20] Boerhaave, a Dutch physician, advocated iatromechanism, i.e. the application of Newton's mechanics to anatomy, and put together a comprehensive theory of fibres.[21] As a matter of fact, fibres were known to anatomists since ancient times, but gained attention at the end of the 16th century, when the invention of the first microscopes allowed close observation of the muscles. Boerhaave believed that the whole body was made up of fibres of different sizes and began to study muscle contraction, which he attributed to the action of adjacent nerves.[22]

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[19] Rousseau, "Nerves, Spirits and Fibres: Towards Defining the Origins of Sensibility", p. 166.

[20] See Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 394–396; and see also chapter 9 ("Du mécanisme à l'animisme. Perrault et Stahl) of François Duchesneau, *Les Modèles du vivant de Descartes à Leibniz*, Paris, J. Vrin, 1998, pp. 265–314.

[21] On iatromechanism, and especially on the critical reaction to it, see Sergio Moravia, "From Homme Machine to Homme Sensible: Changing Eighteenth-Century Models of Man's Image", *Journal of the History of Ideas*, vol. 39, no. 1, January-March 1978, pp. 45–60.

[22] For a summary of Boerhaave's theory of fibres see Eugenio Frixione, "Irritable Glue: the Haller-Whytt Controversy on the Mechanism of Muscle Contraction", in Harry Whitaker, C.U.M. Smith and Stanley Finger (eds), *Brain, Mind and Medicine: Essays in Eighteenth-Century Neuroscience*, New York, Springer, 2007, pp. 115–124, on pp. 115–117, and also Anne C. Vila, *Enlightenment and Pathology: Sensibility in the Literature and Medicine of Eighteenth-Century France*, Baltimore, MD, Johns Hopkins University Press, 1998, pp. 16–18.

One of his students, the Scottish physician Robert Whytt, who taught medicine in Edinburgh, published in 1751 *An Essay on the Vital and Other Involuntary Motions of Animals*, where he introduced the notion of *stimulus* to refer to any physical cause of muscle contraction, though affirmed that this process depended on something that he called "sentient principle".[23] Swiss physician Albrecht von Haller, another Boerhaave's student, challenged his mentor's theories on muscular fibres by conducting a long series of experiments on the nerves and muscles of animals, for which he is recognized today as a pioneer of the physiology of the nerves—even if, according to the vocabulary of the time, his research was not physiological, but anatomical.[24] In his influential work *De partibus corporis humani sensilibus et irritabilibus* (1752, translated into English as *Dissertation on the Sensible and Irritable Parts of Animals*, 1755) Haller made the case for the existence of two different body properties: "irritability", which alluded to the ability of the muscles to contract immediately upon being touched (and to do it usually with a much greater force than that applied to them, what contradicted the principles of mechanism); and "sensibility", which referred to feelings and generally to all the reactions that originated in the nerves and affected the human soul (though it was not clear how this happened). Haller always insisted on keeping irritability and sensibility separate, since he conceived the former as independent from human will and soul, and as an exclusive property of muscular fibres. This conviction was at the core of his dispute with Whytt, who in 1755 had published a critical review of Haller's theories,

[23] Robert Whytt, *An Essay on the Vital and Other Involuntary Motions of Animals*, Edinburgh, John Balfour, 1763 (2nd edition), accessible online: http://archive.org/details/essayonvitalothe00whyt [last access: October 2015].

[24] As Andrew Cunningham has convincingly argued, until the beginning of the 19th century, when experimental physiology was founded, physiology was basically theoretical, not practical; see Andrew Cunningham, "The Pen and the Sword: Recovering the Disciplinary Identity of Physiology and Anatomy Before 1800, II: Old Anatomy—the Sword", *Studies in History and Philosophy of Biological and Biomedical Sciences*, no. 34, 2003, pp. 51–76, and also the first part: "The Pen and the Sword: Recovering the Disciplinary Identity of Physiology and Anatomy Before 1800, I: Old Physiology—the Pen", *Studies in History and Philosophy of Biological and Biomedical Sciences*, no. 33, 2002, pp. 631–665. On Haller's vivisection techniques see Mandressi, *Le Regard de l'anatomiste. Dissections et invention du corps en Occident*, Paris, Seuil, 2003, pp. 194–198.

and was convinced that the contraction of muscles depended on the nerves, not on irritability.[25]

The rapid dissemination of Haller's theories among physicians and philosophers resulted in many cases of confusion between irritability and sensibility, and even—as Anne Vila has argued—in a fusion of the properties of both "into one reactive 'superproperty', with emphasis placed variously on one term or the other".[26] For instance, in his *L'Homme machine*, published in 1748 (translated into English the same year as *Man a Machine*), materialist French philosopher Julien Offray de La Mettrie, who had also studied under Boerhaave, appropriated Haller's research, but contradicted the physician in applying the concept of irritability to the soul.[27] However, the notion of sensibility (or rather its French equivalent, *sensibilité*) was employed by many of the physicians of the Montpellier medical school, which counted Théophile de Bordeu, Menuret de Chambaud (Jean-Joseph Menuret) and Henri Fouquet among its main representatives. Already in the 1730s the Montpellier school physicians had been influenced by Stahl's animist theories, and they later came to develop an approach to anatomy and physiology that was neither animist, nor mechanicist, but vitalist, based on what they called "vital force". In the following decades Bordeu and others would develop explanations of the functioning of the human body that, like those of Haller, challenged iatromechanist views, focussing instead on the reactibility of organic matter.

[25] For an excellent account of Haller's theories, see Vila, *Enlightenment and Pathology*, pp. 18–28; see also Figlio, "Theories of Perception and the Physiology of Mind", pp. 185–191. On his controversy with Wyatt see, again, Frixione, "Irritable Glue: the Haller-Whytt Controversy on the Mechanism of Muscle Contraction"; and also Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 396–399.

[26] Vila, *Enlightenment and Pathology*, p. 15.

[27] Julien Offray de La Mettrie, *L'Homme-machine*, edited with an introduction by Paul-Laurent Assoun, Paris, Denoël, 1981; in English currently as *Machine Man and other Writings*, edited by Ann Thompson, Cambridge, Cambridge University Press, 1996. On La Mettrie see also Vila, *Enlightenment and Pathology*, p. 26–28, and Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 398–399.

Yet, in contrast to Haller, the Montpellier physicians did not apply the notion of sensibility only to fibres or nerves, but to the entire human being.[28]

On the other hand, the Montpellier school physicians focused particularly on the configuration of organs, which they regarded as key to the comprehension of the functioning of the whole organism. As Vila has pointed out, this is recognizable in Bordeu's investigations into glands, where he argued that each gland (associated with a particular organ) functioned autonomously, and therefore each organ lived an autonomous life. Comparing the human body to a bee swarm, Bordeu affirmed that each organ (each bee) had the ability to act independently, disrupting the harmony of the healthy organism. Diderot, a close friend of Bordeu, would borrow the metaphor of the bee swarm to explain the unity of the subject in his brilliant dialogue the *Rêve de d'Alembert* (written in 1769, published posthumously in 1830, in English as "D'Alembert's Dream"), which explored the notion of sensibility, and featured a character named "Bordeu". [29]

The long entry "Sensibilité, sentiment" in Diderot and d'Alembert's *Encyclopédie* (1751-1772), written by the Montpellier physician Fouquet, devotes ample space to ancient and contemporary medical theories of sensibility, including a critical account of Haller's theses, and it presents sensibility almost as an all-explaining concept, able to account for medical pathologies, the life of the senses, the moral

[28] On the theories of the Montpellier medical school, see chapter 2 ("Sensibility and the Philosophical Medicine of the 1750–1770s") of Vila, *Enlightenment and Pathology*, pp. 43–79; see also Roselyne Rey, *Naissance et développement du vitalisme en France de la deuxième moitié du XVIIIe siècle à la fin du Premier Empire*, Oxford, Voltaire Foundation, 2000; Elizabeth A. Williams, *The Physical and the Moral: Anthropology, Physiology, and Philosophical Medicine in France 1750–1850*, Cambridge, Cambridge University Press, 1994; and by the same author, *A Cultural History of Medical Vitalism in Enlightenment Montpellier*, Aldershot, Ashgate, 2003. On the state of life sciences during the 18th century, see Shirley A. Roe, "The Life Sciences", in Roy Porter (ed.), *The Cambridge History of Science, vol. 4: Eighteenth-Century Science*, Cambridge, Cambridge University Press, 2003, pp. 397–416.

[29] Denis Diderot, *Le Rêve de d'Alembert*, in *Oeuvres complètes (DPV), tome XVII: Le Rêve de d'Alembert. Idées IV*, critical and annotated edition, with an introduction by Jean Varloot with Michel Delon, Paris, Hermann, 1978, pp. 24–209. See Vila, *Enlightenment and Pathology*, pp. 65–73, and also Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 399–401.

standards of foreign peoples, or musical taste.[30] (The *Encyclopédie* included also a very short entry "Sensibilité", on the moral sense on the term, written by Louis de Jaucourt.)[31] The wide-ranging definition of *sensibilité* was probably not that surprising if we consider that in early modern French, like in English, *sensibilité* ("sensibility") and *sentiment* ("sentiment") belonged to the same semantic field as other words derived from *sens* ("sense"), such as *sensation* ("sensation") or *sentimental* ("sentimental"), all of which were also related to the physiology of perception. As Georgia Cowart has also pointed out, at the beginning of the 18th century *sentiment* referred primarily to sensations and opinions, not to subjective or private feelings, as attested also by the entry "Sentiment, avis, opinion" written by Jaucourt for the *Encyclopédie*. However, during the century some authors would come to identify *sentiment* with good taste (*bon goût*), and the term would generally acquire—also in English—more emotional meaning.[32]

The association of sensations and moral and aesthetic feelings was also characteristic of some of the most notable philosophers of the British "age of sensibility", like Anthony Ashley Cooper, third Earl of Shaftesbury, Francis Hutcheson

[30] See the entry "Sensibilité, sentiment" by Henri Fouquet, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: August 2015]. Curiously enough, Albrecht von Haller became later the main medical contributor to the *Supplément à l'Encyclopédie*, published in 1776–1777, where he wrote the entry "Sensibilité", which is in part a response to Fouquet's entry; see the entry "Sensibilité", in Diderot and d'Alembert (eds), *Supplément à l'Encyclopédie (Supplément de Panckoucke),* University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu/node/137 [last access: September 2015].

[31] See the entry "Sensibilité" by Louis de Jaucourt, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: August 2015]. See also Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 389–391.

[32] See Georgia J. Cowart, "Sense and Sensibility in Eighteenth-Century Musical Thought", *Acta Musicologica*, vol. 56, no. 2, July-December 1984, pp. 251–266; see also the entry "Sentiment, avis, opinion" by Louis de Jaucourt, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: August 2015]. For English usage of "sensibility" see Koen Vermeir and Michael Funk Deckard, "Philosophical Enquiries into the Science of Sensibility: An Introductory Essay", in Koen Vermeir and Michael Funk Deckard (eds), *The Science of Sensibility: Reading Burke's Philosophical Enquiry*, Dordrecht-Heidelberg-London-New York, Springer, 2012, pp. 3–56.

or Edmund Burke, who treated the moral sense as a natural disposition akin to the recognition of beauty.[33] As Koen Vermeir and Michael Funk Deckard have argued, in the first half of the 18th century "sensibility came to stand for a disposition of being easily and strongly affected—physiologically as well as psychologically—by emotional influences"; it was a way to discuss not only physical sensation, but "the *refinement* of passionate responses, delicate sensitiveness of taste and sympathy for suffering".[34]Ultimately, "sensibility" became a keyword of the period, or—as Vila has put it—"a "bridging concept, that is a means of establishing causal connections between the physical and the moral realms".[35] The spread of this expanded notion of sensibility implied a whole remapping of the human psyche: many authors underlined the continuity between the exercise of the senses and the life of the soul, considering the fact that the organs of the external senses and the nerves created sensations, and sensations were fundamental not only to construct knowledge, but also to stir feelings, cultivate taste and generally educate in morals. In Jessica Riskin's words, "[i]deas, emotions, and moral sentiments alike were expressions of sensibility, movements of the body's parts in response to sensory impressions of the outside world".[36]

As many scholars have argued, the development of a culture of sensibility, particularly in Britain and France, and later in Germany, was also associated with the emergence of a new literary form, the novel, and, more generally, with the consolidation of a public culture—or, using concept coined by Jürgen Habermas, a "bourgeois public

[33] See Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 405–409; and also Vermeir and Funk Deckard, *The Science of Sensibility*.

[34] Vermeir and Funk Deckard, *The Science of Sensibility*, p. 8.

[35] Vila, *Enlightenment and Pathology*, p. 2; see also Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, p. 389.

[36] Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment*, Chicago, University of Chicago Press, 2002, p. 2. For an account of 18th-century sensibility that proceeds along similar lines as the one offered in this section, see Barbara Maria Stafford, *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine*, Cambridge, MA, MIT Press, 1991, pp. 401–413.

sphere" (*bürgerliche Öffentlichkeit*, also translatable as "civil public sphere")—where new forms of cultural exchange and public debate were constantly tested.[37] As I will discuss later in this chapter, musical life was often part of those debates.

5.1.2 Sensibility and the physiology of the senses: towards a differentiation of the sense of hearing

General interest in sensibility and sentiments was accompanied by a concern with the way in which each sense could open a specific doorway to the world, and how the five senses could collaborate in capturing particular qualities and forming ideas. Contrary to what would become standard in the next century, in the 18th century the specificity of the senses was not thought to depend on the specificity of the nerves, since anatomists generally considered them to be all of the same kind, that is "des formes variés de la même substance" ("varied forms of the same substance"). The quotation is part of the *Encyclopédie* entry "Sens externes", where its author, Jaucourt, identified the senses with their bodily organs, and affirmed that differences among sensations stemmed from the number and the more or less exterior location of the nerves attached to those organs. This theory was compatible with the theories of Bordeu, of the Montpellier medical school, on the relationship between single organs and the whole organism, and with the importance he placed on the autonomy of organs.

Nevertheless, medical literature on the organ of the ear and audition, especially that produced during the first half of the 18th century, did not necessarily reflect the conceptual developments of the vitalist school. Such important contributions as

[37] See for instance Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 391–393; see also Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, translated by Thomas Burger with the assistance of Frederick Lawrence, Cambridge, Polity Press, 1989, esp. pp. 14–26. However, Harold Love has criticized the use of the phrase "public sphere" precisely to explain the emergence of musical institutions and forms of sociability during the Enlightenment. According to him, the notion of "public sphere" has no historical substance; see Harold Love, "How Music Created a Public", *Criticism*, vol. 46, no. 2, Spring 2004, pp. 257–271.

Raymond Vieussens's *Traité nouveau de la structure de l'oreille* (1714) and Claude Nicolas Le Cat's *Traité des sens* (1741, in English as *A Physical Essay on the Senses*, 1750) are considered examples of mechanicism, although Vieussens studied in Montpellier. Le Cat was one of the most vocal opponents of Haller's notions of irritability and sensibility, and its theories often had a decidedly Cartesian slant.[38] On the other hand, the anatomical understanding of the organs of the senses, in particular of the eye, but also—to a lesser extent—the ear advanced substantially at the time.[39] Eighteenth-century anatomical and physiological knowledge of the ear benefitted from the efforts of such outstanding physicians as the Italians Antonio Maria Valsalva, Domenico Cotugno and Antonio Scarpa, or the aforementioned Haller, who dealt with hearing in his *Primae lineae physiologiae* (Gottingen 1749; translated anonymously as *Dr. Albert Haller's Physiology,* London, 1754). The way in which this progress in knowledge of the ear and hearing was perceived is attested by the entries "Oreille" et "Ouïe", written by the same Jaucourt for the *Encyclopédie*, which summarized anatomical details and traced a historical account of the subject.[40] Hearing emerged also as an important medical skill in the professional debates on pulse patterns and pulse-taking techniques, to which Bordeu contributed his *Recherches sur le pouls par rapport aux crises* (1757). As Ingrid Sykes has studied, Bordeu underlined the importance of

[38] Raymond Vieussens, *Traité nouveau de la structure de l'oreille*, Toulouse, Jean Guillemette, 1714, accessible online: http://www2.biusante.parisdescartes.fr/livanc/?cote=05399x02&p=1&do=page [last access: September 2015], and Claude Nicolas Le Cat, *Traité des sens*, new corrected and enlarged edition, with illustrations, Amsterdam, J. Wetstein, 1744, accessible online: https://archive.org/details/traitdessens00leca [last access: September 2015]; in English as *A Physical Essay on the Senses*, London, R. Griffiths, 1750 (New York, Readex Microprint Corporation, 1969). On Vieussens and Le Cat see Penelope Gouk and Ingrid Sykes, "Hearing Science in Mid-Eighteenth-Century Britain and France", *Journal of the History of Medicine and Allied Sciences*, vol. 66, no. 4, 2010, pp. 507–545, on pp. 529–533; on Le Cat see also Veit Erlmann, *Reason and Resonance: A History of Modern Aurality*, New York, Zone Books, 2010, pp. 111–125.

[39] See Mazzolini, "Schemes and Models of the Thinking Machine (1662–1762)", pp. 82–83.

[40] See the entries "Oreille" et "Ouïe" by Louis de Jaucourt, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: August 2015]. These entries are also discussed in Béatrice Didier, *La Musique des Lumières. Diderot, l'Encyclopédie, Rousseau*, Paris, PUF, 1985, pp. 129–132.

auditory training for interpreting human pulse patterns, while rejecting any comparison with music.[41]

Antonio Maria Valsalva was the first to dissect and prepare a complete organ of hearing for anatomical demonstration. The results of his otological investigations are gathered in *De aure humana tractatus* (1704, partially translated into English under the title *A Treatise of the Ear*, 1712), a treatise on the anatomy, physiology and pathology of the ear that is organized according to the current division of external, middle and inner ear. In that treatise Valsalva provided many new details of the middle ear (for example, he described and gave Eustachian tube its name), and made also a thorough review of the progress in anatomical knowledge of the inner ear—a part that he denominated "labyrinth", though before the term had mainly been employed to refer to the bony labyrinth. He also recognized the importance of the membranous labyrinth lodged inside the bony labyrinth, where he located the origin of the acoustic nerve and three of the *zonae sonorae* that, according to him, were responsible for audition. Inside the cochlea, where he situated a fourth *zona sonora*, Valsalva discovered a liquid, the perilymph. Besides, rightly contradicting Duverney's (and Haller's) theories, Valsalva maintained that low-pitched tones were detected at the apex of the cochlea and high-pitched tones at the base.[42]

Many of Valsalva's observations were confirmed later by Domenico Cotugno, who described the cochlear and the vestibular aqueducts in his work "De aquaeductibus auris humanae internae anatomica dissertatio" (1760). Cotugno put together a new theory of hearing where the movement of the stapes set the fluid of the cochlea (the perilymph, also called "labyrinthine fluid") into vibration, and this vibration stimulated

[41] See Ingrid J. Sykes, "The Art of Listening: Perceiving Pulse in Eighteenth-Century France", *Journal for Eighteenth-Century Studies*, vol. 35, no. 4, December 2012 (Special Issue on The Senses, guest edited by Jonathan Reinarz and Leonard Schwarz), pp. 473–488.

[42] On Vasalva see Politzer, *History of Otology*, pp. pp. 136–143, and Finger, *Origins of Neuroscience*, pp. 112–114.

in turn the membranous lamina (the basilar membrane) inside the cochlea. Even if he was not aware of existence of a second fluid, called "endolymph", in the inner ear (observed by Johann Theodor Pyl in 1742), Cotugno was able to show that the entire cochlea was full of liquid. This was in blatant contradiction of the *aer implantatus* hypothesis, which thus was finally refuted. Besides, Cotugno affirmed that the basilar membrane consisted in a series of resonating strings, and described it as a kind of cimbalom, a stringed instrument that is played by striking the strings with a hammer.[43] In fact, the identification and description of the specific resonators inside the cochlea was going to become one of the main focuses of otological research during the following century.

Antonio Scarpa, author of *Disquisitiones anatomicae de auditu et olfactu* (1789, illustrated by Faustino Anderloni, who copied Scarpa's drawings) provided one of the most accurate contemporary descriptions of the anatomy of the ear, including for the first time the membranous labyrinth. According to him, sound vibrations were transmitted to the cochlea both through the oval window (at the end of the ossicular chain in the middle ear) and the round window connecting the middle ear with the inner ear.[44] Later on, Charles Bell, in his *Anatomy of the Human Body* (1809), would give a quite exact explanation of the function of the round window connecting the middle ear to the inner ear.[45] However, the level of detail attained by 18th-century anatomists in describing the inner ear required new technological tools that allowed closer observation of those details—something that would become possible only in the next

[43] On Cotugno see Finger, *Origins of Neuroscience*, pp. 113–114; Békésy and Rosenblith, "The Early History of Hearing", p. 743; Adam Politzer, *History of Otology*, translated by Stanley Milstein, Collice Portnoff and Antje Coleman, Phoenix, AZ, Columella Press, 1981, pp. 150–155; and also Ernest Glen Wever, *Theory of Hearing*, New York, Dover Publications, 1949, p. 16.

[44] See Hawkins, Jr., "Auditory Physiological History: A Surface View", p. 16. On Scarpa see also Politzer, *History of Otology*, pp. 155–162.

[45] Boring, *Sensation and Perception in the History of Experimental Psychology*, pp. 402–403.

century, circa 1830, when an enhanced version of the compound microscope was developed.

Jaucourt's *Encyclopédie* entry on the "Sens externes" also reproduced the usual hierarchy of the senses (sight, hearing, smell, taste, touch), and included a vague comparison of the ear with the eye, where the former was presented as less sensitive and less able to perceive faraway objects.[46] Indeed, comparisons among the senses, as well as particular instances of sensory deprivation became a favourite subject of some 18th-century philosophers. Besides, the pervasiveness of sensibility implicated that many were interested not only in the epistemological aspect of the senses, but also in how each sense (and the interaction among them) could contribute to aesthetic and moral education. Questions about the nature of sensation and the characteristics of the senses—in particular, the senses of sight and touch—were raised with reference to the so-called "Molyneux's problem", which had originally been posed by Irish natural philosopher William Molyneux to Locke regarding his *Essay Concerning Human Understanding*. Molyneux speculated about an imaginary man born blind who had recovered sight, and asked whether he would be able to distinguish between different shapes, which he had learned to know only by touch. Locke, like Molyneux, thought that the man would not.[47] In *An Essay towards a New Theory of Vision* (1709), George Berkeley gave a negative answer to the problem, too, but he also insisted on the

[46] See the entry "Sens externes" by Louis de Jaucourt, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: August 2015]. The same hypothesis about the role of the nerves in the differentiation of the senses appears in Buffon's *Histoire Naturelle*, see Georges Louis Leclerc, comte de Buffon, *Barr's Buffon: Buffon's Natural History Containing a Theory of the Earth, a General History of Man, of the Brute Creation, and of Vegetables, Minerals, etc.*, vol. 4, translated by James Smith Barr, London, H.D. Symonds, 1797, p. 174.

[47] Locke decided to include and answer Molyneux's question in the second edition of *An Essay Concerning Human Understanding*, see pp. 145–146 of the aforementioned edition. On the "Molyneux's problem", see mainly Marjolein Degenaar, *Molyneux's Problem: Three Centuries of Discussion on the Perception of Forms*, translated from the Dutch by Michael J. Collins, Dordrecht, Kluwer Academic Publishers, 1996; see also chapter 2 ("The Blind and the Mathematically Inclined"), in Riskin, *Science in the Age of Sensibility*, pp. 19–67; and see also Gaukroger, *The Collapse of Mechanism and the Rise of Sensibility*, pp. 411–416.

specificity of the sensations perceived by each sense, arguing that links between them could only be created by experience.[48]

The fictive situation invented by Molyneux was later put to test by British surgeon William Cheselden, who in 1728 presented a report to the Royal Society on the results of an operation of cataracts that he had performed on a patient born blind. The outcome of the Cheselden operation, after which the patient apparently struggled to recognize the same shapes that he knew by touch, seemed to confirm Molyneux and Locke's convictions. As Marjolein Degenaar has argued, from that date on "Molyneux's problem" was associated with Cheselden's report. Besides, in the following years, other surgeons attempted the same operation in other European countries, leading to a variety of philosophical explanations.

Voltaire introduced the question into the French intellectual debate by including a summary of the Cheselden report in his *Elements de la philosophie de Newton* (1738).[49] The matter was also discussed in Condillac's *Essai sur l'origine des connaissances humaines* (1746, in English as *An Essay on the Origin of Human Knowledge*, 1756), which was intended as a supplement to Locke's *Essay*. However, Condillac displaced the focus of the "Molyneux' problem" from the collaboration between sight and touch—an aspect that had been underlined both by Locke and Berkeley—, to the complexity of the very action of seeing. According to him, the man born blind would be able to distinguish the globe from the cube on sight, though it may took him some time to recover the perfect use of his eyes.[50]

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[48] See George Berkeley, *The Works of George Berkeley, Bishop of Cloyne, vol. 1: Philosophical Commentaries. An Essay Towards A New Theory Of Vision. The Theory Of Vision*, edited by A. A. Luce and T. E. Jessop, London, Nelson, 1948, reprinted in 1967; see also Degenaar, *Molyneux's Problem*, pp. 29–34.

[49] Voltaire, *Oeuvres complètes, vol. 15: Élements de la philosophie de Newton*, critical edition by Robert L. Walter and W.H. Barber, Oxford, Voltaire Foundation-Taylor Institution, 1992, pp. 319–320; see Degenaar, *Molyneux's Problem*, pp. 53–65.

[50] Étienne Bonnot de Condillac, *Essai sur l'origine des connaissances humaines*, Avers-sur-l'Oise, Galilée, 1973; and *Essay on the Origin of Human Knowledge*, translated and edited by Hans Aarsleff, Cambridge, Cambridge University

Diderot's famous letter on blindness, *Lettre sur les aveugles à l'usage de ceux qui voient* (1749, in English as *Letter on the Blind for the Use of Those Who See*) was also a response to "Molyneux's problem", though the author went beyond that to address the effects of sensory deprivation on the character of individuals. Drawing on Condillac's *Essay*, Diderot underlined the educational process on which the exercise of our senses depends, declaring that "the eye may perhaps have to learn to see as the tongue to speak".[51] On the other hand, in his letter on deaf-mutes, titled *Lettre sur les sourds et muets à l'usage de ceux qui entendent & qui parlent* (1751, in English as *Letter on the Deaf and Dumb for the Use of Those Who Hear and Speak*),[52] Diderot dealt with the sense of hearing only episodically, focussing instead on the problem of linguistic inversions, that is the differences between the way in which words were ordered in conventional speech and a supposed "natural order" in perception and knowledge. In this case, the figure of a "theoretical mute" and the conversations with a man born deaf and dumb were instrumental to the author's reflections on gesture as original language, the formation of verbal language and, finally, a comparison of musical harmony with harmony of style in verbal language.[53] These and other topics

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Press, 2001 (on the "Molyneux's problem" see pp. 101–110). On Condillac's relationship to Locke and the purpose of his *Essai* see Hans Aarslef's introduction, ibid., pp. xi–xxxviii. For a thorough commentary of the work in relationship to music theory see chapter 3 ("Music Theory and the Genealogy of Knowledge in Condillac's *Essai sur l'origine des connaissances humaines*") of Thomas, *Music and the Origins of Language*, pp. 57–81.

[51] Denis Diderot, *Lettre sur les aveugles à l'usage de ceux qui voient*, in *Oeuvres complètes (DPV), tome IV: Le nouveau Socrâte. Idées II*, critical and annotated edition, with an introduction by Yvon Belaval et al., Paris, Hermann, 1978, pp. 15–72. It is published in English as *Letter on the Blind for the Use of Those Who See*, in *Diderot's Early Philosophical Works*, translated and edited by Margaret Jourdain, Chicago-London, Open Court Publishing, pp. 68–141 (quotation is on p. 125). Jourdain's translation is apparently based on the first English translation: *A Letter on Blindness. For the Use of those who have their Sight*, which appeared in 1770, though the translator refers vaguely to "an eighteenth-century translation, undated and anonymous, entitled a *Letter on Blindness*" (p. 141, note 1); see Kate E. Tunstall, *Blindness and Enlightenment: An Insight*, with a new translation of Diderot's *Letter on the Blind* and La Mothe Le Vayer's "Of a Man Born Blind", New York, Continuum, 2011, p. 167.

[52] Denis Diderot, *Lettre sur les sourds et muëts à l'usage de ceux qui entendent et qui parlent*, in *Oeuvres complètes (DPV), tome IV: Le nouveau Socrâte. Idées II*, pp. 129–228. It is published in English as *Letter on the Deaf and Dumb for the Use of Those Who Hear and Speak*, also in *Diderot's Early Philosophical* Works, pp. 158–218.

[53] Diderot, *Letter on the Deaf and Dumb*, pp. 214–218. On the study of dumbness and deafness and on the history of the education of deaf and dumb see Jonathan Rée, *I See A Voice: A Philosophical History of Language, Deafness and the Senses*, Hammersmith, Harper Collins, 1999, esp. pp. 89–324.

that I will discuss below were relevant questions to the learned discourse on music at the time.

In his *Traité des sensations* (1754, *Treatise on the Sensations*, 1930) Condillac proposed a second, more radical response to the "Molyneux's problem" by inventing a thought experiment that galvanized the imagination of many contemporary thinkers. He fantasized about a marble human statue, deprived of all senses, that would regain one sense at a time, and tried to understand how each sense (alone and/or in combination with one or two other senses) could provide knowledge of external objects, transforming thus sensations in experiences and judgements.[54] As he declared in the preface, his aim was to reflect on the state of ignorance in which human beings were born, and on the oblivion of our original ignorance that resulted from the lifelong process of learning. Because of that oblivion, Condillac argued—and this idea that I am paraphrasing here seems an important historical precedent to the "sensory turn" reviewed in the first three chapters—, we are inclined to think that our senses have been born with us: the notion that we may have learnt to see, hear, taste or touch seems like the strangest paradox to us.[55] Also, Condillac's aim in the *Traité* was to prove that judgements, reflection, desires and passions were just different varieties of sensation, and that all of them could be explained by the principle of pleasure and displeasure that ruled over the development of human faculties.[56]

[54] Condillac, *Traité des sensations*. On the origin of Condillac's theories in a critique of the Locke's *Essay Concerning Human Understanding*, see O'Neal, *The Authority of Experience*, pp. 13–24. For an introduction to the fortune of the image of the marble human statue, see Jütte, *A History of the Senses*, pp. 129–133.

[55] Condillac, *Traité des sensations*, p. 10. It is worth quoting this passage in the original French: "Cette mémoire réfléchie, qui nous rend aujourd'hui si sensible le passage d'une connaissance à une autre, ne saurait donc remonter jusqu'aux premières : elle les suppose au contraire, et c'est là l'origine de ce penchant que nous avons à les croire nées avec nous. Dire que nos avons appris à voir, à entendre, à goûter, à sentir, à toucher, paraît le paradoxe le plus étrange. Il semble que la nature nous a donné l'entier usage de nos sens, à l'instant même qu'elle les a formés ; et que nous nous en sommes toujours servis sans étude, parce qu'aujourd'hui nous ne sommes plus obligés de les étudier."

[56] Ibid., p. 11.

Condillac's statue recovered hearing in the second place, after the sense of smell, and before taste, sight and touch. As Béatrice Didier has commented, the order chosen by Condillac went from the most internal senses: smell and hearing, which allegedly could not originate in the statue any idea of the existence of external objects, to the most exterior ones: sight and finally touch, which the author considered the only sense able to judge external objects by itself. [57] After regaining hearing, the statue was immediately able to tell noise (*bruit*) from sound (*son*), to obtain pleasure from even the slightest noise, and to perceive relationships between sounds. However, Condillac underlined the importance of learning and habituation—that is, of having a well-organized ear (*une oreille bien organisée*)—so that the marble statue could discern sounds better, appreciate different harmonies, and become acquainted with more complex musical pieces, which will then become new pleasures.[58] In a later chapter the author also exposed how the sense of touch would help the statue identify the objects that produced sounds, contributing in this way to perfect its sense of hearing.[59] The difference that Condillac established between hearing and "a well-organized ear" finds a parallel in a later section devoted to sight, where—as I have mentioned at the beginning of this chapter—he stressed the difference between *voir* ("to see") and *regarder* ("to look", or rather "to watch"), where *regarder* would mean to have an impression accompanied by an idea, or *analyser* ("to analyse") what we see. Yet, significantly, the author stressed the fact that *regarder* implied an action, a direction towards the objects that we were seeing, and thus depended ultimately on the sense of touch.[60]

[57] Didier, *La Musique des Lumières*, pp. 138–143, on p. 139.

[58] Condillac, *Traité des sensations*, p. 58 pp. 55–59 (the reference to the "*oreille bien organisée*" is on p. 58).

[59] Ibid., pp. 136–139.

[60] Ibid., pp. 142–144.

In his *Essai analytique des facultés de l'âme* (Analytical Essay on the Faculties of the Soul, 1760) Genevan naturalist Charles Bonnet also adopted the thought experiment of the marble statue in order to elaborate a comprehensive theory of the generation of sensorial ideas. In contrast to Condillac, Bonnet discussed only the sense of smell, but provided a detailed explanation of the mechanics of sensation based on the excitation of different types of fibres, and on the possibility for those fibres to perceive different "modifications" of those perceptions, that is of distinguishing specific varieties of sensation corresponding to each sense and organ. He also described how the pleasurable or painful impressions left on the body could arise attention, excite imagination or become memories.[61] Bonnet was a keen practitioner of scientific observation, and as other 18th-century natural philosophers, not only understood the importance of the senses, but was also a propagandist of the virtues of attention. As scholars like Lorraine Daston and Michael Hagner have argued, the notion of attention displaced at the time other "passions of inquiry", like wonder or curiosity,[62] becoming one of the most appreciated virtues of the emerging figure of the scientist.[63] While attention was associated with certain procedures and repetition patterns, and sometimes

[61] Charles Bonnet, *Essai analytique sur les facultés de l'âme*, Copenhagen, Frères Cl. & Ant. Philibert, 1760, accessible online: https://archive.org/details/essaianalytiques00bonnuoft [last access: September 2015], esp. pp. ii and xxi. See Vila, *Enlightenment and Pathology*, pp. 30–37. On the role of organic fibres in the context of Bonnet's analysis of sensation, see Tobias Cheung, "Embodied Stimuli: Bonnet's Statue of a Sensitive Agent", in Charles T. Wolfe and Ofer Gal (eds), *The Body as Object and Instrument of Knowledge: Embodied Empiricism in Early Modern Science*, Dordrecht-Heidelberg-London-New York, Springer, 2010, pp. 309–331. On Bonnet's role as a precursor of psychology see Gary Hatfield, "Remaking the Science of Mind: Psychology as Natural Science", in Christopher Cox, Roy Porter and Robert Wokler (eds), *Inventing Human Science: Eighteenth-Century Domains*, Berkeley, California University Press, 1995, pp. 184–231, on pp. 201–207.

[62] On the significance of wonder in the 16th and 17th centuries, see Lorraine Daston and Katharine Park, *Wonders and the Order of Nature, 1150–1700*, New York, Zone Books, 2001, where they introduce the expression "passions of inquiry"; see also Krzystof Pomian, *Collectionneurs, amateurs et curieux. Paris, Venise, XVIe - XVIIIe siècles*, Paris, Gallimard, 1987, pp. 61–80.

[63] See Lorraine Daston, *Eine kurze Geschichte der wissenschaftlichen Aufmerksamkeit*, Munich, Carl Friedrich von Siemens Stiftung, 2000; and "Attention and the Values of Nature in the Enlightenment", in Lorraine Daston and Fernando Vidal (eds), *The Moral Authority of Nature*, Chicago, The University of Chicago Press, 2004, pp. 100–126; and also Daston and Park, *Wonders and the Order of Nature, 1150–1700*, pp. 303–328. By Michael Hagner see his "Toward a History of Attention in Culture and Science", *MLN*, 118, 2003, pp. 670–687, and also "Aufmerksamkeit als Ausnahmezustand", in Norbert Haas, Rainer Nägele and Hans-Jörg Rheinberger (eds), *Aufmerksamkeit*, "Liechtensteiner Exkurse III", Eggingen, Edition Isele, 1998, pp. 273–294.

involved new technologies that enhanced the senses (particularly, the sense of sight),[64] it was essentially an inward action exercised by the soul on the fibres of the brain,[65] hence a movement that was intellectual and physical at the same time. Bonnet also stressed the connection of attention to desire and pleasure, which were the underlying causes that explained the preference of the subject for one or another object. On these movements of the soul and on the notion of harmony he built a theory of education, which—he believed—should aim at the moral perfection of the individual.[66]

Bonnet was all but alone in his preoccupation with education: other 18th-century philosophers also accorded great importance to pedagogical matters. Indeed, the learning process of Condillac's marble state, suspended in a mythical origin, may be interpreted, to a certain extent, as a representation of the education of a child. Jean-Jacques Rousseau, who is usually recognized as the most influential modern thinker on childhood and education, and who was also a musician, considered the education of the senses as an essential part of a child's upbringing. As he stated in *Émile, ou De l'éducation* (1762, translated into English originally as *Emilius and Sophia, or A New System of Education*, 1763) "[t]o exercise the senses is not only to make use of them, it is to learn to judge well with them. It is to learn, so to speak, to sense; for we know how to touch, see, and hear only as we have learned."[67] Touch and sight were the senses that Rousseau addressed in the first place, since he considered them the most important ones. But he also dealt with the education of hearing; in particular, he recommended that children observed how sound is slower than light, and that they exercised the ear by

[64] See Daston, "Attention and the Values of Nature", pp. 109–115.

[65] See Bonnet, *Essai analytique sur les facultés de l'âme*, pp. 103–105.

[66] Ibid., pp. 300–305.

[67] Jean-Jacques Rousseau, *Oeuvres complètes IV: Émile. Éducation – morale – botanique*, edited by Bernard Gagnebin and Marcel Raymond, Paris, Gallimard, 1969; in English currently in *The Collected Writings of Rousseau, vol. 13: Emile, or On Education* (includes *Emile and Sophie, or The Solitaires*), series editors: Roger Masters and Christopher Kelly, translated and edited by Christopher Kelly and Allan Bloom, Hanover, NH-London, University Press of New England, 2009, p. 272.

exercising its corresponding "active organ", namely the voice; e.g. singing simple melodies, or learning to pronounce words correctly. While he disapproved of teaching them music notation, he suggested that they be taught to listen to, compose and sing plain melodies accompanied only by a harpsichord. Rousseau's observations on the education of hearing reflected not only the great value that he, as other contemporary writers, attributed to sensorial knowledge, but also the then-common association of hearing with the voice, and music with language.[68]

5.1.3 Acoustics and music theory in the 18th century

At the beginning of the 18th century physician Antonio Maria Valsalva was convinced that, as it had happened with optics and the study of vision, the progress of the study of hearing depended on advances in the physics of sound.[69] While many of those advances would only come about in the 19th century, the 18th century was a crucial period for the development of physical acoustics, since the discipline took advantage of the new possibilities offered by analytical mechanics and modern calculus. Conceived in parallel by Isaac Newton and Gottfried Leibniz during the previous century, calculus was applied in Newton's *Principia Mathematica* to the analysis of sound wave propagation and the theoretical derivation of the speed of sound, even if the results of these developments could not be fully tested at the time.[70] During the following decades a

[68] Rousseau, *The Collected Writings of Rousseau, vol. 13: Emile, or On Education*, pp. 290–293. One of the most notable followers' of Rousseau's educational theories, Johann Heinrich Pestalozzi, also addressed the education of hearing in the essay "Über den Sinn des Gehörs in Hinsicht auf Menschenbildung durch Ton und Sprache" (1808), in *Kleine Schriften zur Volkserziehung und Menschenbildung*, Bad Heilbrunn, Germany, Verlag Julius Klinkhardt, 1998 (7th ed.), pp. 59–81. However, Pestalozzi's recommendations were mainly oriented towards the instruction in reading and writing.

[69] Quoted in A.C. Crombie, "The Study of the Senses in Renaissance Science", in his *Science, Optics and Music in Medieval and Early Modern Thought*, London-Ronceverte, The Hambledon Press, 1990, pp. 379–398, on p. 397.

[70] See Frederick V. Hunt, appendix on "The Birth of the Calculus", in his *Origins in Acoustics: The Science of Sound from Antiquity to the Age of Newton*, with a foreword by Robert Edmund Apfel, Woodbury, NY, Acoustical Society of America–American Institute of Physics, 1992, pp. 143–147. Newton's "Theoretical Derivation of the Velocity of Sound in Air", reprinted from *Mathematical Principles of Natural Philosophy*, translated by Andrew Motte, New

series of great scholars, including English physicist Brook Taylor, who became a member of the Royal Society, Swiss mathematician and physicist Johann Bernoulli, and his son Daniel, lecturer at the Imperial Russian Academy of Sciences in Saint Petersburg, French mathematicians Jean Le Rond d'Alembert and Joseph Louis Lagrange, of the Académie royale, and Swiss mathematician Leonhard Euler, also of the Russian Academy, would apply Newtonian analytical mechanics to different cases of motion in a continuous medium.[71]

After Sauveur had confirmed the existence of overtones at the turn of the 18th century, the calculation of the fundamental and the overtones of a given sonorous body, typically a vibrating string, became the main problem of musical acoustics. In 1713 Brook Taylor applied rational mechanics to try to determine the motion of a single vibrating string (the monochord), and concluded that it would have the shape of a sinusoid, though he did not explain how overtones could originate from it.[72] Later on, in 1733, Daniel Bernoulli experimented with dangling chains as an example of vibrating system and demonstrated how a vibrating string could generate superposed harmonics, though he could not find a mathematical theorem for the "principle of superposition"—it would only be proposed much later, in 1822, by Jean-Baptiste Joseph Fourier, even if his famous theorem initially referred to heat.[73] Bernoulli and Euler, working separately, did research into the small vibrations of bodies, paying attention to elastic materials

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York, D. Adee, 1848, pp. 356–357, is included in R. Bruce Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, Stroudsburg, PA, Dowden, Hutchinson and Ross, 1973, pp. 74–86.

[71] For a thorough, mathematically-oriented account of the development of vibration science at the time see Clifford Truesdell, *The Rational Mechanics of Flexible and Elastic Bodies, 1638–1788: Introduction to Leonhardi Euleri Opera Omnia, vol. X et XI seriei secundae*, Zurich, Orell Füssli, 1960, and also John T. Cannon and Sigalia Dostrovsky, *The Evolution of Dynamics: Vibration Theory from 1687 to 1742*, New York-Heidelberg-Berlin, Springer Verlag, 1981.

[72] See Brook Taylor, "Concerning the Motion of a Stretched String", translated by R. Bruce Lindsay from "The Motu Nervi Tensi", *Philosophical Transactions of the Royal Society*, no. 28, 1713, pp. 26–32, reprinted in Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, pp. 95–102.

[73] For an excellent explanation of Bernoulli's experiments with dangling chains see Thomas Christensen, *Rameau and Musical Thought in the Enlightenment*, Cambridge, Cambridge University Press, 1993, pp. 150–151. See also "Daniel Bernoulli's Papers on the Hanging Chain and the Linked Pendulum", with English translation, included as Appendix in Cannon and Dostrovsky, *The Evolution of Dynamics*, pp. 123–176.

that, like rods and bars, were not so commonly associated with musical instruments and had not been much studied before. In part as a result of these efforts, they realized that, contrary to Taylor's hypothesis, the motion of a vibrating string was much more complex than a simple sinusoid. Indeed, sinusoidal shapes only seemed to correspond to particular bodies and exceptional conditions of vibration, since most elastic bodies produced markedly dissonant partials in vibrating. In 1747 d'Alembert applied the partial differential equation that he had recently developed to the motion of a vibrating string, and so he gave rise to a heated controversy involving also Euler, Bernoulli, and later Lagrange and Pierre Laplace.[74] Beyond the particularities of the scientific debate, the "vibrating string" controversy bore witness to the intensity of intellectual exchanges among 18th-century physicists, as well as to the strength of a discipline, acoustics, that was just beginning to discover its field.[75]

The expansion of acoustics to cover all kinds of sonorous bodies, and the realization that only some of them could vibrate with overtones had also an impact on the relationship between the physics of sound and music theory. This is apparent in the debates about the theoretical writings of Jean-Philippe Rameau, composer and organist, who is considered the most important music theorist of the century. His major work, *Traité de l'harmonie* (1722, in English as *Treatise on Harmony*, 1971)[76] may be

[74] See R. Bruce Lindsay, "The Story of Acoustics", in Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, pp. 5–20, on pp. 7–9; see the third section ("The Age of Euler", by James F. Bell, Clifford Truesdell and Murray Campbell) of the entry "Physics of Music", in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.; and see also Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 151–152.

[75] See Jean Le Rond l'Alembert, "Investigation of the Curve Formed by a Vibrating String", translated by R. Bruce Lindsay from "Recherches sur la courbe que forme une corde tendue mise en vibration", *Histoire de l'Académie royale des sciences et des belles-lettres de Berlin*, 3, 1747, pp. 214–219, in Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, pp. 118–123. (The original is avaliable online on the website of the Berlin-Brandenburgische Akademie der Wissenschaften, "Digitalisierte Akademieschriften" Collection, 2001: http://bibliothek.bbaw.de/bibliothek-digital/digitalequellen/schriften/anzeige?band=02-hist/1747&seite:int=00000243, [last access: September 2015]). On the "vibrating string" controversy see Truesdell, *The Rational Mechanics of Flexible and Elastic Bodies*, pp. 237–300, and also Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 153–159.

[76] Jean-Philippe Rameau, *Traité de l'harmonie réduite à ses principes naturels*, facsimile of Rameau's personal copy with autograph annotations, in *Complete Theoretical Writings, vol. 1*, edited by Erwin R. Jacobi, Holzgerlingen, American Institute of Musicology-Hänssler Verlag, 1967; English edition as *Treatise on Harmony*, translated with an

located, as Thomas Christensen has argued, at the intersection of two disciplines that were still separate then: *musica theorica*, i.e. the speculative tradition, which had become strong in 17th-century France, and *musica practica*, concerned, among other matters, with the pedagogy of counterpoint and harmony, and with instrumental practice.[77] While here I would focus mainly on the first aspect, it is important to bear in mind that at the time of the publication Rameau was already an experienced organist, and that his theories on musical composition had developed in part from that exercise. In the *Treatise* Rameau presented his theory of the fundamental bass (*bass fondamentale*), which ordered and limited all possible single chords to a few types (and their harmonic inversions), and determined how to construct them and how to compose music with them. Beyond its pedagogical scope, Rameau conceived and presented the fundamental bass as a Cartesian, mathematically based *principe d'évidence* that provided a solid foundation for the science of music. For that purpose he drew on the writings of Zarlino, Descartes and Mersenne, and turned to that old instrument of the Pythagorean tradition, the monochord, in order to show how the main consonances, forming the basic chords (i.e. the major and minor triads, and the different types of seventh chords) could be derived from a single sound. Yet, like Zarlino (see chapter 4), Rameau encountered a number of mathematical difficulties in justifying certain chords (in particular, the minor triad), and there was also an intrinsic difficulty in deriving harmonic principles from an instrument with a single string. [78]

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introduction and notes by Philip Gossett, New York, Dover, 1971; fragments of the work are also included in two source books: Enrico Fubini (ed.), *Music and Culture in Eighteenth-Century Europe: A Source Book*, translated by Wolfgang Freis, Lisa Gasbarrone and Michael Louis Leone, translation edited by Bonnie J. Blackburn, Chicago-London, University of Chicago Press, 1994, pp. 135–140, and Oliver Strunk and Leo Treitler (eds), *Source Readings in Music History*, New York-London, W.W. Norton and Co., 1998, pp. 691–695.

[77] Christensen, *Rameau and Musical Thought in the Enlightenment*, p. 42.

[78] Rameau's aims are clearly expressed in the Preface to the *Treatise on Harmony*, pp. xxxiii–xxxvvii, and the derivation of the major and minor chords, and the different kinds of seventh chords are explained in Book I ("On the Relationship between Harmonic Ratios and Proportions") of the same work, pp. 3–55; see also Philip Gossett's Introduction, ibid., pp. v–xxiv. For a detailed explanation of the fundamental bass see chapter 5 ("The Fundamental Bass") of Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 103–132.

On the other hand, Rameau also strived to keep up with contemporary developments in acoustics, which he tried to put at the service of his theoretical enterprise.[79] Thus, after the publication of the *Treatise on Harmony*, he became acquainted with Sauveur's research into the overtones, and mentioned it in his next work, *Nouveau système de musique théorique* (1726).[80] However, he did not really integrate this new element into his system until a decade later, with the publication of *Génération harmonique* (1737). Adopting the explanation of overtones that had been suggested by mathematician Jean-Jacques Dortous de Mairan, in *Génération harmonique* Rameau tried to demonstrate that each fundamental tone constituted together with its overtones a "sonorous body" (*corps sonore*), from which the major triad and the minor triad could be derived "naturally". Among its first overtones there were the perfect fifth and the major third forming the major triad. Yet, the derivation of the minor chord required a more complex and dubious theorization: Rameau argued that the minor chord could be derived by sympathetic resonance of some lower tones—a phenomenon that does not really exist.[81] He structured the treatise in an elaboratedly systematic manner: each chapter included successive numbered *propositions* followed by *experiences* confirming those propositions, what revealed his determination to present it as scientific. Besides, he submitted the work before publication to the consideration of the French Académie, which issued a favourable report. Rameau appeared again before the Académie in 1749, when he presented a "Mémoire", which he had most probably penned with help from Diderot, and where—almost certainly as a

[79] On Rameau's position as music theorist see mainly chapter 2 ("Rameau as Music Theorist") of Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 21–42; precedents in harmonic theory, including thorough bass (*basso continuo*) practice are reviewed in chapter 3 ("Precursors of Harmonic Theory"), ibid., pp. 43–70.

[80] Jean-Philippe Rameau, *Nouveau système de musique théorique*, in *Complete Theoretical Writings, vol. 2*, edited by Erwin R. Jacobi, [n.p.], American Institute of Musicology, 1967; and also by him, *Génération harmonique*, in *Complete Theoretical Writings, vol. 3*, edited by Erwin R. Jacobi, [n.p.], American Institute of Musicology, 1968.

[81] See chapter 6 ("The *Corps Sonore*) of Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 133–168, esp. pp. 133–150.

result of Diderot's intervention—the theory of the fundamental bass was presented in terms markedly reminiscent of sensationalist philosophy.[82] Diderot would also give to the press, in 1748, his *Principes généraux de la science du son*, a compendium of mathematical propositions on physical acoustics, anatomy and physiology of the ear, and reflections on musical pleasure, which basically constituted a defence of Rameau's harmonic theories.[83]

The "Mémoire" was reviewed, among other academicians, by d'Alembert, and was later published with numerous corrections and additions as *Démonstration du principe de l'harmonie* (1750). It is considered Rameau's more strongly theoretical contribution, though it is essentially an update on the theory of the fundamental bass, and in it the composer still faces serious difficulties, particularly in deriving minor thirds.[84] D'Alembert would later author the *Elémens de musique théorique et pratique suivant les principes de M. Rameau* (1752), a survey of Rameau's theories that would contribute to their popularization and grant the composer the status of a living authority—an "Artist philosophe", as he was emphatically praised by the same d'Alembert in the "Discours préliminaire" of the *Encyclopédie*.[85] Some of the most important articles on music that Rousseau wrote for the *Encyclopédie* also mentioned Rameau's harmonic theories with respect. Nevertheless, none of these facts would keep

[82] Ibid., pp. 212–218.

[83] Denis Diderot, *Principes généraux de la science du son, avec un méthode singulière de fixer le son, de manière qu'on puisse jouer, en quelque temps en en quelque lieu que ce soit, un morceau de musique exactement sur le même ton*, in *Oeuvres complètes, (DPV), tome II: Philosophie et mathématique. Idées I*, critical and annotated edition, with an introduction by Robert Niklaus et al., Paris, Hermann, 1975, pp. 235–281. On Diderot's Ramism see chapter 6 ("Oublier Rameau") see Béatrice Durand-Sendrail, *La Musique de Diderot. Essai sur le hiéroglyphe musical*, Paris, Kimé, 1994, pp. 123–142.

[84] Jean-Philippe Rameau, *Démonstration du principe de l'harmonie*, in *Complete Theoretical Writings, vol. 3*. See Albert Cohen, *Music in the French Royal Academy of Sciences: A Study in the Evolution of Musical Thought*, Princeton, NJ, Princeton University Press, 1981, pp. 82–84, and Chistensen, *Rameau and Musical Thought in the Enlightenment*, pp. 159–162.

[85] Jean Le Rond d'Alembert, "Discours préliminaire des éditeurs (juin 1751)", in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: October 2015].

the composer and theorist from falling out publicly with the *encyclopédistes* around those years.[86] Their disagreement acquired bitter tones during the Quarrel of the Comic Actors (*Querelle des Bouffons*) on the merits of Italian and French operatic styles, which extended between 1752 and 1754, and during which the *philosophes* defended *opera buffa* against the advocates of French opera, including Rameau.[87] Yet, his dispute with the *philosophes*, in particular with Rousseau, went beyond matters of musical taste and personal issues. As I will discuss later in this chapter, it was related to the disciplinary status of music, which Rameau tended to consider among the sciences, if not as the basis of all the sciences, and with the importance of harmony and melody in music.

The support obtained from the Académie increased Rameau's interest in associating his theories with the names of the most excellent physicists of the time, though his efforts did not meet with much success.[88] In the context of the "vibrating string controversy" his work was criticized by Daniel Bernoulli, who pointed to the fact that inharmonic modes of vibration were so natural as harmonic modes. Rameau also tried to gain Euler's favour by sending him the *Démonstration* and his following publication, *Nouvelles réflexions de M. Rameau sur sa démonstration du principe de l'harmonie* (1752).[89] In a letter addressed to the composer in 1753, Euler found fault with his theory and argued that consonances were not based on overtones, but on

[86] See Chistensen, *Rameau and Musical Thought in the Enlightenment*, pp. 247–290.

[87] A report of the facts of the Quarrel, their political circumstances, and the pamphlets produced by those involved in it may be read in the entry "Querelle des Bouffons" by Elisabeth Cook, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

[88] See Cuthbert Girdlestone, *Jean-Philippe Rameau: His Life and Work*, New York, Dover Publications, 1969, p. 490.

[89] Jean-Philippe Rameau, *Nouvelles réflexions de M. Rameau sur sa démonstration du principe de l'harmonie*, in *Complete Theoretical Writings, vol. 5: Minor Works (1732–1761)*, edited by Erwin R. Jacobi, [n.p.], American Institute of Musicology, 1969. See Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 231–235.

mathematical proportions.[90] He also criticized Rameau's consideration of harmonic inversions as functionally equivalent to the triad based on the fundamental, what would prompt a response from the composer in the form of an open letter, *Extrait d'une réponse de M. Rameau à M. Euler sur l'identité des octaves* (1752). In that letter Rameau invoked musical practice to justify harmonic inversions,[91] as it was fitting for somebody who, as Albert Cohen has pointed out, "always remained primarily a musician" and trusted his ears and musical taste to solve any theoretical problems.[92] Whereas the fundamental bass, as elaborated initially in the *Traité de l'harmonie*, already provided a pedagogical method to train both the ears and the hands at the keyboard, the aspects more closely related to instrumental practice were fully developed in the *Code de musique pratique* (1760), where—as Ingrid Sykes has argued—Rameau required that the senses—or rather, the complex constituted by the player's well-trained hands, ear and memory—reacted mechanically "like a form of activated human brain".[93] Nevertheless, Rameau's interest in solving problems of musical practice was compatible with the rationalist inspiration of his theories, and with his goal of presenting music as a deductive science.

[90] See Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 154–155. Daniel Bernoulli's attack on Rameau appears in his "Réflexions et éclaircissemens sur les nouvelles vibrations des cordes exposées dans les mémoires de 1747 & 1748", *Histoire de l'Académie royale des sciences et belles lettres*, no. 9, 1753, pp. 173–195, whereas Euler's letter, dated 13 September 1752, is included in his *Complete Theoretical Writings, vol. 5*, pp. 147–148.

[91] Jean-Philippe Rameau, *Extrait d'une réponse de M. Rameau à M. Euler sur l'identité des octaves*, in *Complete Theoretical Writings, vol. 5: Minor Works (1732–1761)*, edited by Erwin R. Jacobi, [n.p.], American Institute of Musicology, 1969; see also Christensen, *Rameau and Musical Thought in the Enlightenment*, pp. 245–247.

[92] Cohen, *Music in the French Royal Academy of Sciences*, p. 82.

[93] Jean-Philippe Rameau, *Code de musique pratique*, in *Complete Theoretical Writings, vol. 4*, edited by Erwin R. Jacobi, [n.p.], American Institute of Musicology, 1965; and Sykes, "The Art of Listening: Perceiving Pulse in Eighteenth-Century France", p. 484. Besides, as Thomas Christensen has observed, "tactile sensitivity", i.e. sensing the keys, scales and tonal dynamics on the keyboard, was also a relevant characteristic of the harpsichord method developed by Anton Bemetzrieder, *Leçons de clavecin* (1771), which he wrote with Diderot's assistance and is currently part of Diderot's *Oeuvres complètes, tome XIX: Musique*, critical and annotated edition, with an introduction by Jean Mayer, Pierre Citron, co-edited by Jean Varloot, Paris, Hermann, 1983, pp. 61–387. However, Bemetzrieder apparently devised his method as a response to Rameau's fundamental bass; see Thomas Christensen, "Bemetzrieder's Dream: Diderot and the Pathology of Tonal Sensibility in the *Leçons de clavecin*", in Linda Phyllis Austern (ed.), *Music, sensation and sensuality*, London-New York, Routledge, 2002, pp. 39–56.

Euler's criticism of Rameau's theories was consistent with his own theories of musical consonance. In 1739 he had published his *Tentamen novae theoriae musicae* ("Essay of a New Theory of Music"), where he drew on Descartes, Mersenne, Leibniz and his own acoustical investigations, gathered in *Dissertatio physica de sono* (1727), to elaborate a theory of consonance based on the notion of simplicity.[94] In line with Leibniz's famous definition of music as a "hidden arithmetic exercise of the soul, which does not know that it is counting",[95] Euler argued that the harmonic coincidences corresponding to the simplest ratios were intrinsically more agreeable than those based on more complex ratios, since the mind could perceive their simplicity. Indeed, his conception of the perception of ratios as the foundation of musical pleasure seems to have been among the inspirations for Diderot's *Principes généraux de la science du son*, where Euler is alluded to several times.[96] As Peter Pesic has pointed out, in contrast to the perfect numbers and ratios of the Pythagorean tradition, Euler's system gave priority to the perceiving subject, hinting at a mathematics of aesthetics.[97] Euler also advanced a mathematical formula to calculate the degree of agreeableness (*gradus suavitatis*) of intervals, chords and chord series, and classify them accordingly. The resulting classification was a scale of agreeability where there was no clear separation between consonances and dissonances. Yet, it had also some puzzling characteristics,

[94] Leonhard Euler, *Dissertatio physica de sono* and *Tentamen novae theoriae musicae ex certissismis harmoniae principiis dilucide expositae*, both in *Opera Omnia, vol. I seriei tertiae*, Leipzig, Teubner, 1926, pp. pp. 183–196 and pp. 197–427. There is an excellent Italian translation by Alvise de Piero: *Il "Tentamen novae theoriae musicae" di Leonhard Euler (Pietroburgo 1739)*, "Memorie della Accademia delle Scienze di Torino, Classe di Scienze Morali, Storiche e Filologiche", series V, vol. 34, Torino, Accademia delle Scienze di Torino, 2010. On the historical context, content and critical reception of the *Tentamen* see Alvise de Piero's Introduction to that edition, pp. 3–40.

[95] This passage appears in a letter to Christian Goldbach, dated 17 April 1712, in Gottfried Leibniz, *Epistolae ad diversos*, edited by C. Korholt, Leipzig, Breitkopf & Härtel, 1738–1742, pp. 239–242.

[96] Diderot, *Principes généraux de la science du son*; see also de Piero's Introduction to *Il "Tentamen novae theoriae musicae" di Leonhard Euler*, pp. 12–13.

[97] Peter Pesic, "Euler's Musical Mathematics", *The Mathematical Intelligencer*, vol. 35, issue 2, June 2013, pp. 35–43. on p. 37.

like the fact that the major triad and the major seventh chord were assigned the same degree of agreeableness.[98]

In spite of their differences, Euler's *Tentamen* and Rameau's harmonic theories may be interpreted as attempts to reconcile reason and the senses, mathematics and the ear, providing a solid natural foundation for harmonics, and generally for music. Yet, apart from their debatable value as mathematical works, these attempts were not quite in tune with contemporary discourses on music. In this sense, as Fubini has pointed out, it is significant that Rameau's *Traité de l'harmonie* was published around the same years in which an empiricist like Jean-Baptiste Du Bos (Abbé Du Bos) was also active, and when—as I will argue in the next section—a timid consensus was emerging on the pertinence of separating music-as-discourse from music-as-sound.[99] Conceived as discourse, music would preferably be considered within the nascent category of the fine arts, rather than as a science.

Indeed, the same Euler seems to have been conscious of that separation in two different works published decades after the *Tentamen*, where he introduced some ideas that apparently questioned the natural foundation of musical harmony. Thus, whereas in the *Tentamen* the Swiss physicist had only addressed just temperament, in a later essay, *Conjecture sur la raison de quelques dissonances généralement reçues dans la musique* (1766), he considered equal temperament—i.e. the musical temperament where adjacent tones are separated by equal intervals—, which was becoming more and more common at the time. In trying to justify the fact that many of the harmonic coincidences accepted in the equally tempered system were dissonances, that is complex ratios not agreeable to the ear, Euler presumed that the ear could tolerate deviations from the ideal harmonic ratios, and that especially in the case of complex ratios, it could even get used to

[98] Ibid., p. 38.

[99] Enrico Fubini, *Gli enciclopedisti e la musica*, Torino, Einaudi, 1971, p. 69.

them.[100] Similar considerations may be found in the letter VII ("On the twelve tones of the harpsichord", dated 3rd May 1760) of the collection *Lettres à une princesse d'Allemagne sur divers sujets de physique et de philosophie* (1768, translated into English as *Letters to a German Princess on different subjects in Physics and Philosophy*, 1795), which reunites 234 letters that Euler addressed to imperial princess Friederike Charlotte of Brandenburg-Schwedt between 1760 and 1762. Yet, the letter VIII ("On the pleasure derived from fine music", dated 6th May 1760) is more interesting, since in it Euler acknowledged that, even if proportion and order in harmony and measure (rhythm) may explain, at least to a certain extent, the pleasure that we derive from music, there was still something more. And that something more, he argued, may well be the satisfaction that "a connoisseur" obtained, in hearing a certain musical piece, "from divining, in some measure, the views and feelings of the composer", that is the plan that he had followed in his work.[101] Far from invoking mathematical ratios, here Euler seems to refer to a rhetorical structure of address, a music-rhetorical paradigm where pleasure arises from a correspondence between the strategic choices of the composer and the competence and intelligence of the listener, presented as a connoisseur.[102]

5.1.4 Sense and sensibility in musical thought

[100] See Leonhard Euler, "Conjecture sur la raison de quelques dissonances généralement reçues dans la musique", originally published in *Histoire de l'Académie royale des sciences et belles lettres de Berlin*, vol. 20, 1764, pp. 165–173; republished in *Opera Omnia, vol. I seriei tertiae*, Leipzig, Teubner, 1926, pp. 508–515. See also see the third section ("The Age of Euler", by Bell, Truesdell and Campbell) of the entry "Physics of Music", in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.; and Pesic, "Euler's Musical Mathematics", p. 42

[101] Leonhard Euler, *Letters of Euler to a German Princess: On Different Subjects in Physics and Philosophy*, translated by Henry Hunter, with an introduction by Andrew Pyle, facsimile edition of the 1795 edition, London, Thoemmes Continuum, 1997 (2 vols), pp. 27–32 (letter VII), and pp. 33–37 (letter VIII, quotation is on p. 36).

[102] See Martin Kaltenecker, *L'Oreille divisée. Les discours sur l'écoute musicale au XVIIIe et XIXe siècles*, Paris, Éditions MF, 2010, pp. 29–44.

The influence of the sensationalist approach on discourses about music was conditioned by three important questions that shaped the way in which musical life was understood in the 18th century, particularly in France.[103] The first one, which I have just discussed, was the evidence that musical harmony and musical tonality had a mathematical foundation in the acoustical properties of some sonorous bodies, though this foundation was seemingly not able to justify all the details of musical practice. At least for some decades, namely from the publication of the *Traité de l'harmonie*, in 1722, until the development of the Quarrel of the Comic Actors, in the 1750s, the popularity of Rameau's theories and his authority among learned people posed a serious obstacle to any attempt to understand music from the senses.

The second question was the place of music in the configuration of what Paul Otto Kristeller called the "modern system of the arts", that is the delimitation of the fine arts or *beaux arts*—including normally painting, sculpture, poetry, music, and often also architecture—as a field separated from philosophy and the sciences, but also distinct from the mechanical arts, that is the crafts and industries.[104] While it is not clear whether this field could be considered at the time as an established "system",[105] the importance of 18th-century authors in the conceptualization of the fine arts cannot be overstated. This conceptualization, though, was mostly based on literary models and often availed itself of the classical notion—developed by Plato, Aristotle, and later

[103] See Durand-Sendrail, *La Musique de Diderot*, pp. 143–153, where these two questions are developed along similar lines.

[104] See Paul Oskar Kristeller, "The Modern System of the Arts: A Study in the History of Aesthetics Part I", *Journal of the History of Ideas*, vol. 12, no. 4 (October 1951), pp. 496–527, and "The Modern System of the Arts: A Study in the History of Aesthetics Part II", *Journal of the History of Ideas*, vol. 13, no. 1 (January 1952), pp. 17–46. However, the "Discours préliminaire des éditeurs" of the *Encyclopédie* referred to three branches of knowledge: history, which was associated with memory; philosophy, with reason; and the fine arts, with the imagination; see Jean le Rond d'Alembert, "Discours préliminaire des éditeurs", Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: October 2015].

[105] Indeed, this is one of the main criticisms raised by James Porter in his pertinent (though not totally convincing) reappraisal of Kristeller's contribution; see James I. Porter, "Is Art Modern? Kristeller's 'Modern System of the Arts' Reconsidered", *British Journal of Asthetics*, vol. 49, no. 1, 2009, pp. 1–24.

Horace or Plutarch—of imitation or mimesis, whose application to music (especially, to instrumental music) was at least problematic.[106] Besides, whereas the quest for a common principle for the fine arts stimulated comparisons among them and among the senses on which they depended, it also interfered with the incipient exploration of their specificity (see previous section). As Georgia Cowart has pointed out, 18th-century critics often struggled to reconcile "what had finally become a rigid and rule-bound Aristotelian mimesis, and the new critical paths which could more easily accommodate new directions in artistic though."[107] Yet, as I will try to demonstrate in this section, authors dealing with music only rarely denounced the principle of mimesis as such; they rather transformed it, undermining its artistic and literary roots and questioning the validity of rules if not based on the experience of the perceiver. They also reformulated mimesis in ways that foregrounded the expressive characteristics of music.

The third question, closely related to the first one, was the centrality of vocal music, and especially opera, to 18th-century French musical culture, where at least until mid-century, instrumental music was still confined to religious contexts and private concert series, like the Concerts Spirituels series founded in Paris in 1725, which offered mainly religious vocal works, chamber music and Italian-style concertos. German music and musicians and the first Classical symphonies would be introduced in France only in the 1750s.[108] Operas were, however, a relatively young genre, too: the first Italian operas had been introduced by Cardinal Mazarin in mid-17th century.[109] The

[106] For an analysis of the various forms in which 18th-century writers conceived music's mimetic function see Maniates, "'Sonate, que me veux-tu?': The Enigma of French Musical Aesthetics in the 18th Century"; on the problems of musical imitation see chapter 4 of John Neubauer, *The Emancipation of Music from Language: Departure from Mimesis in Eighteenth-Century Aesthetics*, New Haven, CT-London, Yale University Press, 1986, 60–75.

[107] See the Introduction to Cowart (ed.), *French Musical Thought, 1600–1800*, pp. 1–6, on p. 3.

[108] See Debra Nagy, "Music from the Regency to the Revolution, 1715–1789", in Simon Trezise (ed.), *The Cambridge Companion to French Music*, Cambridge, Cambridge University Press, 2015, pp. 88–110.

[109] The first Italian operas imported into France seem to have been Francesco Sacrati's *La finta pazza* (December 1645), Francesco Cavalli's *Egisteo* (1646); see Downing A. Thomas, *Aesthetics of Opera in the Ancien Régime, 1647–*

founding in 1672 of the Académie royale de musique, directed by Jean-Baptiste Lully and devoted to the performance of the new genre, favoured the development of a particular type of French opera, called *tragédie en musique*, which flourished roughly from 1673 to 1764, that is from Jean-Baptiste Lully to Rameau.[110]

Almost since their introduction operas had been at the centre of French public debate, since the new genre represented a major challenge to the ideals of harmony, order and moral restraint typical of French classicism. In the Quarrel of the Ancients and the Moderns that erupted in the 1680s, advocates of the Ancients, like Nicolas Boileau, condemned opera as a sensual distraction and criticized its lack of moral value.[111] Central to their denunciation was the conviction that in the *tragédie en musique* the musical and performative elements, which ideally should have been at the service of the intellectual and moral principles conveyed by the text, too often catered only for sensual pleasure.[112] Thus, they argued, while supernatural effects tried to surprise opera audiences, fanciful melodies aimed at entertaining their ears, at the expense of the comprehension of the plot.[113] These ideas were elaborated and amplified along the 18th century, in the course of successive comparisons between the style of French and Italian operas, like the one that engaged François Raguenet and Jean Laurent Le Cerf de la Viéville, roughly between 1702 and 1706. While Raguenet praised the Italians' adventurous sense of composition and moving inventiveness, Le

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1785, Cambridge, Cambridge University Press, 2002, p. 18. However, between 1660 and 1740, Italian music had been practically banned from the French court, while it became quite popular across Europe; see William Weber, "Le savant et le général. Les goûts musicaux en France au XVIIIe siècle", *Actes de la recherche en sciences sociales*, no. 181–182, 2010/1, pp. 18–33, on p. 25.

[110] See the entry "Tragédie en musique [tragédie lyrique]" by Graham Sandler, in Stanley Sadie (ed.), *New Grove Dictionary of Music and Musicians*, London, Macmillan, 2001, 2nd ed.

[111] On the intellectual debates about opera in late-17th-century and 18th-century French culture see chapter 1 ("Il classicismo e la musica") of Fubini, *Gli enciclopedisti e la musica*, pp. 17–56, esp. 25–27; and chapter 1 ("Song as Performance") of Thomas, *Aesthetics of Opera in the Ancien Régime, 1647–1785*, pp. 17–52.

[112] See Thomas, *Aesthetics of Opera in the Ancien Régime, 1647–1785*, pp. 30–36.

[113] See Thomas, *Music and the Origins of Language*, pp. 146–149.

Cerf de la Viéville defended French music's ability to please the ear, portray the passions in conformity to reason and nature, and respect the rules of good composition.[114] As Fubini has pointed out, the arguments that were discussed reveal reluctance—especially on the part of Le Cerf de la Viéville—to accept the musical element in opera, as well as a moralistic awareness of the power of music, which was only accepted if it followed the text.[115]

As Sarah Nancy has observed, the problem with opera was ultimately related to the tension between *phônê* and *logos*, that is between the animal expression of emotions and rational discourse, as formulated by Aristotle in the *Politics*. While in the second half of the 17th century this tension had been elaborated in rhetorical treatises on *pronunciatio*, and in learned discussions about vocal music, for instance about the *airs* and *airs de cour* that had been so popular in France at the time, in the 18th century it became more visible and pressing with the triumph of opera, which required bigger, more sophisticated performing structures and solicited the public engagement of emotions in a more explicit way.[116] However, it was precisely the non-linguistic expressivity of the voice what, according to some important 18th-century theorists, would provide a justification for music. The double key to this passage was, first, the idea that music aimed at arousing passions and emotions—an idea that, as I argued in the previous chapter, was well established at the end of the 17th century, but that 18th-

[114] François Raguenet, *Paralèle des italiens et des français, en ce qui regarde la musique et les opéras*, Paris, 1702, reprint. Geneva, Minkoff, 1976; Jean Laurent Le Cerf de la Viéville, *Comparaison de la musique italienne et de la musique française*, Brussels, 1705–1706, reprint. Geneva, Minkoff, 1972. Both works were later included in Pierre Bourdelot and Pierre Bonnet, *Histoire de la musique et de ses effets*, Amsterdam, 1725, facsimile ed. Graz, Akademische Druck- u. Verlagsanstalt, 1966. Some excerpts by Raguenet and Le Cerf de La Viéville, translated into English, are now part of Strunk and Treitler (eds), *Source Readings in Music History*, pp. 670–682, and Fubini (ed.), *Music and Culture in Eighteenth-Century Europe*, pp. 66–78.

[115] See Fubini, *Gli enciclopedisti e la musica*, pp. 38–51, esp. pp. 50–51. On the protagonists of the debate see also the entries "Le Cerf de la Viéville, Jean Laurent, Seigneur de Freneuse" by Julie Ann Sadie (with Albert Cohen) and "Raguenet, François", by Albert Cohen and Julie Ann Sadie, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

[116] See Sarah Nancy, "Émotions lyriques, émotions publiques?", *Littératures classiques*, no. 68, 2009/1, pp. 211–224. The reference to *phônê* and *logos* in Aristotle is *Pol*. 1.1253a.

century authors emphasized even more—and second, the association of music (and the musical element in opera) with the non-linguistic expressivity of the voice, often through narratives of origin, as Thomas has studied.[117] As a result, as I will argue below in more detail, music found a moral and aesthetic justification in being considered the natural language of the passions.

The difficulties associated with the treatment of music and the risks that it implied for rationalism were evident, for instance, in one of the earliest French treatises on aesthetics, Jean-Pierre de Crousaz's *Traité du beau* (1715), whose first edition included a long and dense chapter on music that the author decided to suppress in a later edition.[118] Yet, only a few years later Abbé Du Bos' *Réflexions critiques sur la poésie et sur la peinture* (1719/1740, in English as *Critical Reflections on Poetry, Painting and Music*, 1748) demonstrated that imitation could eventually integrate into a decidedly sensualist approach to music.[119] In a few sections (45, 46 and 47) of the first part Du Bos addressed music in relationship to poetry, and discussed it within the paradigm of imitation. He stated that, "[j]ust as the painter imitates the forms and colours of nature so the musician imitates the tones of the voice—its accents, sighs and inflections. He imitates in short all the sounds that nature herself uses to express the feelings and passions." Thus, while articulated words were arbitrary signs of the passions, song

[117] On this subject see particularly chapter 5 ("Sensible Sounds: Music and the Theories of Passions") of Thomas, *Music and the Origins of Language*, pp. 143–172. Thomas' book focuses mainly on 18th-century narratives of the origins of language and music, which is a subject with which I will not deal here.

[118] Jean-Pierre de Crousaz, *Traité du beau, où l'on montre en quoi consiste ce que l'on nomme ainsi, par des exemples tirés de la plupart des arts et des sciences* (Amsterdam, 1715), Geneva, Slatkine Reprints, 1970, which still includes the chapter on music (it disappeared from the 1724 edition). On the role of music in Crousaz' *Traité du beau* see Charles Dill, "Music, Beauty, and the Paradox of Rationalism", in Georgia J. Cowart (ed.), *French Musical Thought, 1600–1800*, Ann Arbor, MI, UMI Research Press, 1989, pp. 197–210.

[119] Abbé (Jean-Baptiste) Dubos, *Réflexions critiques sur la poésie et sur la peinture*, preface by Dominique Désirat, Paris, École nationale supérieure des Beaux-Arts, 1993. Du Bos' *Réflexions critiques…* were published for the first time in 1719, but a new corrected and enlarged edition was issued in 1733. In 1740 there was a third corrected edition on which later posthumous editions were based. The edition published by the École nationale supérieure des Beaux-Arts is based on one of those posthumous editions, that of 1755. The first English edition, *Critical Reflections on Poetry, Painting and Music* (London, J. Nourse, 1748), translated by Thomas Nugent, is available on: https://archive.org/details/criticalreflecti01dubouoft [last access: October 2015].

(accompanied by harmony and rhythm) imitated the natural language of sentiments, and so granted the truth of opera's recitatives. Du Bos also argued that the instrumental sections of operas imitated all kinds of natural sounds and noises,[120] and that musicians could even create imaginary sounds that did not exist in nature, provided that they emulated the way in which they would sound if they existed.[121] In the section 22 of the second part of *Réflexions critiques* the author stressed the importance of *sentiment* (sensations, opinions) for determining whether a work of art had produced on us the impression that it was meant to produce, and he even referred to a "sixth sense" that would be able to judge this.[122] Du Bos defended both the senses and the role of the spectator/listener in the appraisal of the work—as Fubini and Cowart have pointed out, his work opened the way for the recognition of a specifically musical pleasure, a non-verbal aspect of beauty.[123]

Charles Batteux's *Les Beaux-Arts réduits à un même principe*, published in 1746, was considered by Kristeller as "[t]he decisive step toward a system of the fine arts".[124] In the first chapter Batteux classified the arts into three classes (mechanical arts, fine arts, and a third class containing eloquence and architecture) and defined the fine arts by their common object, pleasure.[125] He established the principle of the imitation of nature as common to the fine arts, and stated that "genius—the father of the arts—must imitate nature", though not necessarily as it was. He also argued that taste

[120] Dubos, *Réflexions critiques sur la poésie et sur la peinture*, pp. 150–151. The English quote is taken from the excerpt included in Peter Le Huray and James Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, Cambridge, Cambridge University Press, 1988, pp. 17–22, on p. 18.

[121] Dubos, *Réflexions critiques sur la poésie et sur la peinture*, pp. 154–155.

[122] Ibid., pp. 276–280. On the meaning and sources of *sentiment* in Dubos' *Réflexions critiques…* see Annie Becq, *Genèse de l'esthétique française moderne, 1680-1814. De la Raison classique à l'Imagination créatrice*, Paris, Albin Michel, 1994, pp. 243–265.

[123] Fubini, *Gli enciclopedisti e la musica*, p. 32; and Cowart, "Sense and Sensibility in Eighteenth-Century Musical Thought", pp. 253–254.

[124] Kristeller, "The Modern System of the Arts: A Study in the History of Aesthetics Part II", p. 20.

[125] Charles Batteux, *Les Beaux-Arts réduits à un même principe*, edited by Jean-Rémy Mantion, Paris, Aux Amateurs de Livres, 1989, p. 82.

"finds satisfaction when the artistic choice and imitation of nature has been well managed".[126] Batteux devoted the third part of his treatise to discuss the application of the principle of imitation to the different arts: poetry (including also some theatrical genres), painting, and finally music and dance. Yet, he set music and dance side by side with other usages of speech, gesture and voice, like conversations and orations or formal speeches.[127] Like Dubos, Batteux declared that the passions were the main object of music and dance, and that understanding a piece of music "it is a matter of feeling", since it "speaks to me in tones" and "this language is natural to me". In affirming this, Batteux drew a line between "learned theorists" (*savants théoristes*), who were able to calculate mathematical proportions and knew the relationship between the ear and string vibrations, and "connoisseurs", among whom he wanted to be counted, and who could judge a piece of music as they would judge a picture.[128] While Batteux celebrated the heart as the main organ of musical understanding—he wrote, "when it [the heart] is touched it has understood everything"—,[129] he also advocated a series of aesthetic principles—unity, variety, clarity, exactness, liveliness, simplicity, etc.—inspired by ancient rhetoric and French classicism.[130] In sum, Batteux—like Dubos and other contemporary theorists of the arts—vindicated *sentiment* while still defending imitation and abiding by the rules of good taste and reason.[131]

In the entry "Beau" of the *Encyclopédie* Diderot reviewed past theories of beauty starting with Plato, Augustine, Christian Wolff, and covering also his

[126] Ibid., p. 83; English quotes are taken from the excerpt included in Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, p. 36.

[127] Ibid., pp. 232–233.

[128] Ibid., pp. 239–240, and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, pp. 31–47, on pp. 39–40.

[129] Batteux, *Les Beaux-Arts réduits à un même principe*, p. 241, and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, p. 41.

[130] Batteux, *Les Beaux-Arts réduits à un même principe*, pp. 243–246, and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, p. 41–44.

[131] See Cowart, "Sense and Sensibility in Eighteenth-Century Musical Thought", p. 255.

contemporaries Francis Hutcheson, whose *Inquiry into the Original of our Ideas of Beauty and Virtue* (1725) he analysed and commented very critically, and Yves Marie André (known as Père André), whose *Essai sur le beau* (1741, in English as *Essay on Beauty*, 2010) he strongly recommended.[132] He argued that André's *Essai* was comparable in excellence to Batteux's *Les Beaux-Arts réduits à un même principe*, but objected that both works shared a fault: whereas Batteux did not define the *belle nature* that artists should strive to imitate, André defined many different types of *beau*, but not *beau* itself; besides, neither of them explained how the ideas of *belle nature* or *beau* originated. Since Diderot assumed the Lockean notion that all knowledge came from the senses, he suggested to examine how the notion of *rapport* (ratio, proportion), which André associated with beauty, was created in the perceiving mind, and concluded that anything that had the ability to awaken the idea of *rapport* in that mind could be called beautiful. Even if the notion of *rapport* had mathematical resonances, Diderot did not think that *rapports* should necessarily be consciously perceived in order to be appreciated; on the contrary, he argued that most of the times they were just felt, not understood, as it was the case with musical consonances. The reason for this was habituation, which made possible the quick and easy application of those principles that we had known since childhood, even if this application initially involved judgement.[133] These ideas appeared also in the first of Diderot's *Mémoires sur différents sujets de mathématiques*, entitled *Principes généraux de la science du son* (1748), where the *philosophe* declared that musical pleasure consisted in perceiving *rapports* (ratios,

[132] Francis Hutcheson, *An Inquiry into the Original of Our Ideas of Beauty and Virtue*, revised edition, edited with and introduction by Wolfgang Leidhold, Indianapolis, IN, Liberty Fund, 2008; and Yves Marie André, *Essai sur le beau, avec un discours préliminaire, et des réflexions sur le goût par M. Formey*, Amsterdam, J.H. Schneider, 1760; in English as *Essay on Beauty*, translated and annotated by Alan J. Cain, Porto, Ebook, 2010, available online: https://archive.org/details/EssayOnBeauty [last access: October 2015].

[133] See the entry "Beau" by Denis Diderot, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: October 2015].

proportions) among sounds.[134] Yet, we are not always aware of that perception: instead, we know and appreciate the most perfect chords *par sentiment* (through feeling, or rather through the senses).[135]

Even if Diderot's theory of *rapports* may be interpreted as an attempt to explain art, and particularly music, beyond the notion of imitation, the philosopher never clearly repudiated that notion. Instead, assuming the linguistic character of music, he returned once and again to the complex relationship between the materiality of music and its signification, looking for new ways to understand and express it, and often drawing comparisons between music and the other arts. While it would be possible to trace, as Béatrice Durand-Sendrail has done, the evolution of Diderot's musical ideas from an aesthetics rooted in the verbal model to an aesthetics of sensibility, allusions and metaphors related to both models often appear in the same works, or in works of the same period, as Durand-Sendrail has also recognized.[136] Thus, around the years in which the *Principes généraux de la science du son* and the entry "Beau" of the *Encyclopédie* were published Diderot gave to the press the *Letter on the Deaf and Dumb for the Use of Those Who Hear and Speak* (1751), which I have briefly discussed above.[137] Towards the end of the essay he presented several examples of how an idea could be distinctly expressed in poetry, painting and music,[138] and suggested also the notion of the hieroglyph, which would account for the different ways in which poetry, painting and music were associated with or evoked objects. Diderot developed further

[134] Diderot, *Principes généraux de la science du son*, p. 236.

[135] Ibid., p. 258.

[136] Durand-Sendrail, *La Musique de Diderot*, pp. 143–187, esp. pp. 153 and 165.

[137] While Diderot's *Principes généraux de la science du son* appeared in 1748, the *Encyclopédie, vol. 2: B – Cézimbra*, including his entry "Beau", was published in January 1752, though it was dated 1751; see the page "Vue d'ensemble"on the website of the University of Chicago: ARTFL Encyclopédie Project: http://portail.atilf.fr/encyclopedie/Vue%20d'ensemble.htm#utilise [last access: October 2015]. Therefore, it is possible that Diderot wrote the *Principes généraux de la science du son*, the entry "Beau" and the *Letter on the Deaf and Dumb* (1751) within a few years.

[138] Diderot, *Letter on the Deaf and Dumb*, pp. 210–213.

the notion in a letter addressed to a certain Mademoiselle de La Chaux, where after insisting on the importance of *rapports*, he defined the various arts according to the different ways in which they represented objects. He argued that music did not show or describe objects, but just gave us a vague idea of them; yet, being so imprecise, it could still be the most effective art in engaging our imagination and feelings—an idea that can also be found in similar terms in the entry "Imitation" of Rousseau's *Dictionnaire de musique*.[139] As Durand-Sendrail has observed, music often triggered in Diderot images or metaphors that were at the same time representations of the mechanisms of sensibility. For instance, the metaphor of the sensitive harpsichord (*clavecin sensible*), described in the *Rêve de d'Alembert*, compared the human nerves with the strings of a harpsichord and the resonance of the strings with the act of considering or associating ideas. The musical metaphor stressed so the continuity between sensations or sentiments and ideas.[140]

Built around principle of imitation, Rousseau's *Essai sur l'origine des langues, où il est parlé de la mélodie et de l'imitation musical* (drafted most probably in 1755, but published posthumously in 1781; in English as *Essay on the Origin of Languages*)[141] represented a decided defence of the emotional and moral powers of music. Thus, in chapter 12 the author explained the common origin of language and music, that is how song derived from the first expressive utterances, "accents and

[139] Lettre à Mademoiselle de La Chaux (1951), in Denis Diderot, *Correspondance, tome I*, collected, established and annotated by Georges Roth, Paris, Minuit, 1955, pp. 127; partially translated in Fubini (ed.), *Music and Culture in Eighteenth-Century Europe*, p. 103; and Jean-Jacques Rousseau, *Collection complète des oeuvres, vol. 9. Dictionnaire de musique*, Geneve, 1780-1789, online edition: http://www.rousseauonline.ch/Text/volume-9-dictionnaire-de-musique.php (Beta version: 7 October 2012), pp. 351–353 [last access: October 2015].

[140] Diderot, *Le Rêve de d'Alembert*; see Durand-Sendrail, *La Musique de Diderot*, pp. 190–193.

[141] Jean-Jacques Rousseau, *Essai sur l'origine des langues*, *où il est parlé de la mélodie et de l'imitation musicale*, edited and presented by Jean Starobinski, Paris, Gallimard, 1990. In English as *Essay on the Origin of Languages*, in *The Discourses and Other Early Political Writings*, edited by Victor Gourevitch, Cambridge, Cambridge University Press, 1997, pp. 247–299, though most of the chapters devoted to music are also included in Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, pp. 66–82, and also in Fubini (ed.), *Music and Culture in Eighteenth-Century Europe*, pp. 91–102. On the probable date of composition of the *Essai* see Thomas, *Music and the Origins of Language*, pp. 83–84.

inflections of varying frequency, emphasis and pitch, according to the feelings that are to be conveyed".[142] Rousseau took here a stand similar to Dubos' (see above), but also to Condillac in the chapters devoted to the common origin of language and music in the *Essai sur l'origine des connaissances humaines*. Yet, while in Condillac's account the initial separation of music from words was followed by the discovery of harmony, which he derived from the human voice,[143] Rousseau conceived the *Essai sur l'origine des langues* in blatant opposition to Rameau's harmonic theories, which he openly rejected. In particular, as Thomas has argued, Rousseau wanted to criticize the principle of the *corps sonore*, namely that music is a universal phenomenon resulting from physical action, and that harmony is superior to melody.[144] Thus, in chapters 13 and 14 Rousseau underlined the importance of melody versus harmony (and timbre) by comparing them with design and colour in painting, since "it is melody that delineates the features and forms, harmonies and timbres being only the colours", and it is design and melody that move and affect us when we look at a painting or listen to music.[145] Yet, in order to emphasize his argument, Rousseau identified harmony with "simple sounds", and stated that music was not just the art of combining sounds in an agreeable manner: if that were the case, he adduced, it would "belong to the natural sciences, rather than to the fine arts".[146] Besides, Rousseau denied—against Rameau, again—that harmony was rooted in nature and could be understood by "an untrained person with a good ear"; on the contrary, "[t]he person who has never heard a bass or a harmony will

[142] Rousseau, *Essai sur l'origine des langues*, p. 115; English quotes are taken from the excerpts included in Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, p. 69.

[143] Condillac, *Essay on the Origin of Human Knowledge*, pp. 138–145.

[144] See Thomas, *Music and the Origins of Language*, p. 90, and the whole chapter 4 ("Music and Original Loss in Rousseau's *Essai sur l'origine des langues*, pp. 82–142.

[145] Ibid., pp. 118–119; and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, p. 70.

[146] Ibid., p. 121; and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, p. 72.

find neither, unaided, and if he were made to listen to them, he would find them displeasing and would prefer the simple unison". On the other hand, melody imitated "the inflections of the voice" and "the vocal expressions of passion"—being the natural language of passions, it was able to stir emotions in sensitive hearts.[147]

In chapter 15 Rousseau argued that "[t]he sounds of a melody do not only act on us as sounds but as signs of our affections and feelings", and criticized the consideration of sounds as only "having an effect on the nerves".[148] However, Rousseau did not clarify in which way melodies may have acted as "signs" of affections, neither did he explain how their being "signs"—a true language that had to be interpreted with a dictionary, as he stated in chapter 14—[149] was compatible with the emotional immediacy that he appreciated in them, and which he associated with the natural expressivity of the voice. Moreover, he did not elucidate how the natural expressivity of the voice was different from the effect that sounds may have on the nerves. As Christopher Gärtner has argued, Rousseau circumvented the challenges posed by the passions "by excluding any consideration of the[ir] possible physical causes and manifestations", and by showing no interest "either in the physiological processes of the body or in the problems of sense-perception".[150] In sum, the way in which Rousseau combined the appreciation of non-linguistic elements in the voice and a detachment from the notion of sound comes across as highly paradoxical.

Although in the *Essai sur l'origine des langues* Rousseau sometimes seemed to be theorizing the difference between vocal and instrumental music, the line that he drew

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[147] Ibid., pp. 123–125; and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, pp. 74–75.

[148] Ibid., p. 126; and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, p. 76.

[149] Ibid., p. 123.

[150] Christopher Gärtner, "*Remuer l'Âme* or *Plaire à l'Oreille*? Music, Emotions and the Mind-Body Problem in French Writings of the Later Eighteenth Century", in Penelope Gouk and Helen Hills (eds), *Representing Emotions: New Connections in the Histories of Art, Music and Medicine*, Aldershot, Ashgate, 2005, pp. 173–188, on p. 175.

explicitly separated harmony (sound) from melody, and the physical approach to sound, which he identified with Rameau's harmonic theories, from an appraisal of melody (and melody-based music) as the language of the heart. As Gärtner has also observed, this duality roughly corresponds to the two different *Encyclopédie* entries dealing directly with music: "Musique", written by the same Rousseau, and "Musique, effets de la", penned by the Montpellier school physician Jean-Joseph Menuret, who signed as Menuret de Chambaud.[151] In his long entry Rousseau defined music both as a science and as an art of arranging sounds to produce pleasant sensations, but stressed particularly its ability to touch the soul. Though in a more conciliating tone than the one he adopted in the *Essai sur l'origine des langues*, he praised ancient music for being more expressive and moving, and found fault with modern music for being only oriented to please the ear.[152] At a certain point Rousseau mentioned tarantism as an example of how sound could affect the human body, but differentiated these phenomena from music, and pointed out that they should be explained by physicists.

Phenomena like tarantism were precisely the subject of Menuret de Chambaud's entry, which discussed the power of music on human sensibility, and the fact that music did not influence the soul alone, but also the body. The author reviewed the scholars that had dealt with the magical and therapeutic effects of music, and in doing so he tried to discern the difference between marvellous and accurate reports. He also separated the purely mechanic effects of music from the effects that affected the sensibility, even if he

[151] See the entry "Musique" by Jean-Jacques Rousseau and the entry "Musique, effets de la" by Menuret de Chambaud, in Diderot and d'Alembert (eds), *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.*, University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu [last access: October 2015]. Both entries were included in *Encyclopédie, vol. 10: Mammelle – Myva*, published in December 1765; see the page "Vue d'ensemble"on the website of the University of Chicago: ARTFL Encyclopédie Project: http://portail.atilf.fr/encyclopedie/Vue%20d'ensemble.htm#utilise [last access: October 2015]. See Gärtner, "*Remuer l'Âme* or *Plaire à l'Oreille*?", pp. 174–178.

[152] The comparison with ancient music is addressed in chapter 19 of Rousseau's *Essai sur l'origine des langues*, pp. 138–142; and Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, pp. 80–82.

stressed that the second type was strictly reducible to the first one. Menuret de Chambaud's contribution was, in fact, totally consistent with the notion of sensibility, though it also revealed his author's interest in explaining music's effects in the medical vocabulary of the time. As Thomas has argued, in the 18th-century many writers on music aimed at understanding "the natural effects that music had on the body and soul of the listener".[153] Not surprisingly, many of them were physicians, like Menuret de Chambaud and his Montpellier colleague, Joseph-Louis Roger, author of *Tentamen de vi soni et musices in corpore humano* (1758, in French as *Traité des effets de la musique sur le corps humain*, 1803),[154] or Jean Baptiste Joseph Lallemant, author of the *Essai sur le méchanisme des passions en général* (1751), which apparently mixed observations on medicine and music.[155]

The last decades of the 18th century saw the publication of some essays on music that bore witness of an increasing discontent with the theoretical frameworks within which it had been conceived so far. Thus, in his *Observations sur la musique, et principalement sur la métaphysique de l'art* (1779, "Observations on Music and Principally on the Metaphysics of Art") Michel-Paul-Guy de Chabanon, a violinist and composer, and a close friend of Rameau and Voltaire, found fault with the application of the notion of imitation to music. According to him, music was mainly not about imitating anything, but it essentially consisted in melody: it had to sing, since it was only in singing that it could achieve its purpose of pleasing the audience. This applied

[153] Thomas, *Aesthetics of Opera in the Ancien Régime, 1647–1785*, p. 187, and the whole chapter 6 ("Heart Strings"), pp. 179–200.

[154] Joseph-Louis Roger, *Traité des effets de la musique sur le corps humain*, translated from Latin and annotated by Étienne Sainte-Marie, Paris, Brunot, 1803. Indeed, medical literature on the effects of music was also quite popular in 18th-century Britain, as Penelope Gouk has revealed; see her "Music and the Nervous System in Eighteenth-Century British Medical Thought", in James Kennaway (ed.), *Music and the Nerves, 1700–1900*, Basingstoke, UK, Palgrave Macmillan, 2014, pp. 44–71.

[155] See Thomas , *Music and the Origins of Language*, pp. 154–158, where the author also refers to other contemporary essays on the physiology of musical passions. On 18th-century interest in music's healing powers see also Erlmann, *Reason and Resonance: A History of Modern Aurality*, pp. 133–149.

not only to songs, but also to symphonies, provided that they featured beautiful melodies that flattered the ear.[156] In the preface of the essay Chabanon mentioned the Abbé Morellet and a certain Boyé, author of *L'Expression musical mise au rang des chimères* (1779), as the only authors whose approach to music was akin to his. As Mary Sue Morrow has remarked, their criticisms did not question the validity of the mimetic principle as such, and had a limited impact at the time.[157] Still, they were the sign of a slow transformation in discourse about music that went hand in hand with changes in musical practice.

5.2 Classical music and the question of listening

Early 18th-century audiences often considered musical performances, in Peter Gay's words, as "mere accompaniments to sociability", "an agreeable backdrop for flirting, gossiping, dining".[158] While some scholars have condemned this attitude for their purported lack or weakness of attention, historians of listening practices like James Johnson or William Weber have argued that 18th-century participants in musical events acted according to an attention model that was different from the silent absorption that is still required in most concert halls today. As Johnson has summarized the matter, "listening for storms, birds, and battles, as Rameau's audiences did" did not demand

[156] See chapters 2, 3, 4 (against the notion of music as an art of imitation) and 5 (on the ways in which music can imitate) in Michel-Paul-Guy de Chabanon, *Observations sur la musique, et principalement sur la métaphysique de l'art*, Paris, Pissot, Père et Fils, 1779, accessible online: http://gallica.bnf.fr/ark:/12148/bpt6k108142t [last access: October 2015]. An excerpt of that book has been translated into English and included in Fubini (ed.), *Music and Culture in Eighteenth-Century Europe*, pp. 378–1383. In 1785 Chabanon issued an enlarged edition of the *Observations sur la musique*: *De la Musique considerée en elle-même et dans ses rapports avec la parole, les langues, la poésie et le théâtre*, Paris, Pissot, 1785, accessible online: http://gallica.bnf.fr/ark:/12148/bpt6k1081402.r=chabanon%20musique%20consider%C3%A9e [last access: October 2015].

[157] Mary Sue Morrow, *German Music Criticism in the Late Eighteenth Century: Aesthetic Issues in Instrumental Music*, Cambrideg, Cambridge University Press, 1997, p. 6, which argues against the position of, among others, Neubauer, *The Emancipation of Music from Language*, pp. 170–171. On Chabanon and Boyé see also Maniates, "'Sonate, que me veux-tu?': The Enigma of French Musical Aesthetics in the 18th Century", pp. 124–126.

[158] Peter Gay, *The Bourgeois Experience Victoria to Freud, vol. IV: The Naked Heart*, New York–London, W.W. Norton & Co., 1995, pp. 14–18, quote is on p. 14.

"much less attention than did listening for indescribable feelings and urges, as Beethoven's audiences did": it rather demanded an attention *of a different kind*.[159] More precisely, Weber has stated that "opera in the 18th century possessed what we might call a mixed social etiquette": "[p]eople took for granted that they should socialize during parts of the performance (…) But it is also clear that some people did watch and listen, and that at points the entire audience did so".[160] As he has observed elsewhere, behaviour in musical gatherings was not considered mainly a matter of individual preference or attitude, but a social process.[161]

Around 1770 Parisian musical life took the first steps towards the institution of public concerts. The Concert des Amateurs, a private society of which Chabanon was a member,[162] was founded in 1769, and the Concert des Abonnés and the Concert de la Loge Olympique followed; the latter was open to common people. As I have mentioned above, in the second half of the 18th century instrumental music—Italian and German, mainly—was increasingly present in concert programmes, and the first Classical symphonies were introduced. As James Johnson has argued, the large concert societies of the 1770s and 1780s stimulated a change in the behaviour of audiences: from the amused and mostly distracted attitude of former decades to a more attentive listening, even if complete silence was by no means a requirement. The change, so Johnson contends, also took place at the Opéra, where the triumph of Gluck's operas was accompanied by a new attentiveness of audiences, and by public effusions of sensibility,

[159] Johnson, *Listening in Paris: A Cultural History*, p. 3. However, Johnson begins by admitting that this assertion is an oversimplification ("to oversimplify, listening for storms, birds, etc.").

[160] William Weber, "Did People Listen in the 18th Century?", *Early Music*, vol. 25, n. 4, 25th Anniversary Issue; Listening Practice, November 1997, pp. 678–691, on p. 681.

[161] William Weber, "Le savant et le général. Les goûts musicaux en France au XVIIIe siècle", *Actes de la recherche en sciences sociales*, no. 181–182, 2010/1, pp. 18–33, on p. 26.

[162] See the entry "Chabanon, Michel-Paul-Guy de" by Ora Frishberg Saloman, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

occasionally including tears.[163] Connoisseurs (or *connaisseurs*) also had an increasingly important role in 18th-century musical life and were frequently invoked in music reviews, were generally alluded to in the plural, as a group. Although some of them had some knowledge of musical language, they occupied a particular space between learned people (*savants*, mostly professional musicians) and the general public, whose taste they were not supposed to dictate.[164] Terms similar to "connoisseurs" and *savants* existed also in German to refer to different communities of listeners. As I will argue in the next section, the way in which their meanings changed through the century may provide a cue to understand the profound transformation of the discourses on listening that will take place around 1800.

5.2.1 From the rhetoric of affect to the musical ear as inner sense

As I argued in the previous chapter, musical rhetoric grew in German soil more exuberantly than anywhere else, developing in the 17th century a theory of figures (*Figurenlehre*) that for many scholars has become the emblem of that tradition. At the beginning of the 18th century there were signs of decline, but also important theoretical contributions, like those of Johann Mattheson, author of the influential compendium *Der Vollkommene Capellmeister* (1739, "The Complete Music Director"), where he criticized the identification of music with mathematics and harmony.[165] "Sound—he wrote—is the only subject of music, just as hearing is its object", whereas numbers

[163] See chapter 3 ("Tears and the New Attentiveness") and chapter 4 ("Concerts in the Old Regime") of James H. Johnson, *Listening in Paris: A Cultural History*, Berkeley, University of California Press, 1995, pp. 53–80.

[164] Weber, "Le savant et le général. Les goûts musicaux en France au XVIIIe siècle", p. 27.

[165] Johann Mattheson, *Der Vollkommene Capellmeister*, a revised translation with critical commentary by Ernest C. Harris, Ann Arbor, MI, UMI Research Press, 2005 (2 vols); see also Hans Lenneberg, "Johann Mattheson on Affect and Rhetoric in Music (I)", *Journal of Music Theory*, vol. 2, no. 1, April 1958, pp. 193–236, and by the same author, "Johann Mattheson on Affect and Rhetoric in Music (II)", *Journal of Music Theory*, *Journal of Music Theory*, vol. 2, no. 2, November 1958, pp. 47–84; both articles include a selection of passages of *Der Vollkommene Capellmeister* translated into English. On Mattheson see also the entry "Mattheson, Johann" by George J. Buelow, in Sadie (ed.), *New Grove Dictionary of Music and Musicians*, 2nd ed.

could only assist in the comprehension of harmony.[166] Mattheson was also one of the main proponents of the theory of affects (*Affektenlehre*), which is the name given by some 19h-century German musicologists to the correspondence between the affects expressed in the music and those experience by the listener. Yet, he was more interested in problems of composition (the *inventio* and *dispositio* of classical treatises) that in the cultivation of *elocutio* through rhetorical figures.[167]

In his first published theoretical work, *Das neu-eröffnete Orchestre* (1713), Mattheson had referred to *Liebhaber*—amateurs, dilettanti or *galant hommes*, who were neither professional musicians, nor musical experts, but attended concerts regularly and cultivated their taste.[168] The positive sense of *Liebhaber* must be interpreted within the music-rhetorical paradigm (see earlier in this chapter), where the responsibility of musical understanding is split between composer and audience. As Matthew Riley has argued, the meaning of attention (*Aufmerksamkeit*)[169] for the subsequent generation of German writers on music—that of Georg Friedrich Meier and Johann Georg Sulzer, among others—provides a key to understanding this paradigm, as well as the tensions implicit in it. These authors delineated a concept of attention that, at least in principle, did not discern between beautiful melodies and other pleasant solicitations of the senses.[170] Attention had for them a voluntary (or arbitrary) dimension, and a natural (or

[166] Excerpt from "The Complete Music Director (1739)", in Fubini (ed.), *Music and Culture in Eighteenth-Century Europe*, pp. 277–284, on p. 277; see also Patrick McCreless, "Music and Rhetoric", in Christensen (ed.), *The Cambridge History of Western Music Theory*, Cambridge, Cambridge University Press, 2002pp. 847–879, esp. 868–870.

[167] See Patrick McCreless, "Music and Rhetoric", in Christensen (ed.), *The Cambridge History of Western Music Theory*, Cambridge, Cambridge University Press, 2002pp. 847–879, esp. 868–870.

[168] Riley, *Musical Listening in the German Enlightenment*, p. 89.

[169] I have commented above, with reference to Charles Bonnet, on the importance of the concept of attention in 18th century science; see again Daston, *Eine kurze Geschichte der wissenschaftlichen Aufmerksamkeit*, and Daston and Park, *Wonders and the Order of Nature, 1150–1700*.

[170] Riley, *Musical Listening in the German Enlightenment*, pp. 9–10.

compulsory) one,[171] and it did not primarily consist in decoding the musical work, but in being affected by it. Therefore, the notion of attention normally emerged at the intersection of technical literature on the composition of musical works—some scholars, like Johann Nikolaus Forkel, the first Bach biographer, even discussed "figures of attention" as a possible category—and philosophical observations on the moral and aesthetic effects of music on the listeners.[172]

The notion of attention also resonated with the ideal of harmony between body and soul that, according to Barbara Thums, was cultivated in contemporary German pietist circles, and with the literary movement of *Empfindsamkeit* (sensitive style), which gained momentum in the second half of the century. Attention to beauty (or to perfection) was understood in unequivocal moral terms, as an inspiration for morally uplifting imitation and as a way to educate the senses.[173] Indeed, in the 18th century the senses became the object of a new type of philosophical reflection, aesthetics, which was first introduced by Alexander Baumgarten in his *Meditations philosophicae de nonnullis ad poema pertinentibus* (1735), and later developed in his major work *Aesthetica* (1750), which unfortunately remained unfinished. The fragmentary character of that work,[174] and its author's affiliation—as a student of Christian Wolff, who had studied under Leibniz—to aesthetic rationalism, a tradition that so far has not received much scholarly attention, have hindered the comprehension of the project, whose

[171] Ibid., pp. 3 and 29.

[172] Ibid., p. 7; on figures of attention see chapter 5 ("A Rhetoric of Attention"), pp. 121–171.

[173] See Barbara Thums, "Aufmerksamkeit: Zur Ästhetisierung eines anthropologischen Paradigmas im 18.Jahrhundert", in Jörn Steirgewald and Daniela Watzke (ed.), *Reiz- Imagination - Aufmerksamkeit*, Würzburg, Königshausen & Neuma, 2003, pp. 55–74.

[174] Besides, almost all available translations of Baumgarten's *Aesthetica* (except for a German and a recent Italian edition) are selections; see for instance Alexander G. Baumgarten, *Esthétique précédée des Méditations philosophiques sur quelques sujets se rapportant à l'essence du poème et de la métaphysique*, translation, presentation and notes by Jean-Yves Prandière, Paris, L'Herne, 1988. The first complete German edition is: *Ästhetik*, Latin-German edition, translation, preface, notes and indexes by Dagmar Mirbach, 2 vols., Hamburg, Felix Meiner Verlag, 2007; the Italian edition is: *L'Estetica*, edited by Salvatore Tedesco, Palemo, Aesthetica Edizioni, 2002.

purpose remains still unclear.[175] However, it is probably safe to state that Baumgarten's aesthetics should be interpreted as a philosophy of the sensible rather than as a philosophy of the arts or a science of beauty.[176] Besides, according to Frederick Beiser, Baumgarten's aesthetics conveyed the tension between the objective and the subjective that was characteristic of aesthetic rationalism. A second important attribute of aesthetic rationalism was its insistence on the necessity of rules as a guarantee for the formal perfection of aesthetic objects;[177] a requirement that also applied to the appraisal of musical works. As Mary Sue Morrow has argued, allusions to various rules of composition—regarding, for example, the movement of voices, the preparation of cadences, or the specific character of certain genres—were a staple of German music reviews until well into the 1760s.[178]

Johann Georg Sulzer, author and editor of the *Allgemeine Theorie der schönen Künste* (1771-1774, "General Theory of the Fine Arts"), occupied a singular place between the doctrine of aesthetic rationalism and sensationism.[179] Sensationism had been introduced to Germany through the translation, in 1726, of Du Bos' *Réflexions critiques* and the influence of the British empiricists.[180] For instance, in the entry "Aesthetic [*Aesthetik*]" of the *Allgemeine Theorie* Sulzer credited Baumgarten with the coinage of the term, and mentioned also the necessity of establishing certain rules for

[175] However, two recent books have tried to fill the gap, though they have taken different directions: Frederick C. Beiser, *Diotima's Children: German Aesthetic Rationalism from Leibniz to Lessing*, Oxford, Oxford University Press, 2009, and Stefanie Buchenau, *The Founding of Aesthetics in the German Enlightenment: The Art of Invention and the Invention of Art*, Cambridge, Cambridge University Press, 2013.

[176] See for instance Steffen W. Gross, "The Neglected Programme of Aesthetics", *British Journal of Aesthetics*, vol. 42, no. 4, October 2002, pp. 403–414.

[177] See Beiser, *Diotima's Children*, pp. 9–12.

[178] See chapter 5 ("The Importance of Being Correct") of Morrow, *German Music Criticism in the Late Eighteenth Century*, pp. 79–98.

[179] See Thomas Christensen's Introduction to a selection of articles from Sulzer's *General Theory of the Fine* Arts, in Nancy Kovaleff Baker and Thomas Christensen, *Aesthetics and the Art of Musical Composition in the German Enlightenment: Selected Writings of Johann Georg Sulzer and Heinrich Christoph Koch*, Cambridge-New York, Cambridge University Press, 1995, p. 5.

[180] See Cowart, "Sense and Sensibility in Eighteenth-Century Musical Thought", p. 258.

the realization of art; yet, he emphasized that the main purpose of the fine arts, including music, was "to manipulate emotions".[181] The importance of emotions in Sulzer's understanding of music is clearly expressed in the entry "Musical Expression [*Ausdruck in der Musik*], where he stated that we should heard in song "not just the most perfect succession of notes, but also a speech that seems to be the outpourings of a sensitive heart, the pleasing engagement of the ear", and that "the pleasing engagement of the ear serves as a kind of inducement to the soul by which it can succumb to all the sentiments brought forth through the expressiveness of the song".[182] In considering also his earlier works on the theory of pleasures, Sulzer seems to conceive aesthetics as a proper science of sentiment, based on the dynamism of the soul.[183]

In 1777 Forkel published his *Ueber die Theorie der Musik, insofern sie Liebhabern und Kennern nothwendig und nützlich ist* (translatable as "On the Theory of Music, in So Far as It Is Necessary and Useful for Amateurs and Connoisseurs"), where he drew on Sulzer's entry "Kenner" also to reflect on *Kenner* (connoisseurs, experts) and *Liebhaber* (amateurs, dilettanti). Yet, in contrast to Mattheson, Forkel regarded *Liebhaber* mainly as potential *Kenner*—an approach that was also evident in his cultural initiatives, which were often conceived to enhance the education of listeners.[184] A few years later Carl Philipp Emanuel Bach, the fifth of Johann Sebastian's children, who was a regular correspondent with Forkel, would publish six collections of sonatas, rondos and fantasias under the title *Clavier Sonaten für Kenner und Liebhaber* (1779-

[181] Ibid., pp. 25–27.

[182] Kovaleff Baker and Christensen, *Aesthetics and the Art of Musical Composition in the German Enlightenment*, p. 50.

[183] See Élisabeth Décultot, "Métaphysique ou physiologie du beau? La théorie des plaisirs de Johann Georg Sulzer (1751–1752)", *Revue germanique internationale*, no. 4, 2006: "Estétiques de l'Aufklärung", pp. 93–106.

[184] See Johann Nikolaus Forkel, *Ueber die Theorie der Musik, insofern sie Liebhabern und Kennern nothwendig und nützlich ist: Eine Einladungsschrift zu musikalischen Vorlesungen*, Göttingen, Vandenhoeck, 1777, accessible online on the website of the Bayerische StaatsBibliothek: http://www.mdz-nbn-resolving.de/urn/resolver.pl?urn=urn:nbn:de:bvb:12-bsb10527183-1 [last access: October 2015]; see also Matthew Riley, *Musical Listening in the German Enlightenment: Attention, Wonder and Astonishment*, Aldershot, Ashgate, 2004, pp. 88–89.

1787); other composers would promptly imitate the title.[185] Among the musical forms included in the collections, the very popular rondos were especially directed to the *Liebhaber*, who often were also domestic amateur players, and whose musical taste (and wanting technique) authors and publishers could not afford the luxury of ignoring.[186]

According to Riley, Forkel's approach to *Liebhaber* pointed to an important change that took place in the German countries towards the end of the century, and which transformed the meaning of attention and the conception of music listening. While music listening had mainly been considered as a correspondence between the rhetorical structure of the work and the disposition of the listener, at the turn of the century it was increasingly described as an inner sense, an inner dynamic of the soul (as we have seen in Sulzer), which could be cultivated (as Forkel advocated). Not surprisingly, the internalization of listening happened in parallel to the increasing appreciation of the composers' creative genius in German music reviews, which Morrow observed in reviews appeared since the 1770s in general and music periodicals.[187] In contrast to the empire of rules that was typical of aesthetic rationalism, the notion of genius was associated with the power of invention and originality; in Sulzer's view, genius required not only a powerful intellect, but also a lively imagination and intense emotions.[188]

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[185] See Christopher Hogwood's introduction to Carl Philipp Emanuel Bach, *The Complete Works, Series I, vol. 4.1: "Kenner und Liebhaber" Collections I*, edited by Christopher Hogwood, general editor: Darrell M. Berg, Los Altos, California, The Packard Humanities Institute, 2009, pp. xi–xxi.

[186] See Riley, *Musical Listening in the German Enlightenment*, p. 152; and Mark Evan Bonds, "Listening to Listeners", in Danuta Mirka and Kofi Agawu (eds), *Communication in Eighteenth–Century Music*, Cambridge, Cambridge University Press, 2008, pp. 34–52.

[187] See chapter 6 ("The Reign of Genius") of Morrow, *German Music Criticism in the Late Eighteenth Century*, pp. 99–133.

[188] See the entry "Genius [Genie]" in the *Allgemeine Theorie der schönen Künste* (1792-1794; 2nd ed.), included in Le Huray and Day (eds), *Music and Aesthetics in the Eighteenth and Early-Nineteenth Centuries*, abridged edition, pp. 102–105.

CHAPTER 6

Studying Hearing and Music Listening after 1800

6.1. Listening to music and science in Romanticism

6.1.1 Acoustic experimentation and the development of new instruments

As Paolo Brenni has observed, at the end of the 18th century numerous acoustic phenomena had been discovered and studied in detail, but "no systematic experimentation had been conducted parallel to theory".[1] Comparing the third volume of Jean-Antoine Nollet's *Leçons de physique expérimental* (second edition, 1750) and Mathurin Jacques Brisson's *Traité élementaire ou principe de physique* (1797) Brenni finds references to the same elementary acoustic instruments, such as some bells, the megaphone, the monochord, and the famous bell in an air pump (used to prove that sound does not travel through a vacuum), and presents this fact as evidence of the scarce importance of acoustical experimentation at the time.[2]

However, towards the turn of the century a change can be perceived, with physics treatises like those of Jean-Baptiste Biot (*Traité de physique expérimentale et mathématique*, 1816) and Claude Pouillet (*Éléments de physique expérimentale et de météorologie*, 1827) giving more space to acoustics and including illustrations of a substantial number of acoustic instruments.[3] The work of German physicist and musician Ernst Chladni (1756-1827) is commonly held responsible, at least in part, for this renewed interest in acoustics. As Dieter Ullmann has remarked, it seems reasonable

[1] Paolo Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", in Anna Giatti and Mara Miniati (eds), *L'acustica e i suoi strumenti: La collezione dell'Istituto Tecnico Toscano/ Acoustics and Its Instruments: The Collection of the Istituto Tecnico Toscano*, Firenze, Giunti, 2001, pp. 57–72, at p. 57.

[2] Ibid., pp. 57–58.

[3] Ibid., p. 58.

to think that the flourishing of European musical life during the second half of the 18th century, which was associated with a need to improve old musical instruments and devise new ones, may have also played a crucial part in that change.[4] The first decades of the 19th century brought about the consolidation of acoustics as a branch of physics and the intensification of acoustic experimentation—a process that was accompanied by the invention of an increasing number of instruments and by the emergence of the first acoustical instrument makers. To some extent this renewed interest in acoustics was inspired by the theories and designs of German physicist and musician Ernst Chladni (1756-1827).

Having studied the writings on acoustics of Leonhard Euler and Daniel Bernoulli (see chapter 5), Chladni was determined to investigate two questions that had not received much attention so far: the vibratory properties of plates and the transversal vibrations of rods.[5] Indeed, his most famous experiment dealt with the first question: after having lightly covered a plate with sand, he stroke it with a violin bow, which made the plate resonate at one of its natural frequencies and created patterns on the surface that reflected he vibratory patterns of the plate. According to Dieter Ullmann, the idea of using a violin bow to make the plate vibrate had been first suggested by Nikolaus Forkel, although Chladni had found a decisive clue about the figures in an experiment with electricity conducted and reported by Georg Christoph Lichtenberg.[6] Chladni first described the sand patterns—called thereafter "Chladni's figures"—in his *Entdeckungen über die Theorie des Klanges* ("Discoveries in the Theory of Sound", 1787), though they were also reproduced in *Die Akustik* ("Acoustics", 1802) and reappeared in later works like *Neue Beyträge zur Akustik* ("New Contributions to

[4] Dieter Ullmann,"Chladni und die Entwicklung der experimentellen Akustik um 1800", *Archive for History of Exact Sciences*, vol. 31, issue 1, 1984, pp. 35–52, p. 35.

[5] Ibid., at pp. 38–39.

[6] Ibid., p. 39.

Acoustic", 1817) and *Kurze Übersicht der Schall- und Klanglehre* ("Short Digest of the Theory of Sound and Tone", 1827). Yet, he did not include a mathematical explanation of his observations—this was partially provided only in 1815 by French mathematician Sophie Germain, who was awarded for her achievement a special prize offered by Napoleon. Neither could Chladni prove whether the sand patterns coincided with the nodes (the points of no vibration) of the plates. Using Chladni's figures French physicist Félix Savart would demonstrate the vibration of the tympanic membrane in 1824; whereas in 1831 British physicist Michael Faraday also devoted a long paper to Chladni's sand figures.[7]

Like other physicists of the late eighteenth and early-nineteenth centuries, Chladni also devised and built new musical instruments, such as the euphone and the clavicylinder, which he conceived as applications of his theories.[8] As Myles W. Jackson has argued, this was far from unusual at the turn of the 19th century, when the interests of musicians and instrument makers, on one hand, and, on the other hand, natural philosophers and physicians often converged on the invention and construction of musical instruments.[9] Besides, Chladni was the first to systematically study the vibration of tuning forks, a type of instrument that had been invented in 1711 by the English trumpeter John Shore. Originally conceived for musical purposes, the purity

[7] On Sophie Germain's mathematical solution, see ibid., pp. 34–35, and also Lindsay, "The Story of Acoustics", in R. Bruce Lindsay (ed.), *Acoustics: Historical and Philosophical Development*, Stroudsburg, PA, Dowden, Hutchinson and Ross, 1973, pp. 5-20, at p. 9. On Chladni see Ullmann,"Chladni und die Entwicklung der experimentellen Akustik um 1800", pp. 41–42, and also the webpage *Ernst Chladni – Monoskop*, http://monoskop.org/Ernst_Chladni [last access: November 2015].

[8] Chladni mentions those two instruments and his reasons for developing them in the preface to the French edition of *Die Akustik*, which he translated from German; see Chladni, *Traité d'acoustiqu*e, Paris, Courcier, 1809, digital edition accessible online: http://gallica.bnf.fr/ark:/12148/bpt6k61977h [last access: October 2015].

[9] On German-speaking countries see Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany*, Cambridge, MA, and London, MIT Press, 2006, pp. 1–3 and *passim*.

and stability of their tones would attract the attention of physicists and physicians in the following century.[10]

The siren, created by Charles Cagniard de la Tour around 1819, and successively improved by August Seebeck, Heinrich Wilhelm Dove and Hermann von Helmholtz, was a fine example of the new generation of acoustic instruments.[11] Caignard's main aim in inventing it was the determination of the exact frequency of sounds, which could be measured more easily than with strings or vibrating reeds. The new instrument could also produce a wider range of frequencies than that of conventional musical instruments—after Helmholtz's later improvements, sirens would even produce various combinations of sounds.[12] Yet, the mechanism of the siren was even more interesting, since it was based on the observation that a quick succession of single sounds would be perceived as a continuous sound, whose pitch depended on the frequency of the beats.[13]

Taking advantage of new acoustic instruments, 19th-century physicists would not only study the acoustic properties of different kinds of surfaces and objects, but would also explore the potential and limits of the ear. Indeed, interest in the measuring of human auditory capacities grew in parallel to the emergence of otology as a medical speciality, during the second half of the 19th century (see next section). Interestingly, though, the hearing tests and clinical procedures conceived by physicians did not necessarily overlap with those conceived by physicists, since they served different purposes.

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[10] On Chladni's importance for the history of acoustics, and particularly on how he developed his research between physics and music-instrument making, see chapter 2 ("E.F.F. Chladni: The Nodal Point between Acoustician and Musical-Instrument Maker") of Jackson, *Harmonious Triads*, pp. 13–44.

[11] See Robert T. Beyer, *Sounds of Our Times: Two Hundred Years of Acoustics*, New York, Springer Verlag-AIP Press, 1998, pp. 29–32.

[12] Paolo Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", pp. 61–62.

[13] Charles (Baron) Caignard de la Tour, "Sur la Sirène, nouvelle machine d'acoustique destinée à mesurer les vibrations de l'air qui constituent le son", *Annales de chimie et de physique*, vol. 12, 1819, pp. 167–171; see also Stephan Vogel, "Sensation of Tone, Perception of Sound, and Empiricism: Helmholtz's Physiological Acoustics", in *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*, Berkeley, University of California Press, 1993, pp. 259–287, on pp. 262–263.

After the first auditory measurements made by Joseph Sauveur in 1700, during the 18th and early 19th centuries other physicists tried to establish the limits of human audition using sonorous pipes or stretched strings.[14] For instance, in 1820 physicist and physician William Hyde Wollaston, who was the first to understand the clinical importance of measuring upper and lower thresholds,[15] constructed a series of pipes to measure absolute thresholds, and found them at 30 and 18,000 Hz, which is fairly close to current data.[16] In the 1830s physicist Savart began experimenting with spoked wheels (also known as "toothwheel sirens" or "Savart's wheels"), which in the following decades became popular for determining frequency and testing upper limits of audibility. (As a matter of fact, the spoked or toothed wheel had been conceived by Robert Hooke 150 years before, but apparently nobody took note.) Savart tried to establish the frequency of tones by matching by ear the tone heard with the one produced by the toothed wheel, which had a mechanical tachometer attached. He placed the upper audibility threshold at 24,000 Hz and the lower threshold at 8 Hz.[17] Yet, the rotating bars that he used to test lower limits proved to be less reliable.[18]

Savart's mentor, Biot (1808), and later Hermann von Helmholtz (1865) and Rudolph Koenig (1899) also attempted to determine the lower tone limit, obtaining

[14] Audrey B. Davis and Uta C. Merzbach, *Early Auditory Studies: Activities in the Psychology Laboratories of American Universities*, Washington D.C., Smithsonian Institution, 1975, p. 12; on sonorous pipes see Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", pp. 60–61.

[15] Harald Feldmann, "A History of Audiology: A Comprehensive Report and Bibliography from the Earliest Beginnings to the Present", *Translations of the Beltone Institute for Hearing Research*, no. 22, January 1970, p. 29.

[16] Georg von Békésy and Walter A. Rosenblith, "The Early History of Hearing: Observations and Theories", *The Journal of the Acoustical Society of America*, vol. 20, no. 6, 1948, pp. 727–748, at p. 745.

[17] Félix Savart, "Notes sur la sensibilité de l'organ de l'ouïe", *Annales de chimie et de physique*, vol. 44, 1830, pp. 337–352; see also Lindsay, "The Story of Acoustics", pp. 14–15; Davis and Merzbach, *Early Auditory Studies*, p. 12; Feldmann, "A History of Audiology", p. 30; and Frederick J. Ampel and Ted Uzzle, "The History of Audio and Sound Measurement", presented at the 94th Convention of the Audio Engineering Society (AES), Berlin, March 1993, Preprint of the AES, no. 3598, 1993, pp. 2–3.

[18] Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", p. 62.

results between 16 and 32 Hz.[19] The British savant Francis Galton focused instead on the upper limits of audible sound, which he tested with a whistle that could be adjusted to produce sounds of different frequencies. Introduced in 1876, the "Galston whistle" was able to reach frequencies higher than 80,000 Hz. Galton famously used the whistle not only to test the audition of humans, but also of animals, for which he applied it to a walking stick that he brought with him during his strolls in the zoological gardens. He also discovered that in men the ability to hear higher sounds decreases with age, though it is unrelated to sharpness of hearing.[20] In 1870 Ludwig Boltzmann and August Toepler measured for the first time the minimum sound intensity necessary for audibility. They did it by means of optical interference, and their values contrasted with current ones.[21]

As I mentioned above, the manufacture of acoustic apparatus, part of the thriving precision instruments trade, emerged as a commercial activity by mid-19th century. Albert Marloye, who assisted physicist Savart and was active in Paris during the 1840s and 1850s, was the first instrument maker entirely devoted to that business. In 1858, when Marloye retired, Rudolph Koenig, who had previously been an apprentice to a luthier, opened business as an acoustic instrument maker also in Paris, earning an impressive reputation.[22] While Chladni had studied the vibratory characteristics of tuning forks ca. 1802,[23] it was Koenig who—in collaboration with Helmholtz, and later with physician Adam Politzer—brought their manufacturing to a higher level. Indeed, during the second half of the 19th century tuning forks became the most common

[19] Lindsay, "The Story of Acoustics", p. 15. Actually, the measurements were originally expressed in cps (cycles per second), as the Hertz was adopted only in 1960.

[20] See Francis Galton, *Inquiries into Human Faculty and its Development* (1883), edited by Gavan Tredoux, based on the text in the Everyman second edition (London, J.M. Dent & Co., 1907), accessible online on the website of the Galton Archives: http://galton.org/ [last access: October 2015], pp. 26–28, and 252–254. See also Feldmann, "A History of Audiology", p. 31, and Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", p. 62.

[21] Lindsay, "The Story of Acoustics", p. 15.

[22] See David Pantalony, *Altered Sensations: Rudolph Koenig's Acoustical Workshop in Nineteenth-Century Paris*, New York, Springer, 2009, esp. chapter 1 (pp. 1–17).

[23] Feldmann, "A History of Audiology", p. 23.

instruments for the measurement of auditory acuity, and were also employed to settle auditory thresholds. For instance, Koenig constructed a giant tuning fork ranging from 16 to 24 Hz to test the lower limit of audibility,[24] and he also made tiny ones that vibrated at high frequencies of near 90,000 Hz to test upper limit.[25]

One of Koenig's major accomplishments was the construction, in the 1870s, of a *grand tonomètre*: a set of 692 tuning forks, of frequencies ranging from 16 to 4,096 Hz, that was intended to assist and supplement the tuning skills of musicians and was displayed at the 1876 Philadelphia exposition.[26] The idea was based on the various *tonomètres* constructed in the 1830s by silk manufacturer and physicist Johann Scheibler, who wanted to avoid the imperfections of the human ear in tuning pianos and organs in equal temperament.[27]According to Myles Jackson, the standardization of tuning procedures made possible by the *tonomètre* may be interpreted within the context of the debates about mechanization and standardization that developed in music since the second half of the 20th century, and which regarded, for example, the adoption of a standard pitch or the use of the metronome.[28]

Some of the devices created or perfected by Koenig, like the manometric flame or the phonautograph, patented by Édouard-Léon Scott de Martinville in 1857, were employed to visualize sound, what was useful not only for experimental research, but also for scientific demonstrations and the educational market.[29] As David Pantalony has

[24] Davis and Merzbach, *Early Auditory Studies*, p. 12.

[25] Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", p. 62.

[26] Pantalony, *Altered Sensations*, pp. 91–96; and also Brenni, "1800–1900: A Century of Instruments for the Study of Acoustics", pp. 59–60.

[27] On Scheibler's *tonomètres* and tuning techniques see Jackson, *Harmonious Triads*, chapter 6 ("The Fetish of Precision I: Scheibler's Tuning"), pp. 151–181.

[28] Ibid., chapter 7 ("The Fetish of Precision II: Standardizing Music"), pp. 183–230.

[29] On the phonautograph see Pantalony, *Altered Sensations*, pp. 41–47, and also Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction*, Durham, NC, Duke University Press, 2003, pp. 31–50. On the manometric flame, see Pantalony, *Altered Sensations*, pp. 58–60. On the various devices to make sound visible that were produced in the second half of the 19th century, see also Beyer, *Sounds of Our Times*, pp. 138–144.

pointed out, the phonautograph, which is considered the first self-recording instrument, "was part of a wider trend in mid nineteenth-century instrumentation with an emphasis on automation (…), objectivity in instrumentation (…) and the investigation of previously unobserved patterns and effects (extension of the senses)"[30]—a trend that would only become stronger in forthcoming centuries. Interestingly, a phonautograph constructed by Koenig would be employed years later, in the 1860s, to register the movements of the ossicular chain in the middle ear of a freshly removed human organ. The experiment was presented in Paris by Hungarian physician Adam Politzer, who would become one of the first otologists. Besides the phonograph (to stimulate the chain), it involved a kymograph (a device invented by physiologist Carl Ludwig in the 1840s) that registered movement through small pointers inserted in the ossicles.[31]

6.2 The new sciences of hearing: otology and physiological acoustics

Around mid-century physiological research became experimental, developing rapidly in France (thanks to pioneers Claude Bernard and François Magendie), and later in Britain and Germany.[32] Many 19th-century physiologists devoted intensive attention to the senses, either as part of the nervous system or in connection to the new theories on the localization of brain functions. Indeed, physiologists were not only able to convey an increasingly detailed image of the functioning of the senses—I will just refer here to a few of the many contemporary physiological discoveries related to the senses—, but

[30] Pantalony, *Altered Sensations*, p. 41.

[31] See Albert Mudry and Marcel Kraft, "How Adam Politzer (1835-1920) Became an Otologist", accessible on the website of the Politzer Society, http://www.politzersociety.org/content.php?conid=686 [last access: October 2015]. Politzer's experiment with the phonautograph and the kymograph prefigured Alexander Graham Bell and Clarence Blake's 1874 ear phonautograph, which also incorporated a human ear; Sterne, *The Audible Past*, pp. 51–57 (Politzer is mentioned on p. 56).

[32] On the history of physiology, see Canguilhem, "La constitution de la physiologie comme science", in *Études d'histoire et de philosophie des sciences concernant les vivants et la vie*, pp. 226–273, and John V. Pickstone, "Physiology and Experimental Medicine", in R.C. Olby, G.N. Cantor, J.R.R. Christie and M.J.S. Hodge (eds), *Companion to the History of Modern Science*, London, Routledge, 1990, pp. 728–742.

experimental sensory-motor physiology provided the model after which the nervous system, and particularly the brain, was studied.[33] To list just some of the most important physiological discoveries of the time, in the first quarter of the century British anatomist Charles Bell and French physiologist François Magendie, following up Haller's research on the peripheral nerves, formulated independently (in 1811 and 1822) the Bell-Magendie law, which proved that the functions of motion and sensibility are performed by different fibres of the spinal nerve root (motor fibres occupying the anterior spinal nerve roots, and sensory fibres the posterior ones).[34]

Later on, in 1835, Johannes Peter Müller proposed the law of specific nerve energies, according to which sensations do not depend either on their external cause, or on the special sensibility of the sensory organs to certain stimuli, but on the characteristics of the nerve that is affected by the nature of the stimulus.[35] Hermann von Helmholtz, a pupil of Müller and probably the most important sensory physiologist in history, initiated in 1850 a series of experiments on the propagation velocity of the nervous impulse that were based on the research of his friend Emil du Bois-Reymond, Müller's assistant in physiology, on the electrochemical structure of nerve fibres. These experiments showed that physical stimuli and mental representations were not simultaneous, and thus opened the field for the investigation and quantification of this

[33] See Robert M. Young, *Mind, Brain, and Adaptation in the Nineteenth Century: Cerebral Localization and Its Biological Context from Gall to Ferrier*., New York-Oxford, Oxford University Press, 1990 (originally published in 1970), p. 54.

[34] On Magendie and the Bell-Magendie law see Young, *Mind, Brain, and Adaptation in the Nineteenth Century*, pp. 74–88.

[35] See Johannes Peter Müller, chapter 1 of the *Handbuch der Physiologie des Menschen für Vorlesungen*, 2nd ed., translated by Edwin Clarke and Charles D. O'Malley, in Edwin Clarke and Charles D. O'Malley (eds), *The Human Brain and Spinal Cord. A Historical Study Illustrated by Writings from the Antiquity to the Twentieth Century*, San Francisco, Norman Publishers, 1996, p. 206; and on Müller's *Handbuch* see also Young, *Mind, Brain, and Adaptation in the Nineteenth Century*, pp. 88–94. See Johannes Peter Müller *Elements of Physiology*, translated by Wm. Baly, and arranged from the second London edition by John Bell, Philadelphia, Lea & Blanchard, 1843, p. 588, available online: http://archive.org/details/elementsphysiol00mlgoog [last access: October 2015].

gap.[36] In order to explain how perception could be possible this gap notwithstanding, Helmholtz coined the notion of "unconscious inferences", which are tacit inferences that individuals derive from sensorial impressions, and which allow them to build mental representations of external objects.[37] In doing so, he pointed to the boundary between the physiology of the senses and what he called "pure psychology".[38]

Besides, researches on the spinal and peripheral nerves were progressively supplemented by new research on the physiology of the brain,[39] which drew on the pioneer efforts of Franz Joseph Gall, founder of phrenology and champion of the centrality of the brain as the organ of the mind, and his contemporary opponent Jean Pierre Flourens, who advocated the application of experimental techniques to the exploration of the brain.[40] In that line, the French physician Paul Broca made a decisive contribution when he localized the brain area linked to aphasia, called thereafter "Broca's area", providing thus valuable evidence for the localization of different functions in specific sections of the brain. Particular brain sections were discovered to be linked to certain sensorial processes, and the senses were thus valued and classified in relation to the "importance" of the brain areas that were linked to them, whereas the relative "importance" of those areas was determined according to their hypothetical place in animal evolution.[41]

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[36] On these experiments, see Claude Debru, "Helmholtz and the Psychophysiology of Time", *Science in Context*, 14(3), 2001, pp. 471–492.

[37] See Hermann von Helmholtz, *Handbuch der physiologischen Optik*, Leipzig, Leopold Voss, 1867, pp. 427–430. Although Helmholtz elaborated the concept of "unconscious inference" in the context of his optical research, he explicitly declares (p. 429) that it can be applied to all the senses.

[38] Indeed, in defining "unconscious inference" he located his efforts "in the psychological part of the physiology of the senses", see Helmholtz, *Handbuch der physiologischen Optik*, p. 427.

[39] On 19th-century brain research see Young, *Mind, Brain and Adaptation in the Nineteenth Century.*

[40] Flourens also made an important contribution to the physiology of the inner ear: in 1824 he established that the semicircular canals played a role in reflexive orientation and equilibrium; see Finger, *Origins of Neuroscience*, p. 114-115.

[41] As I have explained above, within the framework of 19th-century comparative anthropology and "scientific racism", particular configurations of the senses were also associated with different races. In this way, cerebral topography was put at the service of the classificatory and controlling schemes of colonialist states for dealing with

In sum, late-19th-century physiology of the nervous system tended to conceive the senses as autonomous, separate circuits, which according to the law of specific nerve energies reacted differently to the same stimuli, and were also connected to distinct brain areas.[42]

6.2.1 The establishment of otology as a medical speciality in the 19th century

While in the 18th century practitioners without any formal credentials often performed ear surgical procedures,[43] at the beginning of the 19th century ear problems were most often treated by eye physicians,[44] and the medical study of the ear was still considered a second-rate occupation.[45] Otology, that is the medical speciality dealing with the anatomy and physiology of the ear, with ear pathologies and their clinical treatment, including all kinds of hearing loss, was established in most European countries during the second half of the 19th century. It stemmed from the new clinical practice that developed in France during the first decades of the 19th century, flourishing later in the British Islands and in German-speaking countries, and it was also part of a widespread call for medical specialization that had both professional and social and political causes.

After surgeons were officially merged with physicians in France at the end of the 18th century, there was an increasing pressure towards the adoption by physicians of higher professional standards, what brought more attention to training and research. At

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foreign populations (and also with local underprivileged populations). See Dias, *La Mesure des sens: les anthropologues et le corps humain au XIX siècle*.

[42] See Jütte, *A History of the Senses*, chapter 10 ("Experimental Physiology and the Separation of the Senses"), pp. 218–236, and Sterne, *The Audible Past*, pp. 60–62.

[43] On the ear as a field for quackery see R. Scott Stevenson and Douglas Guthrie, *A History of Oto-Laryngology*, Edinburgh, E. & S. Livingstone, 1949, pp. 62–63.

[44] Luis García-Ballester, Guillermo Olagüe and Miguel Ciges (eds), *Classics in Modern Otology*, Granada, University Press of Granada, 1978, p. 21, mentions some 19th-century clinical institutions treating eye and ear diseases, like the New York Eye and Ear Infirmary (founded in 1820 as New York Eye Infirmary, although the 'Ear' was included shortly afterwards), the Massachusetts Charitable Eye and Ear Infirmary, in Boston, or the St. Marks Eye Infirmary, founded in 1844 in Dublin, which also treated ear patients.

[45] See the written testimonies reported in Sterne, *The Audible Past*, pp. 53–55.

the beginning of the 19th century, the Paris post-revolutionary school of clinical anatomy established the three staples of clinical practice: physical examination, autopsy and statistics.[46] In that context, what Roy Porter called the "rise of physical examination"[47] stimulated the invention of new diagnostic instruments and exploratory techniques for observation in vivo, which were meant to replace or supplement such traditional practices as history taking or visual inspection. Among the new exploratory techniques involving auditory skills, it is worth mentioning the invention of the stethoscope by René Laënnec in 1816, which had an important precedent in the percussion technique developed by Viennese physician Leopold Augenbrugger in mid-18th century (his 1761 treatise on the matter had appeared in French in 1808).[48] On the other hand, the emergence of medical specialities was a result of the process of urbanization that was taking place in most European countries at the time, which brought large populations to insalubrious areas, increasing thus the incidence of certain medical conditions.[49] In particular, ear diseases were favoured not only by poor conditions of hygiene, like in the case of otitis media, but also by the increasing level of noise that accompanied industrialization and dense urbanization, and which caused professional conditions like boilermaker's disease.[50]

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[46] See Erwin H. Ackerknecht, *Medicine at the Paris Hospital, 1794-1848*, Baltimore, Johns Hopkins Press, 1967, mentioned in García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, p. 33. However, García-Ballester et al. also observe here that in the case of ear diseases autopsy is not very useful for observing pathological signs, as they cause death only rarely.

[47] Roy Porter, "The rise of physical examination", in W.F. Bynum and Roy Porter (eds), *Medicine and the Five Senses*, Cambridge, Cambridge University Press, 1993, pp. 179–197. However, Porter's essay discusses in particular clinical practice in 18th- and 19th-century England.

[48] See Jens Lachmund, "Making Sense of Sound: Auscultation and Lung Sound Codification in Nineteenth-Century French and German Medicine", *Science, Technology, & Human Values*, vol. 24, no. 4, Autumn 1999, pp. 419–450, at p. 423.

[49] For an overview of the historical causes of medical specialization see the Introduction to George Weisz, *Divide and Conquer: A Comparative History of Medical Specialization*, Oxford, Oxford University Press, 2006, pp. xi–xxx. For a detailed analysis of the socio-medical conditions that favoured the emergence of otology, see García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, pp. 21–35.

[50] Regarding noises in modern European towns, see David Garrioch, "Sounds of the City: the Soundscape of Early Modern European Towns", *Urban History*, vol. 30, no. 1, 2003, pp. 5–25; specifically during the Victorian era, see Peter Bailey, "Breaking the Sound Barrier", in *Popular Culture and Performance in the Victorian City*, Cambridge,

Pioneering otologists were associated in France with institutes for the deaf, particularly with the Institution Nationale des Sourds-Muets (National Institution for Deaf Mutes) and the Hospice des Orphelins (Hospice for the Orphans). Although the Institution Nationale des Sourds-Muets had been founded in 1760 by Charles-Michel de l'Epée, it gained importance after the French Revolution, particularly under the guidance of two notable physicians, Jean Marc Gaspard Itard, author of a two-volume *Traité des maladies de l'oreille et de l'audition* (1821)—although he is also known today for being the author of a famous report on "savage child" Victor de l'Aveyron—and Prosper Ménière, who for the first time related vertigo to an affection of the internal ear.[51] Physician Nicolas Deleau directed an ear clinic at the Hospice des Orphelins.[52]

Anatomical models had been in use for study and teaching purposes since the end of the 18th century, but the first large-scale model of the ear seems to have been introduced in 1834 by the prestigious Parisian model maker Louis Auzoux.[53] Those first ear models were ultimately a by-product of the dissection practices that had become standard in previous centuries, and also bore evidence of the relationship between the foundation of otology as a medical speciality and the conception of the ear as a separate object, abstracted from the rest of the body.[54] Yet, new clinical instruments and techniques to examine the auditory system could engage not only the eyes of physicians, but also their ears, and most frequently both senses. More importantly, as S.

Cambridge University Press, 1998, pp. 194–211, and John M. Picker, *Victorian Soundscapes*, New York, Oxford University Press, 2003. Karin Bijsterveld's *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*, Cambridge, MIT Press, 2008 deals with a later period, but chapters 2 and 3 refer also to the problem of noise in 19th-century cities. The reference to otitis media is found in S. D. G. Stephens, "The British Medical Profession and the First Audiometers", *The Journal of Laryngology and Otology*, vol. 95, December 1981, pp. 1223–1235, at p. 1224.

[51] Stevenson and Guthrie, *A History of Oto-Laryngology*, p. 58.

[52] See García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, p. 23.

[53] Davis and Merzbach, *Early Auditory Studies*, p. 8.

[54] On the importance of the practices of dissection for the abstraction of the ear from the body see Sterne, *The Audible Past*, pp. 55–59.

D. G. Stephens has pointed out, they required the development of new skills, since early instruments were often difficult to use.[55] Thus, the stethoscope was also employed in the detection of ear diseases—a diagnostic method explored by Deleau in Paris, and perfected later by Politzer in Vienna. In contrast, a mirror to look into the middle ear, called aural speculum or otoscope, was developed by Itard (1821) and popularized in mid-19th century by Anton von Troeltsch, who added indirect illumination using a concave mirror perforated in the centre.[56]

Whereas at the beginning of the 19th century clinical hearing tests consisted in such basic practices as having the patient repeat some sentences or listen to a pocket watch,[57] physicians like Itard and later Politzer invented (in 1821 and 1877, respectively) special devices for the measurement of auditory acuity, known as "acumeters", which produced standardized stimuli, avoiding so the discrepancies found between watches. However, since they were aimed at the assessment and classification of hearing losses, they did not produce fixed-pitch sounds but only noises of different intensities.[58] Tuning forks were introduced to the assessment of hearing loss only in the early 19th century, when British physicist Charles Wheatstone (1827) and German physiology Ernst Heinrich Weber (1834) studied independently the effects of occlusion and lateralization produced by placing on the forehead a tuning fork when one or both ears were closed.[59] Between the end of the 19th century and the beginning of the next century the Weber and Rinne tuning-fork tests—devised by Weber and by physician Heinrich Adolf Rinne respectively, and based on the phenomenon of bone conduction

[55] Stephens, "The British Medical Profession and the First Audiometers", p. 1225.

[56] García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, pp. 16–17, and pp. 72–102; see also Stephens, "The British Medical Profession and the First Audiometers", pp. 1225–1226.

[57] García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, p. 19.

[58] Feldmann, "A History of Audiology", pp. 19–21, and Stephens, "The British Medical Profession and the First Audiometers", p. 1227.

[59] Myles W. Jackson, "From Scientific Instruments to Musical Instruments: The Tuning Fork, the Metronome, and the Siren", in Pinch and Bijsterveld (eds), *The Oxford Handbook of Sound Studies*, pp. 201–223, at pp. 204–205.

of sound, which had been known since at least the 16th century—[60] became the most popular means of assessing the nature and extent of hearing loss, although many other tests involving variously adapted tuning forks were also in use.[61] The "continuous frequency series", which was composed of ten tuning forks, two organ-type pipes and one Galton whistle and allowed to test the whole range of frequencies audible to men, was devised by otologists Friedrich Bezold and Adolf Edelmann towards the end of the century.[62] Its conception ran in parallel to that of the first audiometers, which would become the most important tool for the assessment of hearing at the beginning of the 20th century.

During the second half of the 19th century, the new clinical medicine progressively incorporated laboratory practice to the explanation of pathological processes, integrating physical, chemical and biological notions and techniques that eventually became also part of medical science.[63]. A key moment in the progress of laboratory practice was the development, ca. 1830, of a more powerful version of the compound microscope, which made possible the observation of serial sections of the ear. New histological techniques granting better tissue fixation were also critical in bringing to light new details of the inner ear.[64] French physician Gilbert Breschet contributed to this process with the reordering and clarification of the nomenclature of the parts of the ear, published in his *Recherches anatomiques et physiologiques sur*

[60] On the discovery of bone conduction in the 16th century, see Feldmann, "A History of Audiology", pp. 15–16.

[61] On tuning-fork tests see Matthew Ng and Robert K. Jackler, "Early History of Tuning-Fork Tests", *The American Journal of Otology*, vol. 14, no. 1, January 1993, pp. 100–105; and Feldmann, "A History of Audiology", pp. 23–29.

[62] Feldmann, "A History of Audiology", pp. 33–35.

[63] Ibid. pp. 15–16 and 18.

[64] Compound microscopes were already in use in mid-17th century, but British amateur opticist Joseph Jackson Lister is often credited with having perfectioned them in the 1820s and 1830s, as he succeeded in making microscope lenses that were free from achromatic and spherical aberrations. On the importance of anatomical techniques, see also chapter 3 of Békésy, *Experiments in Hearing*, , edited and translated by Ernest G. Wever, New York-Toronto-London, McGraw-Hill Book Company, 1960, pp. 19–32.

l'organe de l'ouie et sur l'audition dans l'homme et les animaux vertébrés (1836).[65] Joseph Toynbee, aural surgeon and lecturer at St Mary's Hospital in London collected approximately 2,000 ear preparations, described in *A Descriptive Catalogue of Preparations Illustrative of the Diseases of the Ear* (1857) and *The Diseases of the Ear: Their Nature, Diagnosis and Treatment* (1860).[66] Toynbee and William Robert Wilde, who ran the St Mark's Ophthalmic Hospital for Diseases of the Eye and Ear in Dublin and was also the author of *Practical Observations on Aural Surgery and the Nature and Treatment of Diseases of the Ear* (1853), influenced strongly the younger generation of German-speaking ear physicians,[67] one of whose most notable exponents, Anton von Troeltsch, trained with both of them.

The emergence of otology as a medical speciality in German-speaking countries during the decades 1860-1870 meant the consolidation of its research orientation, as well as the acceptance of the speciality into the academic milieu—indeed, whereas in England and Ireland new otology clinics were normally established at hospitals, in Germany and Austria universities were to become the preferred setting for them. During the first decades the advancement of otology in German universities was visible mostly among lower academic ranks, though this was set to change later on.[68] Von Troeltsch received his habilitation and later taught otology at the University of Würzburg, where he was eventually named professor. His pupil Herrmann Schwartze was recognized as Privatdozent by Halle University in 1863, and he opened there an otology clinic that he

[65] See Joseph E. Hawkins, Jr., "Auditory Physiological History: A Surface View", in Anthony F. Jahn and Joseph Santos-Sacchi (eds), *Physiology of the Ear*, New York, Raven Press, 1988, pp. 1–28, at p. 17.

[66] See Mudry and Kraft, "How Adam Politzer (1835-1920) Became an Otologist".

[67] García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, pp. 30 and 34.

[68] Weisz mentions that "it was relatively easy to introduce junior positions into German medical schools. Thus otology, a subject that does not show up on lists of university chairs, was nonetheless well represented in junior positions. In 1879, fourteen universities in the Kaiserreich had a total of seventeen teachers in the field, nine of them extraordinary professors"; see Weisz, *Divide and Conquer*, p. 55.

directed from 1884.[69] Adam Politzer undertook in 1860 a two-year training period with the best physiologists and physicians of the time,[70] and in 1861 he became the first otology professor acknowledged as Privatdozent by the University of Vienna. In 1873 he was made chair and director (with Josef Gruber) of the new Wiener Ohrenklinik (Vienna Ear Clinic) at the Vienna General Hospital, and he also became a notable historian of the discipline, author of the two-volume *Geschichte der Ohrenheilkunde* (1907, published in English as *History of Otology*, 1981, abridged version).[71] Politzer, Schwartze and von Troeltsch were the founders of the first academic journal devoted exclusively to otology, *Archiv für Ohrenheilkunde*, launched in 1864.[72]

Whereas German and Austrian universities taught the most prestigious European and North American otologists, who later led the development of the speciality in their countries, some German otologists emigrated to the United States and also played an important role in the establishment of the discipline there.[73] According to Luis García-Ballester, Guillermo Olagüe and Miguel Ciges, by 1878 there were nine extraordinary professors, eight Privatdozenten and eight university clinics in Germany, and chairs of otology existed already in the universities of other European countries, like the University of Amsterdam (1886), and in a few universities of the East Coast of the

[69] See Schwartze's and von Troeltsch's biographical notes in García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, pp. 342–343.

[70] He visited Carl Ludwig in Vienna, Heinrich Müller, Albert von Kölliker and Anton von Troeltsch in Würzburg, Hermann von Helmholtz in Heidelberg, Claude Bernard and Prosper Menière in Paris and Joseph Toynbee in London.

[71] See Politzer, *History of Otology*. Regarding Politzer's academic career, see García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, pp. 19–20, and Mudry and Kraft, "How Adam Politzer (1835-1920) Became an Otologist".

[72] On other specialized journals and the foundation of the first otology national societies, see García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, p. 28 and 31, and also pp. 57–66. *Archiv für Ohrenheilkunde* is still published today under the title *European Archives of Oto-rhino-laryngology*.

[73] García-Ballester, Olagüe and Ciges (eds), *Classics in Modern Otology*, pp. 26 and 28.

United States. In some other European countries, e.g. Sweden and Spain, the first chairs of otology were created during the first decade of the 20th century.[74]

6.2.2 From acoustics to physiological acoustics: Hermann von Helmholtz

Taking advantage of his considerable experience in general physiology and physiological optics, in 1855 Helmholtz decided to start his research into physiological acoustics, with the explicit intention to reform and advance the field. The process would culminate in 1863 with the publication of *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* (1863; *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, 1875, translated from the 3rd German edition), which is considered the foundational text of physiological acoustics. Before the publication, Helmholtz had set himself various objectives: the elaboration of a consonance theory based on beats, the exploration of tone quality (timbre; it depends on the upper harmonic), the exploration of the ear's different capabilities, the formulation of a resonance theory of pitch perception, and—last but not least—to explain and discover the real causes of the differences between "harmony" and "disharmony". [75]Yet, *On the Sensations of Tone* covered many other aspects.[76]

Helmholtz based his theory of hearing on different theoretical elements that were part of acoustical and physiological debates at the time, and that he combined in a

[74] Ibid., pp. 30–31. García-Ballester, Olagüe and Ciges also mention Italy among the countries that created otology chairs during the fist decade of the 20th century, but apparently otologist Emilio de Rossi was nominated as full professor of otology already in 1891, in Rome; see Dino Felisati and Giorgio Sperati, *Italian ORL Society: Past and Present*, Genova, Società Italiana di Otorinolaringologia e Chirurgia Cervico-Facciale, 2005, pp. 25–26.

[75] Hermann von Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, translated by Alexander J. Ellis, with a new introduction by Henry Margenau, New York, Dover Publications, 1954. Actually, Helmholtz introduced his theory of audition for the first time in a 1857 public lecture, "On the Physiological Causes of Harmony in Music", included in Hermann von Helmholtz, *Science and Culture: Popular and Philosophical Essays*, edited with an introduction by David Cahan, Chicago and London, The University of Chicago Press, 1995, pp. 46–75. See Vogel, "Sensation of Tone, Perception of Sound, and Empiricism", pp. 266–270. For a brief introduction to Helmholtz see Beyer, *Sounds of Our* Times, pp. 55–69.

[76] See Vogel, "Sensation of Tone, Perception of Sound, and Empiricism", p. 268–270.

powerful synthesis. He also integrated successfully different approaches and methods, e.g. mathematical analysis, physiological studies, musical theory, etc. The first theoretical element was Müller's law of specific nerve energies, which he had tested. A second element was his knowledge of the latest anatomical discoveries related to the ear, in particular Italian physiologist Alfonso Corti's observations of the minute anatomical details of the cochlea, published in *Recherches sur l'organe de l'ouïe des mammifères* (1851). While working at Albert von Kölliker's physiological laboratory, Corti had discovered a series of structures resting on the basilar membrane, the "organ of Corti", which included the tectorial membrane, the hair cells, and the "rods or arches of Corti". According to Helmholtz's initial hypothesis, the rods of Corti—or the transverse fibres of the basilar membrane, as he argued since 1869—acted as resonators, each of them vibrated inside the cochlea to a different speed, like the strings of la piano. Since it was the place assigned to each resonator what determined its pitch, Helmholtz' theory of pitch perception is also known as "place theory".[77]

A third element was the law formulated in 1843 by German physicist Georg Simon Ohm, known as "Ohm's law", which applied Fourier's principle of superposition (initially conceived to explain heat) to tones. Thus, Ohm's law stated that the ear was able to analyse any musical tone into its component simple tones (its harmonics); in other words, that the ear worked as a Fourier analyser. Ohm also affirmed that a complex tone of a certain pitch must always contain the sinusoidal wave corresponding to its fundamental.[78] In 1841, against Ohm's definition, August Seebeck had reported the results of a series of experiments with sirens that suggested that the pitch of a complex tone may not necessarily be that of its fundamental, but could be based on all

[77] Wever, *Theory of Hearing*, pp. 29–33; on Helmholtz's theory of hearing; see also Boring, *Sensation and Perception in the History of Experimental Psychology*, pp. 404–411; and Beyer, *Sounds of Our Times*, pp 55 69, on pp. 64–65.

[78] Wever, *Theory of Hearing*, pp. 26–29; see also Beyer, *Sounds of Our Times*, p. 45.

its partials.[79] As Stephan Vogel has argued, the Ohm-Seebeck controversy derived from discrepancies on the definition of tone, which according to Seebeck could be reduced to the periodicity of beats, and was independent from wave form. Instead, Ohm wanted to reintroduce wave form as a defining element of tone.[80] Helmholtz tried to solve the controversy by distinguishing between *Ton* (tone, namely the sensation produced by the vibration corresponding to a single sinusoidal wave) and *Klang* (translated as "clang" or "musical tone"), that is "a *compound*, containing a series of different tones".[81] As Benjamin Steege has argued, "Helmholtz realized that Ohm and Seebeck had been talking about, and perhaps even listening to, different epistemic objects."[82] Steege has also observed that the Ohm-Seebeck controversy not only pitted one hypothesis against the other, but also raised fundamental questions about the complexities of hearing. For instance, in answering Seebeck's objections Ohm introduced the suspicion that the ear may involuntarily hear the fundamental tone louder than it really was. Rather than a simple receptor, the ear might rather be educable and manipulable through practice.[83]

Several scholars have underlined the importance of laboratory instruments for the scientist's theory and practice. Thus, the instruments that Helmholtz employed in his research enabled, embodied and shaped the experimental practices and skills that he developed in dealing with them.[84] Apart from tuning forks and sirens, which had become staples of contemporary physics laboratories, he invented in collaboration with Koenig the "Helmholtz resonators", empty spheres (usually made of brass or glass) with

[79] On the Ohm-Seebeck controversy see Benjamin Steege, *Helmholtz and the Modern Listener*, Cambridge, Cambridge University Press, 2012, pp. 46–54; see also Reinier Plomp, "Pitch of Complex Tones", *Journal of the Acoustical Society of America*, volume 41, issue 6, 1967, pp. 1526–1533; and Vogel, "Sensation of Tone, Perception of Sound, and Empiricism", pp. 262–266.

[80] See Vogel, "Sensation of Tone, Perception of Sound, and Empiricism", pp. 263–264.

[81] Helmholtz, *On the Sensations of Tone*, pp. 34–36, on p. 34.

[82] Steege, *Helmholtz and the Modern Listener*, p. 55.

[83] Ibid., p. 52.

[84] See Vogel, "Sensation of Tone, Perception of Sound, and Empiricism", pp. 259–261; and Timothy Lenoir, "Helmholtz and the Materialities of Communication", *Osiris*, no. 9, 1994, pp. 185–207, at pp. 205–207.

an open hole that the researcher could attach to sound sources to amplify specific tones, or which could also be arranged in sets to produce compound tones artificially. Helmholtz employed resonators, for instance, to discover and listen to combination tones, or differential tones. Helmholtz also conceived—often in collaboration with Koenig, too—other apparatuses combining tuning forks and/or resonators with magnetic or electrical elements, or even with a microscope, which a view to producing, amplifying or making primary tones visible.[85] Timothy Lenoir has also raised attention to the importance of contemporary media technologies in Helmholtz' sensorial project, and how they functioned both as materializations and productive models for experimental research.[86]

Helmholtz is recognized today not only for having developed notions and experimental practices that shaped contemporary research on hearing, but also because of his determination to bridge the gap, quite visible at the time, between the physiological and quantitative conception of hearing, and hearing as imagined and required by musical aesthetics. As he stated in the very first lines of the Introduction to *On the Sensations of Tone*, the main aim of the work was "to connect the boundaries of two sciences, which (…) have hitherto remained practically distinct—I mean the boundaries of *physical and physiological acoustics* on the one side, and of *musical science and esthetics* on the other".[87] As Matthias Rieger has investigated, drawing on music journals, popular scientific writings, music dictionaries and theoretical treatises, many 19th-century German theorists and music critics embarked on a polarizing debate regarding precisely this argument. On the one hand, there were those favourable to the

[85] Lenoir, "Helmholtz and the Materialities of Communication", pp. 199–201. On Helmoltz and media see John Dungham Peters, "Helmholtz, Edison, and Sound History", in RABINOVITZ, Lauren; GEIL, Abraham (ed.): *Memory Bytes. History, Technology, and Digital Culture*, Durham, NC-London, Duke University Press, 2004, pp. 177–198.

[86] See Timothy Lenoir, "Helmholtz and the Materialities of Communication", *Osiris*, 1994, 9, pp. 185–207, at pp. 205–207.

[87] See Helmholtz, *On the Sensations of Tone*, p. 1.

intellectual exchange between (or even the merging of) acoustics and musics, who expected that a better understanding of musical material would derive from it. On the other hand, there were those who wanted to keep music and acoustics separate, and who underlined the difference between the "physiological ear" (*Ohr*) and "musical hearing" (*musikalisches Gehör*). [88] Since Helmholtz's *On the Sensations of Tone* was a commercial success, followed by the publication of reviews and various textobooks based on ti, it was immediately brought in the debate.[89]

After Helmholtz, the publication of Lord Rayleigh's two-volume *Theory of Sound* (1877-1878), which offered a comprehensive coverage of contemporary acoustics including also exhaustive mathematical explanations of many aspects of sound, marked the end of the "classical era" of the discipline,[90] during which the mathematization and standardization of experimental procedures were achieved. It is generally accepted today that towards the end of the 19th century music had already ceased to be the main model of acoustic research, as musical issues—in particular, questions related to consonance as a source of musical pleasure—had progressively been displaced from its nucleus.[91] Even if there might be some hesitations about chronology,[92] with some scholars also pushing the date further, to the start of World

[88] Matthias Rieger, "Unterscheidung und Synthese: Rezeptionsformen akustischer Forschung in der Musikliteratur des 19.Jahrhunders", *Berichte zur Wissenschaftgeschichte*, no. 31, 2008, pp. 181–194.

[89] On this see also Erwin & Elfrieda Hiebert, in Lorenz Ktüger (ed.), "Musical Thought and Practice: Links to Helmoltz's *Tonemfpindungen*, in KRÜGER, Lorenz (ed.): *Universalgenie Helholmtz: Rückblick nach 100 Jahren*, Berlin, Akademia Verlag, pp. 295–311 "Musical Thought and Practice: Links to Helmoltz's *Tonemfpindungen*, in KRÜGER, Lorenz (ed.): *Universalgenie Helholmtz: Rückblick nach 100 Jahren*, Berlin, Akademia Verlag, pp. 295–311.

[90] Westwick, "Acoustics and Hearing", pp. 8–9; Lindsay, "The Story of Acoustics", p. 17. On Rayleigh see Beyer, *Sounds of Our Times*, chapter 4 ("Lord Rayleigh and His Book", pp. 83–102) and also Ku, "British Acoustics and its Transformation from the 1860s to the 1910s", *Annals of Science*, vol. 63, no. 4, 2006, pp. 395–423, at pp. 412–421.

[91] See Alexandra Hui, Julia Kursell and Myles W. Jackson, introduction to *Osiris,* special issue on "Music, Sound, and the Laboratory from 1750 to 1980", vol. 28, 2013, pp. 1–11, where they mention "some time in the late nineteenth century" as the historical moment in which "music ceased to be the most important source of sound that could be subjected to investigation" (p. 1).

[92] I must mention here again Hui, Kursell and Jackson's introduction to *Osiris*'s special issue, as later on in the same text (p. 3) they refer to "the beginning of the nineteenth century" as a historical moment in which "music and science had undergone radical transformations, which in turn colored their interactions. Music was no longer the main source of objects for acoustical experimentation."

War I,[93] it seems safe to state that the results of this displacement were in full view in the 1920s, whereas some elements of it can be traced back even earlier than the 19th century. (The various solutions given to the question depend on how each scholar conceives and defines that process, which—as I have already implied—was not only conceptual, but had everything to do with experimental practices and the instruments employed in them. Besides, it is practically impossible to pinpoint the exact beginning of a change that did not take place in different European countries at the same time.)

On the other hand, the abandonment of musical models in acoustics proceeded in parallel with a progressive estrangement of music from the field of sciences, which was in course already in the 18th century. Other notions of hearing—or rather, of (musical) *listening*—developed, and they were not based primarily on scientific claims, but on rhetoric and the conviction that music should be considered as aesthetically autonomous. In the second half of the 19th century, when psychology was constituted as an experimental discipline, including also the study of hearing, models of concert listening were already part of classical music's etiquette and ideology, whereas the most notable propagandist of formalism, Eduard von Hanslick, had already published his influential *Vom Musikalisch-Schönen* (1854, translated into English as *The Beautiful in Music*, 1891).[94] Between the notions and auditory skills associated with experimental physics and physiology, and the listening models promoted in the field of music aesthetics there were some continuities, but also significant contrast. Eventually the physics of musical sounds (produced either by musical instruments or by the human voice) came to be considered as a special branch of acoustics (musical acoustics), while

[93] Roland Wittje, "The Electrical Imagination: Sound Analogies, Equivalent Circuits, and the Rise of Electroacoustics, 1863-1939", in *Osiris,* special issue on "Music, Sound, and the Laboratory from 1750 to 1980", vol. 28, 2013, pp. 40-63, at p. 44. Edwin G. Boring also refers to the 1920s as the moment in which music stimuli were removed from the core of acoustics, see his *Sensation and Perception in the History of Experimental Psychology*, New York, Appleton-Century-Crofts, 1942, pp. 320–321.

[94] Eduard Hanslick, *The Beautiful in Music*, translated by Gustav Cohen; edited, with an introduction by Morris Weitz, New York, Liberal Arts Press, 1957.

the perception of music would become (post-Helmholtz) the main research interest of music psychologists.

6.3 The new experimental psychology: reshaping sensation

As I have anticipated in chapter 1, the analytical separation of sensation and perception bears witness to conceptual shifts that developed in Europe from the second half of the 19th century on, and which involved the reshaping of the notion of sensation in the language of experimental physiology. This reshaping took place in a cultural climate where science and philosophy were distancing themselves from moral and religious concerns—a movement that became especially visible after the diffusion of Darwin's theory of evolution (*On the Origin of the Species* was published in 1859)—, and where new "properly scientific" disciplines, like anthropology and experimental psychology, were established. In particular, the different schools and orientations that converged on the new psychology—mainly in Britain, France and Germany—[95]showed an urgency to provide materialist explanations for questions that had formerly been considered philosophical, rooting psychological notions in the physiology of the nerves. Some philosophers, like the British associationists, and particularly Scottish Alexander Bain, author of *The Senses and the Intellect* (1855), played a key role in this transitional process, by making space in the science of mind for physiological discoveries, and specifically for sensory-motor physiology.[96] Bain's *The Emotions and the Will* (1859)[97] is also an example of the contemporary refashioning of "passions", "affections" and

[95] For an introduction to these three "national ways to experimental psychology", see Graham Richards, *Mental Machinery, Part 1: The Origins and Consequences of Psychological Ideas from 1600 to 1850*, London, The Athlone Press, 1992, part three (pp. 289–406).

[96] Alexander Bain, *The Senses and the Intellect*, London, Longman, 1864. On Bain, see also chapters 2 and 3 of Young, *Mind, Brain, and Adaptation in the Nineteenth Century*, pp. 54–133. For an introduction to mid-nineteeth-century psycho-physiology see Kurt Danziger, "Mid-Nineteenth-Century British Psycho-Physiology: A Neglected Chapter in the History of Psychology", in Woodward and Ash (eds), *The Problematic Science*, 119–146.

[97] Alexander Bain, *The Emotions and the Will*, London, Longmans, Green & co., 1865.

"sentiments" as the more morally neutral "emotions", what according to contemporary philosopher Thomas Dixon was a consequence of the new secularized approach to human nature.[98]

On the other hand, new developments in experimental physiology must be understood in the wider context of contemporary life sciences, and thus in the general metaphoric framework of the relationship organism-environment. Within this new theoretical framework, the concept of stimulus, which had already appeared in 18th-century debates on irritability and sensibility, increasingly gained importance. As Danziger has studied, during the 19th century stimuli came to encompass not only physical causes, but also mental ones, while in the context of the new life sciences the word was more and more often used to describe a functional, even abstract relationship, rather than a specific agent. In this way it became a cognitive schema—the schema of "stimulated motion", as Danziger denominates it—,[99] and played an important role in the first theories of experimental psychology, particularly in the analysis of sensations, of which stimuli were considered as a kind of correlate. In Robert M. Young's words, psychology moved at the time "from an epistemological enquiry to a study of the adaptations of organisms to their environment".[100]

At the same time, the pairing of sensations with stimuli, combined with new ideas on their measurability, resulted in a whole new notion: sensation ceased to be an inner faculty, a part of the life of the mind, and—in Jonathan Crary's words—became

[98] Thomas Dixon, *From Passions to Emotions: The Creation of a Secular Psychological Category*, Cambridge, Cambridge University Press, 2003.

[99] As Danziger has observed, the importance of the notion of *stimulus* lies in that it "involved a fundamentally different kind of causal relationship than that represented by mechanical force (...) and rational intention": since *stimuli* acted only on parts or organs that were responsive to them, they were not simply external mechanical agents, and their effects depended also on the internal requirements of the affected living system; see Kurt Danziger, "Origins of the Schema of Stimulated Motion: Towards a Pre-history of Modern Psychology", *History of Science*, vol. 21, n. 2, June 1983, pp. 183–210, at p. 189.

[100] Young, *Mind, Brain, and Adaptation in the Nineteenth Century*, p. xix.

instead "a quantity or set of effects that could be measured or observed externally",[101] or that at least could aspire to that condition. Yet, in the last decades of the 19th century researchers in the physiology of the senses seemed to have attained a point where they faced questions that could hardly be answered without trespassing disciplinary limits. As Danziger has observed, "[w]hen the new program of systematic experimentation became extended to sensory functions, some psychological implications could not be avoided".[102]

On the fringes of physiology, though still linked to philosophy by tradition, a new discipline, psychology, appeared as a convergent space for scholars of different backgrounds, whose research projects and practices were only relatively consistent, but who apparently shared a determination to establish the basic facts of human psychology experimentally, that is through the use of a range of apparatuses. That experimental approach was favoured by the contemporary tide of scientism, which promoted the idea that the methods of natural sciences were the only ones that could produce reliable knowledge about any subject, and thus could guarantee *true* scientific status.[103] Even if in many instances the new experimental psychology courses were hosted in philosophy departments, or were taught by scholars that had a philosophical background, their advocates underscored mainly their scientific value.[104] Besides, the traditional practices

[101] Jonathan Crary, *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, Cambridge, MIT Press, 1999, p. 27.

[102] Danziger, *Constructing the Subject*, pp. 26–27.

[103] On the physiological roots of early psychology, see Danziger, *Constructing the Subject*, pp. 24–27, and also Lorraine Daston, "The Theory of Will versus the Science of Mind", in William R. Woodward and Timothy G. Ash (ed.), *The Problematic Science: Psychology in Nineteenth-Century Thought*, New York, Praeger, 1982, pp. 88–115. However, in many European and American universities that first psychology professors were affiliated with philosophy departments, which in some cases even changed their names to add the new discipline.

[104] For example, according to the contemporary report of a French student of his (Alfred Grafé), when Wilhelm Wundt (more on him below) selected the students that were allowed to take part in research at the Leipzig psychological laboratory, he apparently favoured those who not only had some knowledge of psychology, but had also a background in mathematics or physiology; see Serge Nicolas, Valérie Gyselinck, David J. Murray and Christina A. Bandomir, "French Descriptions of Wundt's Laboratory in Leipzig in 1886", *Psychological Research*, vol. 66, 2002, pp. 208–214, at p. 210.

of observation (introspection), which in past times had provided psychology with its very object (the notion of an inner mental world), tended to be questioned[105] and in many cases were just abandoned. As Lorraine Daston has underlined, this lack of confidence in introspection stemmed ultimately from a widespread disbelief about rationality and generally human will.[106] Yet, paradoxically, it was also related to fundamental flaws in the scientific practices of observation and inscription[107] that had been discovered since the end of the 18th century, such as the serious discrepancies between the timing star transits recorded by different astronomers, which threw doubt on their objectivity and in the 1830s led to the coining of the expression "personal equation". Though these episodes were initially thought of as physiological errors, they contributed to the definition of the emergent psychological field and of some of its most characteristic experimental practices.[108] Besides, as Simon Schaffer has argued, experimental psychologists' obsession with measurement (more on measurement below) may be interpreted as a later response to those concerns.[109]

The way in which sensations were investigated in the new psychological laboratories, in imitation of the experimental practices that had come to be identified with the scientific method, put them under a different light and changed how they were conceived. This new approach to sensation can be recognized in the practice and writings of Wilhelm Wundt, a physiologist by education and the founding father of experimental psychology—or, as he also called the new discipline, "physiological

[105] See Kurt Danziger, "Wilhelm Wundt and the Emergence of Experimental Psychology", in R.C. Olby, G.N. Cantor and J.R. R. Christie (eds), *Companion to the History of Modern Science*, pp. 396–409, at p. 399.

[106] See Daston, "The Theory of Will versus the Science of Mind".

[107] On scientific observation see Lorraine Daston, "On Scientific Observation", *Isis*, vol. 99, no. 1, 2008, pp. 97–110.

[108] See chapter 8, "The Personal Equation", of Edwin G. Boring, *A History of Experimental Psychology*, New York, Appleton-Century-Crofts, 1950 (2nd edition), pp. 134–153.

[109] Simon Schaffer, "Astronomers Mark Time: Discipline and the Personal Equation", *Science in Context*, vol. 2, 1988, pp. 115–145. On precision in early psychology see also Ruth Benschop and Douwe Draaisma, "In Pursuit of Precision: The Calibration of Minds and Machines in Late Nineteenth-Century Psychology", *Annals of Science*, vol. 57, no. 1, 2000, pp. 1–25.

psychology"—,[110] who circa 1879 established the first psychological laboratory as part of the Institute of Experimental Psychology that he led at the University of Leipzig.[111] Wundt placed sensations at the very centre of his research; for him they were the "psychical elements" of psychological life, out of which "psychical compounds" (ideas, emotions, volitional acts) were built.[112] Regarding method, Wundt declared in his 1882 essay "Die Aufgaben der experimentellen Psychologie" (The tasks of experimental psychology) that, if we understood "observation" in a scientific sense, self-observation (introspection) was just impossible: the more we make an effort to watch ourselves, the more certain we can be that we observe simply nothing. According to him, inner states cannot be fixed with attention, in fulfilment of a programme and certain expectations—that is, in the same way as we would observe external objects—, but they can only be perceived freely and fragmentarily.[113]

Instead, Wundt proposed two intertwined methodological alternatives to introspection: in the first place, experimentation, understood as an active interference in mental processes to a particular effect; in the second place, experimental observation, which (contrary to "pure observation") followed immediately on the original perception,

[110] Indeed, one of Wundt's main works is titled *Grundzüge der physiologischen Psychologie* (1873–1874), translated into English by Edward Bradford Titchener as *Principles of Physiological Psychology* (1904), available online: http://psychclassics.yorku.ca/Wundt/Physio/ and http://archive.org/details/principlesofphys01wund [last access: October 2015]. On the role of Wilhelm Wundt and the complexities of his intellectual stance, see Danziger, "Wilhelm Wundt and the Emergence of Experimental Psychology".

[111] On the institution and early years of this laboratory, which initially seems to have been little more than a storage space for Wundt's instrument collection, as well as a place for conducting demonstrations to supplement his lectures, see Wolfgang G. Bringmann, Norma J. Bringmann and Gustav A. Ungerer, "The Establishment of Wundt's Laboratory: An Archival and Documentary Study", in Wolfgang G. Bringmann and Ryan D. Tweney (eds), *Wundt Studies. A Centennial Collection*, Toronto, C.J. Hogrefe, 1980, pp. 123–157.

[112] See Wilhelm Wundt, *Outlines of Psychology*, translated with the cooperation of the author by Charles Hubbard Judd, Leipzig-London-New York, Wilhelm Engelmann-Williams & Norgate-Gustav E. Stechert, 1897 (originally published in German as *Grundriss der Psychologie*, Leipzig, Wilhelm Engelmann, 1896). Actually, about 70 per cent of the psychological theses directed by Wundt in Leipzig from 1875 to 1920 (that is 81 out of a total of 116) were devoted to questions related to sensation and perception; see Miles A. Tinker, "Wundt's Doctorate Students and Their Theses 1875–1920", in Bringmann and Tweney (eds), *Wundt Studies*, pp. 269–279, at p. 278.

[113] Wilhelm Wundt, "Die Aufgaben der experimentellen Psychologie", *Unsere Zeit*, 1882, reprinted in *Essays*, 2nd. ed., Leipzig, Engelmann, 1906, pp. 187–212, accessible online: http://archive.org/details/essayswund00wunduoft [last access: October 2015], pp. 197–198. On this distinction, see also Danziger, *Constructing the Subject*, pp. 34–36.

leaving virtually no time for the mind to elaborate on it, and resembling so scientific observation.[114] However, their scopes were quite restricted: though they could certainly discover the existence of higher mental processes like apperception, volition or emotion, according to Wundt these could not be analysed using experimental methods,[115] or could only be analysed indirectly at the most, for instance through the reaction-time experiments that were so important during the first decades of experimental psychology.[116] Both experimentation and experimental observation had to be performed under certain stable conditions, in the first psychological laboratories, which allowed also the replication of experiments. Besides, in psychological laboratories, particularly in the one that Wundt established in Leipzig, psychological experiments were limited to very simple operations, most often involving the senses, so that the subjects—not just anybody, but often trained students—[117]did not have time to reflect upon what they saw or heard, but would just report it. New instruments also shaped and conditioned the experimental programme; for example reaction-time experiments were typically performed with the chronoscope.[118]

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[114] Wundt, *Outlines of Psychology*, pp. 18–24

[115] Indeed, Wundt thought that psychology's aim was the explanation of the totality of mental life, and that this could only be accessed through the kind of comparative cultural study that he called *Völkerpsychologie*, to which he devoted the ten-volume work of the same title. Other scholars, among which Wundt's former student Oswald Külpe, who taught in Würzburg, did not share his vision on the limits of experimental methods and attempted to study mental processes through so- called "systematic instrospection". See Alfred H. Fuchs and Katharine S. Milar, "Psychology as a Science", in Donald K. Freedheim and Irving B. Weiner (eds), *Handbook of Psychology, vol. 1. History of Psychology*, Hoboken, NJ, John Wiley & Sons, 2003, pp. 1–26, at p. 5; Danziger, "Wilhelm Wundt and the Emergence of Experimental Psychology", p. 404; and also his *Constructing the Subject*, pp. 36–37.

[116] On the importance of reaction-time experiments for psychometrics, that is for the indirect measurement of the duration of mental processes, see the contemporary account of James McKeen Cattell, "The Psychological Laboratory at Leipsic" (1888), first published in *Mind*, 13, pp. 37–51, at pp. 45–46, available online: http://psychclassics.yorku.ca/Cattell/leipsic.htm [last access: October 2015]).

[117] On the question of the training of experimental subjects, see E.B. Titchener, "Anthropometry and Experimental Psychology", *The Philosophical Review*, vol. 2, no. 2, March 1893, pp. 187–192.

[118] On the use of the chronoscope in the first German and French psychological laboratories, see Jacqueline Carroy and Henning Schmidgen, *Psychologies expérimentales: Leipzig-Paris (1890–1910)*, "Preprint 206", Berlin, Max-Planck-Institut fur Wissenschaftsgeschichte, 2002, accessible online: https://www.mpiwg-berlin.mpg.de/en/resources/preprints [last access: October 2015]; and also Henning Schmidgen, "Time and Noise: the Stable Surroundings of Reaction Experiments, 1860–1890", *Studies in History and Philosophy of Science. Part C: Biological and Biomedical Sciences*, vol. 34, no. 2, June 2003, pp. 237–275.

Logically, the use of such instruments as the chronoscope presupposed something apparently not so obvious, that is that sensations (and not only stimuli) could be quantified and measured—a notion that at the end of the 19th century had become part of common sense. Thus, in the first half of the 19th century Ernst Heinrich Weber had developed the notion of "just noticeable difference" to refer to the minimum changes in stimulus magnitude that were noticed by a subject, and had also affirmed that those changes in perception were constantly proportional to the changes in stimulus magnitude. In 1860 Gustav Theodor Fechner's *Elemente der Psychophysik* brought Weber's postulates one step further by arguing that there was a logarithmic relation between stimulus magnitude and the intensity of a sensation—what came to be known as the "Weber-Fechner law". As a result of these conceptual developments, which coincided with the diffusion of Darwin's theories on natural selection, not only the new experimental psychologists, but also other scholars who studied the senses from what we would now define as "an anthropological perspective" undertook the collection of objective, measurable data using different tools and procedures. This was notably the case of Darwin's younger half-cousin Francis Galton, who took anthropometric measures and conducted sensitivity tests in his Anthropometric Laboratory (established in the South Kensington Museum, London, in 1884),[119] or the scholars who joined the Cambridge Torres Strait Expedition (1898) for testing the senses of native populations, whose research I have briefly discussed above with reference to the idea that the senses are culturally constructed.

As Joel Michell has pointed out, the Weber-Fechner law assumed that sensations (and generally mental phenomena) were quantifiable and measurable, but it did not

[119] On Francis Galton see Nicholas Wright Gillham, *A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics*, Oxford University Press, 2001. In "Anthropometry and Experimental Psychology" E.B. Titchener compares the universal subject of Galton's anthropometrical experiments to the trained subject (usually, a psychologist) of psychological experiments.

prove it. Besides, the methods used by Fechner to measure sensations did not guarantee that they were related only to certain stimuli, as they could also be associated with other stimuli or with particular conditions of the subject,[120] who normally had the double role of experimenter and observer.[121] As for experimental practices at Wundt's Leipzig laboratory, notions of precision seem to have been initially associated with the calibration of apparatus, as experimental controls and rules were only developed successively.[122] As Kurt Danziger has pointed out, the production of quantitative data was certainly based on established (though sometimes tacit) social rules of procedure, that is on an agreement on some basic notions—the notion of "sensation", for instance, or the separation of the senses—, on the acceptance of the roles of the researcher and the (normally trained) experimental subject, and—as I mentioned above—on a strict limitation of the responses available to those subjects in the psychological laboratory.[123]

6.3.1 The beginnings of the psychology of music

Even if musical sounds would continue to be used as tonal stimuli in psychological experiments in audition until well into the 1920s,[124] tuning forks and other acoustic apparatuses already occupied a place of honour in the first psychological laboratories,

[120] On Weber's and Fechner's theories with reference to the concepts of quantity and measure, see Joel Michell, *Measurement in Psychology. A Critical History of a Methodological Concept*, Cambridge, Cambridge University Press, 1999, chapter 4 ("Early psychology and the quantity objection"), pp. 78–108.

[121] Fuchs and Milar, "Psychology as a Science", in Freedheim and Weiner (eds), *Handbook of Psychology, vol. 1. History of Psychology*, p. 8.

[122] See John A. Popplestone and Marion White McPherson, "The Vitality of the Leipzig Model of 1880–1910 in the United States in 1950–1980", in Bringmann and Tweney (eds), *Wundt Studies*, pp. 226–257, at p. 227.

[123] See Danziger, *Constructing the Subject*, pp. 137–139, and generally chapter 9 ("From quantification to methodolatry"), pp. 136–155. On the "social technology" required by psychological experiments see also Benschop and Draaisma, "In Pursuit of Precision". On the distribution of the roles of researcher and subject at the Leipzig laboratory James McKeen Cattell wrote: "The men work in groups; at least two are needed to carry on most psychological experiments, the one acting as subject, the other taking charge of the apparatus and registering the results. The students must, therefore, mutually help each other: one is responsible for the research, and if it is successful he prints it, often using it for a doctor's dissertation", see Cattell, "The Psychological Laboratory at Leipsic", p. 39.

[124] Boring, *Sensation and Perception in the History of Experimental Psychology*, pp. 320–321.

which were set up in some university departments during the second half of the 19th century for purposes of demonstration and research. For instance in 1888, when Wilhelm Wundt's historical Leipzig laboratory, active since 1879, was expanded for the second time, the new facilities included also insulated rooms for acoustical experiments, and a dedicated room containing the drop-phonometer, which was used to assess the perception of different sound intensities.[125] Later on, in 1897, Wundt's Institute of Experimental Psychology moved to a new building in Leipzig, which contained a specific laboratory for acoustical experiments (another one was devoted to visual experiments) where researchers and students could avail themselves of a long series of tuning forks and other sound generators.[126]Among the theses on psychological questions directed by Wundt from 1875 to 1920 (a total of 116), around a 16 per cent (that is 19) focused on audition and acoustic phenomena. Some of these dealt with issues (e.g. pitch perception, interval perception, the influence of articulation and hearing in singing together, the emotional character of particular chord progressions) that may be considered as musical.[127]

Nevertheless, as Hui has observed, by 1890 consensus about the value of musical expertise—that is, the auditory skills of musically trained subjects— in the psychological laboratory was apparently broken among German scholars, to the point that it became a subject of contention between Wundt and Carl Stumpf, author of the two-volume treatise *Tonpsychologie* ("The Psychology of Music", first volume

[125] See Wilhelm Wundt, "Psychophysik und experimentelle Psychologie" (1893), quoted in Wolfgang G. Bringmann, Norma J. Bringmann and Gustav A. Ungerer, "The Establishment of Wundt's Laboratory: An Archival and Documentary Study", in Wolfgang G. Bringmann and Ryan D. Tweney (eds), *Wundt Studies. A Centennial Collection*, Toronto, C.J. Hogrefe, 1980, pp. 123–157, at p. 152.

[126] See Wilhelm Wundt, "Das Institut für experimentelle Psychologie zu Leipzig" (1910), quoted in Sven Hroar Klempe, "The Role of Tone Sensation and Musical Stimuli in Early Experimental Psychology", *Journal of the History of the Behavioral Sciences*, vol. 47, no. 2, Spring 2011, pp. 187–199, at pp. 189–191.

[127] See Miles A. Tinker, "Wundt's Doctorate Students and Their Theses 1875-1920", in Bringmann and Tweney (eds), *Wundt Studies*, pp. 269–279, and also Hroar Klempe, "On the Role of Tone Sensation and Musical Stimuli in Early Experimental Psychology", p. 189.

published in 1883; second one in 1890). Against Wundt and one of his students, Carl Lorenz, Stumpf defended the relevance of musical auditory skills, that is the need to employ musically trained subjects in experiments, and to consider the way in which their musical expertise would affect the results.[128] Like Stumpf, also Hugo Riemann, Ernst Mach and Ernst Kurth focused mainly on musical sounds: the psychology of music originated from their efforts. Music and sound were also important in the first stages of Gestalt psychology, which was founded by a group of Stumpf's students. Yet, how the new psychologists of music heard or listened to music, exactly which elements of music they considered, under which conditions, and for what purposes should be the object of a separate investigation.

[128] See chapter 5 ("The Bias of *Musikbewusstsein* When Listening in the Laboratory, on the City Street, and in the Field") of Alexandra Hui, *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840-1910*, Cambridge, MA, MIT Press, 2013, pp. 123–148. On the relationship between the concepts of consonance-disonance and knowledge of musical harmony in Stumpf, see also Julia Kursell, "Hermann von Helmholtz und Carl Stumpf über Konsonanz und Dissonanz" in Julia Kursell (ed.), *Sounds of Science - Schall im Labor (1800-1930)*, "Preprint 346", Berlin, Max-Planck-Institut für Wissenschaftsgeschichte, 2008, PP. 130–143, accessible online: https://www.mpiwg-berlin.mpg.de/en/resources/preprints [last access: October 2015].

CONCLUSIONS

In the Introduction I presented the four thematic threads that run through this thesis: the intersection of sound studies and the "sensory turn", the history of the anatomy and physiology of the ear, acoustics in the history of science, and the discourses of music listening. I brought attention to the fact that these subjects are not often treated together, and set myself the task to discover continuities and discontinuities—coincidences and divergences—between them, especially in the way in which they have taken part in the history of hearing and listening. Considering that I have already indicated those continuities and divergences at the appropriate points, in the previous chapters, I do not intend to present now a conclusion or a set of conclusions. I will propose instead a series of reflections—related to the thematic threads—that sometimes will underline questions or notions that have appeared in the course of the research, and some other times will suggest possible research directions that have not found space here.

Audition and sound

In the Introduction I made the case for the consideration of music listening within the framework of sound studies, and listening is already an established subject in this new field, as attested by the bibliography that I have used and quoted. Nevertheless, during the course of this research I have taken every opportunity to remind the reader that the relationship subject-sound is never direct and protolinguistic: it is always mediated by language, by previous experiences, and by the way in which we have perceived and elaborated those past experiences. While the name "sound studies" seems to have been already accepted, I find "auditory culture" much preferable, particularly to counteract the temptation of creating a mysticism of sound as opposed to (rational, modern) vision.

As I hope to have demonstrated along this investigation, the ear is so much steeped in the "evils" of modernity and modernism as is the eye.

Sensory skills, auditory skills

I have chosen the term "skill" to try and define human interaction with sounds and sound objects in a way that integrates the dimensions of time (skills are learnt) and action (the body). However, I am aware of the fact that "skill" may not be the most appropriate term to refer to interactions that, like those where music is involved, normally have a strong emotional component. Nevertheless, if the agents, objects, places and temporalities that take part in each skilling process are well defined, skill can be a very useful term, especially because it can be applied to both scientific and aesthetic practices.

Instruments of science, instruments of music

One of the subjects that have emerged more clearly in the course of this research is that of instrumentality, namely the role of instruments in the production of knowledge experience. While laboratory instruments have a special status in the history of science and studies of science of technology,[1252] it is important to bear in mind that, at least until early modernity, musical instruments were also instruments of science, on which experiments were performed. Also, other instruments have travelled in the opposite direction: they were conceived for sciencific purposes, but have been used to create music. The study of this rich intersection zone between acoustics, music, technology and psychoacoustics has already began, as attested by a series of authors and studies that have been key to this work, and are appropriately credited. However, integrating

[1252] For a philosophical approach to the notion of instrument see Davis Baird, *Thing Knowledge: A Philosophy of Scientific Instruments*, Berkeley, University of California Press, 2004,

aesthetic discourses into these investigations remains a challenge, and probably could only be achieved with some contribution from music scholars.

Music as language and performance

Precisely one of the main obstacles to any form of collaboration with music scholars—I am thinking here particularly of conventional musicologists—is the prevalence of concepts and approaches that can only correspond to a certain type of music (instrumental music), and which do not take into account the performative and linguistic (or communicative) elements that are always part of music-making. Discovering, or rediscovering the performative dimension of music is necessary, not for any specious reason, but just to understand how music is already working for us. In that sense, the effort to comprehend the values that past centuries attributed to music, as I have tried to do in the last chapters of this thesis, may add density and complexity to the urgencies of the present.

BIBLIOGRAPHY

ABU-LUGHOD, Lila: *Veiled Sentiments: Honor and Poetry in a Bedouin Society*, Berkeley, University of California Press, 1986.

ACKERKNECHT, Erwin H.: *Medicine at the Paris Hospital, 1794–1848*, Baltimore, MD, Johns Hopkins University Press, 1967.

ADLER, Guido; MUGGLESTONE, Erica: "Guido Adler's 'The Scope, Method, and Aim of Musicology' (1885): An English Translation with an Historico–Analytical Commentary", *Yearbook for Traditional Music*, 13 (1981), pp. 1–21.

ADORNO, T. W. : *Einleitung in der Musiksoziologie*, in *Gesammelte Schriften, 14 (Dissonanzen. Einleitung in der Musiksoziologie)*, ed. Rolf Tiedemann, Frankfurt, Suhrkamp, 1973, pp. 169–420.

--- *Introduction to the Sociology of Music*, translated by E.B. Ashton, New York, The Seabury Press, 1976.

--- "Über den Fetischcharakter in der Musik und die Regression des Hörens" in *Gesammelte Schriften, 14 (Dissonanzen. Einleitung in der Musiksoziologie)*, ed. Rolf Tiedemann, Frankfurt, Suhrkamp, 1973, pp. 14–50.

--- "Zur Musikpädagogik", in *Gesammelte Schriften, 14 (Dissonanzen. Einleitung in der Musiksoziologie)*, ed. Rolf Tiedemann, Frankfurt, Suhrkamp, 1973, pp. 108–126.

--- *Der getreue Korrepetitor*, in *Gesammelte Schriften*, *15 (Komposition für den Film. Der getreue Korrepetitor)*, ed. Rolf Tiedemann, Frankfurt, Suhrkamp, 1984, pp. 157–368.

--- "Musik im Hintergrund" in *Gesammelte Schriften*, *18*, ed. Rolf Tiedemann and Klaus Schutz, Frankfurt, Suhrkamp, 1984, pp. 819–823.

--- "Schöne Stellen" in *Gesammelte Schriften, 18*, ed .Rolf Tiedemann and Klaus Schutz, Frankfurt, Suhrkamp, 1984, pp. 695 et seq.

--- "Bewusstsein des Konzerhörers" in *Gesammelte Schriften, 18*, ed .Rolf Tiedemann and Klaus Schutz, Frankfurt, Suhrkamp, 1984, pp. 815–818.

--- "Zum Problem der Reproduktion" in *Gesammelte Schriften, 19*, ed. Rolf Tiedemann and Klaus Schutz, Frankfurt, Suhrkamp, 1984, pp. 440–444.

--- "Gebrauchsmusik" in *Gesammelte Schriften, 19*, ed. Rolf Tiedemann and Klaus Schutz, Frankfurt, Suhrkamp, 1984, pp. 444–447.

--- "On Popular Music", in FRITH, Simon; GOODWIN, Andrew: *On Record. Rock, Pop and the Written Word*, London, Routledge, 1990, pp. 301–314.

--- ”The Curves of the Needle”, trans. Thomas Y. Levin, *October*, 55, Winter 1990, pp. 48–55.

--- ”The Form of the Phonograph Record”, trans. Thomas Y. Levin, *October*, 55, Winter 1990, pp. 56–61.

--- *Essays on Music*, selected, with introduction, commentary and notes by Richard Leppert; translations by Susan H. Gillespie and others, Berkeley, University of California Press, 2002.

--- ”The Radio Symphony: and experiment in theory”, in LAZARSFELD, Paul; STANTON, F.: *Radio Research 1941*, New York, Arno Press, 1979.

--- *Il fido maestro sostituto. Studi sulla comunicazione nella musica*, introduzione e traduzione di Giacomo Manzoni, Torino, Einaudi, 1969.

--- “Sociology and Empirical Research”, in CONNERTON, Paul (ed.): *Critical Sociology: Selected Readings*, Harmondsworth, Penguin Books, 1976, pp. 237–257.

--- “Scientific Experiences of a European Scholar in America”, in FLEMING, Donald; BAILYN, Bernard: *The Intellectural Migration. Europe and America, 1930–1960*, Cambridge, MA, Belknap Press–Harvard University Press, 1969.

--- “Analytical Study of the NBC “Music Appreciation Hour””, *The Musical Quarterly*, vol. 78, no. 2, Summer 1994, pp. 325–377.

--- *Filosofía de la nueva música (Obra completa, 12)*, edited by Rolf Tiedemann, with the collaboration of Gretel Adorno, Susan Buck-Morss and Klaus Schultz, translated by Alfredo Brotons Muñoz, Madrid, Akal, 2003.

--- “Sobre el problema del análisis musical”, traducción de Ramón Silles, *Quodlibet. Revista de especialización musical*, nº 13, 1999, pp. 106–119.

--- “A Social Critique of Radio Music”, *The Kenyon Review*, 1945, 7 (2), pp. 208–217.

--- *In Search of Wagner*, translated by Rodney Livingstone, with a new foreword by Slavoj Zizek, London–New York, Verso, 2005.

ADORNO, T.W.; EISLER, Hanns: *El cine y la música*, trans. Fernando Montes, Madrid, Fundamentos, 1981.

AGAMBEN, Giorgio: “¿Qué es un paradigma?”, *Fractal,* http://www.mxfractal.org/GiorgioAgamben.htm [last access: October 2015].

--- *Che cos’è un dispositivo*, Roma, Nottetempo, 2006.

AGAWU, Kofi: “Analyzing Music under the New Musicological Regime”, *Journal of Musicology*, 15, 1997, pp. 297–307.

AGNEW, Vanessa: “The Colonialist Beginnings of Comparative Musicology”, in AMES, Eric; KLOTZ, Marcia; and WILDENTHAL, Lora (ed.): *Germany’s Colonial Pasts: An Anthology in Memory of Susanne Zantop*, Lincoln: University of Nebraska Press, 2005, pp. 41–60.

--- “Listening to Others: Eighteenth–Century Encounters in Polynesia and Their Reception in German Musical Thought”, Eighteenth–Century Studies, vol. 41, no. 2 (2008), pp. 165–188.

--- *Enlightenment Orpheus: The Power of Music in Other Worlds*, Oxford: Oxford Universty Press, 2008.

AIELLO, Rita; SLOBODA, John (ed.): *Musical Perceptions*, New York, Oxford University Press, 1994.

AIKHENVALD, Alexandra Y.; STORCH, Anne: “Linguistic Expression of Perception and Cognition: A Typological Glimpse”, in AIKHENVALD, Alexandra Y.; STORCH, Anne (eds): *Perception and Cognition in Language and Culture*, Leiden, Koninklijke Brill NV, 2013, pp. 1–45.

ALLEN, Jont B.: “Harvey Fletcher’s Role in the Creation of Communication Acoustics”, *Journal of the Acoustical Society of America*, vol. 99, no. 4, April 1996, pp. 1825–1839.

ALTMAN, Rick (ed.): *Sound Theory/Sound Practice*, New York-London, Routledge, 1992.

AMES, Eric: “The Sound of Evolution”, *Modernism/modernity*, vol. 10, no. 2, April 2003, pp. 297–325.

AMPEL, Frederick J.; UZZLE, Ted (eds): “The History of Audio and Sound Measurement”, presented at the 94th Convention of the Audio Engineering Society (AES), Berlin, March 1993, Preprint of the AES, no. 3598, 1993.

ANDERSON, Tim J.: *Making Easy Listening: Material Culture and Postwar American Recording*, Minneapolis, University of Minnesota Press, 2006.

ANDRÉ, Yves Marie: *Essai sur le beau, avec un discours préliminaire, et des réflexions sur le goût par M. Formey*, Amsterdam, J.H. Schneider, 1760.

--- *Essay on Beauty*, translated and annotated by Alan J. Cain, Porto, Ebook, 2010, accessible online: https://archive.org/details/EssayOnBeauty [last access: October 2015].

ARISTOTLE: *The Complete Works of Aristotle*, the revised Oxford translation, edited by Jonathan Barnes, Princeton, NJ, Princeton University Press, 1984 (2 vols).

ARLINGER, Stig; LUNNER, Thomas; LYXELL, Björn; and PICHORA–FULLER, M. Kathleen: “The Emergence of Cognitive Hearing Science”, *Scandinavian Journal of Psychology*, 2009, vol. 50, pp. 371–384.

AROM, Simha: *African Polyphony and Polyrhytm: Musical Structure and Methodology*, translated from French by Martin Thom, Barbara Tuckett and Raymond Boyd, Cambridge, Cambridge University Press, 1999.

--- "'Du pied à la main': les fondaments métriques des musiques traditionnelles d'Afrique Centrale", *Analyse musicale*, 10, 1988, pp. 16–22

ASH, Mitchell G.: *Gestalt Psychology in German Culture, 1890–1967: Holism and the Quest for Objectivity*, Cambridge, Cambridge University Press, 1995.

ASHBY, Arved: *Absolute Music, Mechanical Reproduction*, Berkeley, University of California Press, 2010.

ATTALI, Jacques: *Bruits. Essai sur l'économie politique de la musique*, Paris, Presses Universitaires de France, 1977.

ATTNEAVE, Fred: "Informational Aspects of Visual Perception", *Psychological Review*, vol. 61, no. 3, 1954.

AUBERT, Laurent: *La musique de l'autre. Les nouveaux défis de l'ethnomusicologie*, Chêne–Bourg/Genève, Georg Éditeur, 2001.

AUBERT, Eduardo Henrik: "A música do ponto de vista do nativo: um ensaio bibliografico", *Revista de Antropologia* (Sâo Paulo), v. 50, nº 1, 2007, pp. 271–312.

AUCANTE, Vincent: *La philosophie médicale de Descartes*, Paris, PUF, 2006.

AUGOYARD, François: "La sonorización antropológica del lugar", in AMERLINCK, Mari-Jose (comp.): *Hacia una antropología arquitectónica*, Guadalajara (México), Universidad de Guadalajara, 1995, pp. 205–219.

AUGOYARD, François; TORGUE, Henry: *À l'écoute de l'environnement. Répertoire des effets sonores*, Marseille, Editions Parenthèses, 1995.

AUGUSTINE: "On Music", translated by Robert Catesby Taliaferro, in *The Writings of Saint Augustine*, *vol. 2*, edited by Ludwig Schopp, New York, CIMA, 1947, pp. 153–379.

AUSLANDER, Philip: "Performance Analysis and Popular Music: A Manifesto", *Contemporary Theatre Review*, col. 14, no. 1, February 2004, pp. 1–14.

--- "Musical Personae", *TDR: The Drama Review*, vol. 50, no. 1, Spring 2006, pp. 100–119.

--- *Liveness*: *Performance in a Mediatized Culture*, New York, Routledge, 2008.

AUSTERN, Linda Phyllis (ed.): *Music, Sensation and Sensuality*, London-New York, Routledge, 2002.

BAADE, Christina L.: *Victory Through Harmony: The BBC and Popular Music in World War II*, New York, Oxford University Press, 2012.

BAARS, Bernard J.: *The Cognitive Revolution in Psychology*, New York-London, The Guilford Press, 1986.

BACH, Carl Philipp Emanuel: *The Complete Works, Series I, vol. 4.1: "Kenner und Liebhaber" Collections I*, edited by Christopher Hogwood, general editor: Darrell M. Berg, Los Altos, California, The Packard Humanities Institute, 2009.

BACHELARD, Gaston: *La Poétique de l'espace*, Paris, PUF, 1957.

BABBITT, Milton: "Who Cares if You Listen?", *High Fidelity*, febrer 1958, disponible a: http://www.palestrant.com/babbitt.html [last access: October 2015].

BAILER-JONES, Daniela M.: "Models, Metaphors and Analogies", in MACHAMER, Peter; SILBERSTEIN, Michael (eds): *The Blackwell Guide to the Philosophy of Science*, Oxford, Blackwell, 2002, pp. 108–127.

BAILHACHE, Patrice: "Cordes vibrantes et consonances chez Beeckman, Mersenne et Galilée", *Sciences et techniques en perspective*, no 23: "Musique et mathématiques", 1993, pp. 73-91, accessible online: http://patrice.bailhache.free.fr/thmusique/cordesvibr.html [last access: October 2015].

--- *Une histoire de l'acoustique musicale*, Paris, CNRS, 2001.

BAILEY, Peter: *Popular Culture and Performance in the Victorian City*, Cambridge, Cambridge University Press, 1998.

BAILY, John: "Music Structure and Human Movement", in HOWELL, Peter; CROSS, Ian; WEST, Robert (eds): *Musical Structure and Cognition*, London, Academic Press, 1985, pp. 237–258.

--- "Anthropological and Psychological Approaches to the Study of Music Theory and Musical Cognition", *Yearbook for Traditional Music*, vol. 20, 1988, pp. 114–124.

--- "Using Tests of Sound Perception in Fieldwork", *Yearbook for Traditional Music*, vol. 28 (1996), pp. 147–173.

BAIN, Alexander: *The Senses and the Intellect*, London, Longman, 1864.

--- *The Emotions and the Will*, London, Longmans, Green & co., 1865.

BAKER, Nancy Kovaleff; CHRISTENSEN, Thomas: *Aesthetics and the Art of Musical Composition in the German Enlightenment: Selected Writings of Johann Georg Sulzer and Heinrich Christoph Koch*, Cambridge-New York, Cambridge University Press, 1995.

BANDRÉS, Javier; LLAVONA, Rafael: "La Psicología en los Campos de Concentración de Franco", *Psicothema*, vol. 8, no. 1, 1996, pp. 1–11.

--- “Psicología y Colonialismo en España (I): la Inteligencia del Negro Guineano”, *Psychologia Latina*, vol. 1, no. 2, 2010, pp. 144–153.

--- “Psicología y Colonialismo en España (II): en busca del Cociente Intelectual del Negro”, *Psychologia Latina*, vol. 1, no. 2, 2010, pp. 154–162.

BARALE, Francesco; MINAZZI, Vera: “Off the beaten track: Freud, sound and music. Statement of a problem and some historico–critical notes”, *International Journal of Psychoanalysis*, 89, 2008, pp. 937–957.

BARBIERI, Daniele: “Quando Mozart faceva piano bar. Appunti per una semiotica dello sfondo”, *E/C*, serie speciale, anno I, n. 1, 2007, pp. 147–150. ‘’

--- “Appunti per un'estetica del senso”, *Tempo Fermo*, nº 4, 2005.

BARBIERI, Patrizio: “‘Galileo’s Coincidence Theory of Consonances, from Nicomachus to Sauveur”, *Recercare*, XIII, 2001, pp. 201–232.

BARBOUR, J. Murray: *Tuning and Temperament: A Historical Survey*, Mineola, NY, Dover, 2004 (originally published in East Lansing, Michigan State Press, 1951).

BARKER, Andrew (ed.): *Greek Musical Writings, II: Harmonic and Acoustic Theory*, Cambridge, Cambridge University Press, 1989.

BARKER-BENFIELD, G. J.: *The Culture of Sensibility: Sex and Society in Eighteenth-Century Britain*, Chicago, University of Chicago Press, 1992.

BARNES, Ralph; JONES, Mari Riess: “Expectancy, Attention, and Time”, *Cognitive Psychology*, 41, 2000, pp. 254–311.

BARONI, Mario; FUBINI, Enrico; PETAZZI, Paolo; SANTI, Piero; VINAY, Gianfranco: *Storia della musica*, Milano, Einaudi 1999 (1988).

BARTEL, Dietrich: *Musica Poetica: Musical-Rethorical Figures in German Baroque Music*, Lincoln-London, University of Nebraska Press, 1997.

BARTHES, Roland: *Le grain de la voix: entretiens (1962–1980)*, Paris, Seuil, 1981.

--- *L’obvie et l’obtus. Essais critiques III*, Paris, Seuil, 1982.

--- *The Responsibility of Forms*, translated by Richard Howard, Berkeley–Los Angeles, University of California Press, 1991.

BARTLETT, Frederick C.: “Psychological Methods and Anthropological Problems”, Africa, vol. 10, 1937, pp. 401–420, accessible online at the Frederick Bartlett Archive: http://www.bartlett.psychol.cam.ac.uk/PsychologicalMethodsAnthro.htm [last access: September 2014].

BARZ, Gregory F.; COOLEY, Timothy J. (ed.): *Shadows in the Field: New Perspectives for Fieldwork in Ethnomusicology*, New York-Oxford, Oxford University Press, 1997.

BASS, Henry E.; CAVANAUGH, William J. (eds): *ASA at 75*, Leetsdale, PA, The Acoustical Society of America, 2004.

BATESON, Gregory: *Naven: A Survey of the Problems suggested by a Composite Picture of the Culture of a New Guinea Tribe Drawn from Three Points of View*, Cambridge, Cambridge University Press, 1936.

--- *Steps to an Ecology of Mind*, New York, Ballantine Books, 1972.

BATESON, Gregory; MEAD, Margaret: *Balinese Character: A Photographic Analysis*, New York, New York Academy of Sciences, 1942.

BATTEUX, Charles: *Les Beaux-Arts réduits à un même principe*, edited by Jean-Rémy Mantion, Paris, Aux Amateurs de Livres, 1989.

BAUMAN, Richard: *Verbal Art as Performance*, with supplementary essays by Barbara A. Babcock, Gary H. Gossen, Roger D. Abrahams and Joel F. Sherzer, Prospect Heights, Waveland Press, 1984 (1977).

BAUMAN, Richard; SCHERZER, Joel: "The Ethnography of Speaking", *Annual Review of Anthropology*, vol. 4, 1975, pp. 95–119.

BAUMANN, Max Peter: "The Ear as Organ of Cognition: Prolegomenon to the Anthropology of Listening", in BAUMANN, Max Peter; SIMON, Artur; WEGNER, Ulrich (eds): *European Studies in Ethnomusicology: Historical Developments and Recent Trends*. *Intercultural Music Studies*, Wilhelmshaven: Florian Noetzel Verlag, pp. 123–141.

--- "Listening to Nature, Noise and Music", in *The World of Music*, special issue on "Hearing and Listening in Cultural Contexts", edited by Max Peter Baumann and Linda Fujie, vol. 40, no. 1, 1999, pp. 97–112.

BAUMGARTEN, Alexander G.: *Esthétique précédée des Méditations philosophiques sur quelques sujets se rapportant à l'essence du poème et de la métaphysique*, translation, presentation and notes by Jean-Yves Prandière, Paris, L'Herne, 1988.

---*L'Estetica*, edited by Salvatore Tedesco, Palemo, Aesthetica Edizioni, 2002.

--- *Ästhetik*, Latin-German edition, translation, preface, notes and indexes by Dagmar Mirbach, 2 vols, Hamburg, Felix Meiner Verlag, 2007.

BECKER, Judith: *Deep Listeners: Music, Emotion and Trancing*, Bloomington, Indiana University Press, 2004.

--- "L'action-dans-le-monde. Émotion musicale, mouvement musicale et neurones miroirs", *Cahiers d'ethnomusicologie*, vol. 23, 2010, pp. 29–52.

BECQ, Annie: *Genèse de l'esthétique française moderne, 1680-1814. De la Raison classique à l'Imagination créatrice*, Paris, Albin Michel, 1994.

BEEMAN, William O.: "Linguistics and Anthropology", in KEMPSON, Ruth; FERNANDO, Tim; ASHER, Nicholas (eds): *Philosophy of Linguistics*, Amsterdam, North Holland, 2012, pp. 531–551.

BÉGUIN, Albert: *L'Âme romantique et le rêve: essai sur le romantisme allemand et la poésie française*, Paris, Librairie José Corti, 1939.

BÉHAGUE, Gerard: "A Performance and Listener-Centered Approach to Musical Analysis", *Latin American Music Review / Revista de Música Latinoamericana*, vol. 27, no 1 (Spring–Summer, 2006), pp. 10–18.

BÉHAGUE, Gerard (ed.): *Performance Practice. Ethnomusicological Perspectives*, Westport, Greenwood Press, 1984.

BEISER, Frederick C.: *Diotima's Children: German Aesthetic Rationalism from Leibniz to Lessing*, Oxford, Oxford University Press, 2009.

BÉKÉSY, Georg von: *Experiments in Hearing*, edited and translated by Ernest G. Wever, New York-Toronto-London, McGraw–Hill Book Company, 1960.

--- "Concerning the pleasures of observing, and the mechanics of the inner ear. Nobel Lecture, December 11, 1961", in *Nobel Lectures Physiology or Medicine 1942 – 1962*, Amsterdam, Elsevier, 1964, pp. 722–746.

BÉKÉSY, Georg von; ROSENBLITH, Walter A.: "The Early History of Hearing – Observations and Theories", *The Journal of the Acoustical Society of America*, vol. 20, no. 6, November 1948, pp. 727–748.

BELL, Andrew: "Resonance Theories of Hearing – A History and a Fresh Approach", *Acoustics Australia*, vol. 32, December 2004, no. 3, pp. 95–100.

BELLER, Jonathan: *The Cinematic Mode of Production: Attention Economy and the Society of Spectacle*, Lebanon, NH, Darmouth College Press-University Press of New England, 2006.

BELLO, Patrizia Di; KOUREAS, Gabriel (eds): *Art, History and the Senses: 1830 to the Present*, Farnham, UK, Ashgate, 2010.

BENDELOW, Gillian; WILLIAMS, Simon J. (eds): *Emotions in Social Life: Critical Themes and Contemporary Issues*, London-New York, Routledge.

BENDIX, Ruth: "The Pleasures of the Ear: Toward an Ethnography of Listening", *Cultural Analysis*, vol. 1, 2000, pp. 33–50. http://socrates.berkeley.edu/~caforum/volume1/pdf/bendix.pdf [last access: October 2015].

BENEDICT, Ruth: *Patterns of Culture*, with a new foreword by Mary Catherine Bateson and a preface by Margaret Mead, Boston, Houghton Mifflin, 1989.

BENJAMIN, Walter: *Illuminations*, edited and with an introduction by Hannah Arendt, translated by Harry Zohn, New York, Schocken Books, 1968.

BENSCHOP, Ruth; DRAAISMA, Douwe: "In Pursuit of Precision: The Calibration of Minds and Machines in Late Nineteenth–Century Psychology", *Annals of Science*, vol. 57, no. 1, 2000, pp. 1–25.

BENT, Ian (ed.): *Music Analysis in the Nineteenth Century, vol. 2: Hermeneutic Approaches*, Cambridge, Cambridge University Press, 1994.

BENTHALL, Jonathan; POLHEMUS, Ted (eds): *The Body as a Medium of Expression*, London, Allen Lane, 1975.

BERGER, Harris M.: *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*, Hanover, NH-London, Wesleyan University Press, 1999.

BERGER, Harris M.; DEL NEGRO, Giovanna P.: *Identity and Everyday Life. Essays in the Study of Folklore, Music, and Popular Culture*, Middletown, CT, Wesleyan University Press, 2004.

BERGER, Kenneth W: "Genealogy of the Words 'Audiology' and 'Audiologist'", *Journal of the American Audiology Society*, vol. 2, no. 2, 1976, pp. 38–44.

BERGERON, Katherine; BOHLMAN, Philip V. (eds): *Disciplining Music: Musicology and Its Canons*, Chicago, Chicago University Press, 1992.

BERGSON, Henri: *Matière et mémoire (1939),* electronic edition in the series "Les classiques des sciences sociales", http://classiques.uqac.ca, Montréal, Université du Quebec, 2003, from Henri Bergson, *Matière et mémoire. Essai sur la relation du corps à l'esprit* (1939), Paris, PUF, 1965, 72nd ed. [last access: October 2015].

BERKELEY, George: *The Works of George Berkeley, Bishop of Cloyne, vol. 1: Philosophical Commentaries. An Essay Towards A New Theory Of Vision. The Theory Of Vision*, edited by A. A. Luce and T. E. Jessop, London, Nelson, 1948, reprinted in 1967.

BERLAND, Jody: "Locating Listening: Technological Space, Popular Music, and Canadian Meditations", in LEYSHON, Andrew; MATLESS, David; REVILL, George: *The Place of Music*, New York-London, The Guilford Press, 1998, pp. 129–150.

BERLIN, Brent; KAY, Paul: *Basic Color Terms: Their Universality and Evolution*, Berkeley, University of California Press, 1969.

BERLYNE, D.E.: *Conflict, Arousal, and Curiosity*, New York-Toronto-London, McGraw Hill, 1960.

BERLYNE, D.E. (ed.): *Studies in the New Experimental Aesthetics. Steps Toward an Objective Psychology of Aesthetic Appreciation*, Washington D.C., Hemisphere Publishing Corporation, 1974.

BERLYNE, D.E.: "Attention", in CARTERETTE, Edward C.; FRIEDMAN, Morton P. (eds), *Handbook of Perception*, vol. 1, New York, Academic Press, 1971, pp. 123–147.

BERMAN, Marshall: *All That Is Solid Melts into Air: The Experience of Modernity*, New York, Simon and Schuster, 1982.

BERNSTEIN, Leonard: *The Joy of Music*, with a foreword by Tim Page, Pompton Plains, NJ, and Cambridge, Amadeus Press, 2004.

BERTHOZ, Alain: *Le sens du mouvement*, Paris, Odile Jacob, 1997.

BESSELER, Heinrich: "Grundfragen des musikalischen Hörens" (1925), in *Aufsätze zur Musikäesthetik und Musikgeschichte*, edited by Peter Gülke, Leipzig, Reclam, 1978, pp. 29–53.

--- *Das musikalische Hoeren der Neuzeit*, Berlin, Akademie-Verlag, 1959.

BEYER, Robert T.: "Acoustic, Acoustics", *Journal of the Acoustical Society of America*, vol. 98, no. 1, 1995, pp. 33–34.

--- *Sounds of Our Times: Two Hundred Years of Acoustics*, New York, Springer Verlag-AIP Press, 1998.

BHARUCHA, Jamshed; CURTIS, Meagan; and PAROO, Kaivon: "Varieties of Musical Experience", *Cognition*, 100 (2006), pp. 131–172.

BIAL, Henry (ed.): *The Performance Studies Reader*, London, Routledge, 2004.

BIERNOFF, Suzannah: *Sight and Embodiment in the Middle Ages*, New York, Palgrave Macmillan, 2002.

BIJSTERVELD, Karin: *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*, Cambridge, MA, MIT Press, 2008.

BIJSTERVELD, Karin (ed.): *Soundscapes of the Urban Past: Staged Sound as Mediated Cultural Heritage*, Bielefeld, Transcript Verlag, 2013.

BIJSTERVELD, Karin; VAN DIJCK, José (eds): *Sound Souvenirs: Audio Technologies, Memory and Cultural Practices*, Amsterdam, Amsterdam University Press, 2009.

BIRDSALL, Carolyn: *Nazi Soundscapes: Sound, Technology, and Urban Space in Germany, 1933–1945*, Amsterdam, Amsterdam University Press, 2012.

BIRDSALL, Carolyn; ENNS, Anthony (ed.): *Sonic Mediations: Body, Sound, Technology*, Newcastle Upon Tyne, Cambridge Scholars Publishing, 2008.

BIRDWHISTELL, Ray L.: *Kinesics and Context: Essays on Body-Motion Communication*, Harmondsworth, UK, Penguin, 1973 (1st ed. Philadelphia, University of Pennsylvania Press, 1970).

BLACKING, John: *Venda Children's Songs*: *A Study in Ethnomusicological Analysis*, Chicago-London, University of Chicago Press, 1995 (1st ed. 1967).

--- "The Value of Music in Human Experience", *Yearbook of the International Folk Music Council*, vol. 1, 1969, pp. 33–71.

--- "Towards a Theory of Musical Competence", in JAGER, E. J. de (ed.): *Man: Anthropological Essays Presented by O.F. Raum*, Capetown, C. Struik, 1971, pp. 19–34.

--- *How Musical is Man?*, Seattle, University of Washington Press, 1973.

--- *'A Commonsense View of All Music': Reflections on Percy Grainger's Contribution to Ethnomusicology and Music Education*, Cambridge, Cambridge University Press, 1987.

--- *Music, Culture and Experience: Selected Papers of John Blacking*, edited with an introduction by Reginald Byron, with a foreword by Bruno Nettl, Chicago, Chicago University Press, 1995.

BLACKING, John (ed.): *The Anthropology of the Body*, London, Academic Press, 1977.

BLACKING, John, KEALIINOHOMOKU, Joann (eds): *The Performing Arts: Music and Dance*, The Hague–Paris–New York, Mouton Publishers, 1979.

BLAUERT, Jens: *Spatial Hearing: The Psychophysics of Human Sound Localization*, Cambridge, MA, MIT Press, 1997.

BLESSER, Barry and SALTER, Linda-Ruth: *Spaces Speak, Are You Listening?,* Cambridge, MA, MIT Press, 2006.

BLOCH, Marc: *Les Rois thaumaturges: étude sur le caractère surnaturel attribué à la puissane royale, particulièrement en France et en Anglaterre*, Paris, Armand Colin, 1961.

--- *The Royal Touch: Sacred Monarchy and Scrofula in England and France*, translated by J.E. Anderson, London, Routledge and Kegan Paul, 1973.

--- *Feudal Society, 1: The Growth of Ties of Dependence*, translated from the French by L.A. Manyon, with a new foreword by T.S.Brown, London, Routledge, 1961.

BLOCH, Maurice E. F.: *How We Think They Think: Anthropological Approaches to Cognition, Memory, and Literacy*, Boulder, Westview Press, 1998.

BLONDEL, Charles: *La Mentalité primitive*, preface by Lucien Lévy-Bruhl, Paris, Stock, 1926.

--- *Introduction à la psychologie* collective, Paris, Armand Colin, 1928.

BLUM, Stephen: "Hearing the Music of the Middle East", in DANIELSON, Virginia; MARCUS, Scott; and REYNOLDS, Dwight (eds): *The Garland Encyclopedia of World Music*, *vol. VI: The Middle East*, New York, Garland, 2002, pp. 3–13.

BOAKES, Robert: *From Darwin to Behaviourism: Psychology and the Minds of Animals*, Cambridge, Cambridge University Press, 1984.

BOAS, Franz: "On Alternating Sounds", *The American Anthropologist*, vol. A2, no. 1, January 1889, pp. 47–54.

--- "Introduction to the Handbook of American Indian Languages", *Smithsonian Institution Bulletin*, Part I, 1911.

BÖDEKER, Hans Erich; VEIT, Patrice; WERNER; Michael: *Le concert et son public. Mutations de la vie musicale en Europe de 1780 à 1914 (France, Allemagne, Angleterre)*, Paris, Éditions de la Maison des sciences de l'homme, 2002.

BOETHIUS, Anicius Manlius Severinus: *Fundamentals of Music*, translated with introduction and notes by Calvin M. Bower, edited by Claude V. Palisca, New Haven, CT, Yale University Press, 1989.

BOHLMAN, Philip V.: "The European Discovery of Music in the Islamic World and the 'Non–Western' in 19th–Century Music History", *The Journal of Musicology*, vol. 5, no. 2 (Spring, 1987), pp. 147–163.

--- "Traditional Music and Cultural Identity: Persistent Paradigm in the History of Ethnomusicology"*, Yearbook for Traditional Music*, vol. 20, 1988, pp. 26–42.

--- "Missionaries, Magical Muses, and Magnificent Menageries: Image and Imagination in the Early History of Ethnomusicology", *The World of* Music, 30 (3), 1988, pp. 5–27.

--- *World Music: A Very Short Introduction*, Oxford, Oxford University Press, 2002.

BOISSIÈRE, Anne: "Écoute et analyse chez Adorno", in KINTZLER, Catherine (éd.): *Peinture et musique: penser la vision, penser l'audition*, Villeneuve d'Ascq, Presses Universitaires du Septentrion*,* 2002, pp. 143–156.

BONDS, Mark Evan: *Wordless Rhetoric: Musical Form and the Metaphor of the Oration*, Cambridge, MA, Harvard University Press, 1991.

--- *Music as Thought: Listening to the Symphony in the Age of Beethoven*, Princeton, Princeton University Press, 2006.

--- “Listening to Listeners”, in MIRKA, Danuta; AGAWU, Kofi (eds): *Communication in Eighteenth-Century Music*, Cambridge, Cambridge University Press, 2008, pp. 34–52.

--- *Absolute Music: The History of an Idea*, New York, Oxford University Press, 2014.

BONNET, Charles: *Essai analytique sur les facultés de l’âme*, Copenhagen, Frères Cl. & Ant. Philibert, 1760, accessible online: https://archive.org/details/essaianalytiques00bonnuoft [last access: September 2015].

BOQUET, Damien: “L’erreur de Lucien Febvre: anti-historiographie de l’histoire des émotions”, Carnet d’EMMA, 12 novembre 2013, accessible online: http://emma.hypotheses.org/?p=2067 [last access: February 2015].

BOQUET, Damien; NAGY, Piroska: “Une histoire des émotions incarnées”, *Médiévales*, 61 (“La chair des émotions. Pratiques et représentations corporelles de l'affectivité au Moyen Âge”), edited by Damien Boquet, Piroska Nagy and Laurence Moulinier-Brogi, Autumn 2011, pp. 5–24, accessible online: http://medievales.revues.org/6249?lang=en [last access: February 2015].

BORING, Edwin G.: “Auditory Theory with Special Reference to Intensity, Volume, and Localization”, *The American Journal of Psychology*, vol. XXXVII, no. 2, April 1926, pp. 157–188.

--- *Sensation and Perception in the History of Experimental Psychology*, New York, Appleton-Century-Crofts, 1942.

--- *A History of Experimental Psychology*, New York, Appleton-Century-Crofts, 1950 (2nd ed.).

BORN, Georgina: *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Musical Avant-Garde*, Berkeley, University of California Press, 1995.

BORN, Georgina; HESMONDHALGH, David (eds): *Western Music and its Others*, Berkeley, University of California Press, 2000.

BOTSTEIN, Leon: Music and Its Public: Habits of Listening and the Crisis of Musical Modernism in Vienna, 1870–1914 (Ph. D. Harvard University, 1985), Ann Arbor, University Microfilms International.

--- “Time and Memory: Concert Life, Science, and Music in Brahms’s Vienna”, in FRISCH, Walter (ed.): *Brahms and His World*, Princeton, Princeton University Press, 1990, pp. 3–22.

--- “Listening through Reading: Musical Literacy and the Concert Audience”, *19th-Century Music*, vol. 16, no. 2: “Music in Its Social Context”, Autumn 1992, pp. 129–145.

--- “Toward a History of Listening”, *The Musical Quarterly*, vol. 82, no. 3–4, special issue: “Music as Heard”, Autumn-Winter 1998, pp. 427–431.

--- "The Audience", *The Musical Quarterly*, vol. 83, no. 4, 1999, pp. 479–486.

--- "The Eye of the Needle: Music as History after the Age of Recording", in FULCHER, Jane F. (ed.): *The Oxford Handbook of the New Cultural History of Music*, New York, Oxford University Press, 2011, pp. 256–304.

BOURDELOT, Pierre; BONNET, Pierre: *Histoire de la musique et de ses effets*, Amsterdam, 1725, facsimile ed. Graz, Akademische Druck- u. Verlagsanstalt, 1966.

BOURDIEU, Pierre: *Esquisse d'une théorie de la pratique: précédé de trois études d'ethnologie kabyle*, Geneva, Droz, 1972.

--- *Outline of a Theory of Practice*, translated by Richard Nice, Cambridge, Cambridge University Press, 1977.

--- *La Distinction*, Paris, Minuit, 1979.

--- *Distinction: A Social Critique of the Judgement of Taste*, translated by Richard Nice, Cambridge, MA, Harvard University Press, 1984.

--- *Le Sens pratique*, Paris, Minuit, 1980.

--- *The Logic of Practice*, translated by Richard Nice, Cambridge, Polity Press, 1990.

--- "Artistic taste and cultural capital", in ALEXANDER, Jeffrey C.; SEIDMAN, Steven (eds): *Culture and Society: Contemporary Debates*, Cambridge, Cambridge University Press, 1990.

BOURKE, Joanna: "Fear and Anxiety: Writing About Emotion in Modern History", *History Workshop Journal*, issue 55, 2003, pp. 111–133.

--- *Fear: A Cultural History*, London, Virago, 2005.

BOWMAN, Wayne D.: *Philosophical Perspectives on Music*, New York, Oxford University Press, 1998.

BOYDEN, David D.: *An Introduction to Music*, London, Faber and Faber Limited, 1971 (2nd edition).

BRAVERMAN, Harry: *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*, New York, Monthly Review Press, 1974.

BRACKETT, David: "Economics and Aesthetics in Contemporary Art Music", *Stanford Humanities Review, vol. 3, n. 2: "And the walls come a–tumblin'down": Music in the age of postdisciplinarity*, edited by Anahid Kassabian, Autumn 1993, pp. 49–59.

BRADY, Erika: *A Spiral Way: How the Phonograph Changed Ethnography*, Jackson, University Press of Mississippi, 1991.

BREGMAN, Albert S.: *Auditory Scene Analysis: The Perceptual Organization of Sound*, Cambridge, MA, MIT Press, 1990.

BRENNI, Paolo: "The Triumph of Experimental Acoustics VI: Albert Marloye (1795-1874) and Rudolph Koenig (1832-1901)", *Bulletin of the Scientific Instrument Society*, no. 44, http://www.sis.org.uk/resources/bulletin/145-bulletin-back-issue- [last access: May 2015].

BRIGGS, Jean L.: *Never in Anger: Portrait of an Eskimo Family*, Cambridge, MA, Harvard University Press, 1970.

BRINGMANN, Wolfgang G.; TWENEY, Ryan D. (eds): *Wundt Studies: A Centennial Collection*, with a foreword by Ernest R. Hilgard, Toronto, C.J. Hogrefe, 1980.

BROADBENT, D. E.: *Percepción y comunicación*, trans. Ana Julia Garriga Trillo and Carmen Mas Díaz-Utano, Madrid, Debate, 1983.

BROWN, Steven: "The 'Musilanguage' Model of Music Evolution", in WALLIN, Nils L.; MERKER, Björn; BROWN, Steven (eds): *The Origins of Music*, Cambridge, MA, MIT Press, 2000, pp. 271–300.

BROWN, Steven; VOLGSTEN, Ulrik (eds): *Music and Manipulation. On the Social Uses and Social Control of Music*, Oxford-New York, Berghahn Books, 2006.

BRUNER, Frank G.: *The Hearing of Primitive Peoples: An Experimental Study of the Auditory Acuity and the Upper Limit of Hearing of Whites, Indians, Philipinos, Ainu and African Pigmies*, New York, The Science Press, 1908 (reprinted for the series "Reprints from the collections of the University of Michigan Library").

BUCHENAU, Stefanie: *The Founding of Aesthetics in the German Enlightenment: The Art of Invention and the Invention of Art*, Cambridge, Cambridge University Press, 2013.

BUCHLOH, Benjamin H.D.: *Neo-Avantgarde and Culture Industry: Essays on European and American Art: Essays on European and American Art from 1955 to 1975*, Cambridge, MA, MIT Press, 2000.

BUCK-MORSS, Susan: "Aesthetics and Anaesthetics: Walter Benjamin's Artwork Essay Reconsidered", *October*, vol. 62, Autumn 1992, pp. 3–41.

BULL, Michael: *Sounding Out the City: Personal Stereos and the Management of Everyday Life*, Oxford, Berg Publishers, 2000.

--- "No Dead Air! The iPod and the Culture of Mobile Listening", *Leisure Studies*, 24, October 2005, 343–355.

--- *Sound Moves: iPod Culture and Urban Experience*, The International Library of Sociology, London, Routledge, 2007.

BULL, Michael; BACK, Les (eds): *The Auditory Culture Reader*, Oxford–New York, Berg Publishers, 2003.

BULL, Michael; GILROY, Paul; HOWES, David; KAHN, Douglas: "Introducing Sensory Studies", *The Senses and Society*, vol. 1, no. 1, 2006, pp. 5–7.

BÜRGER, Peter: *Vermittlung – Rezeption – Funktion. Ästhetische Theorie und Methodologie der Literaturwissenschaft*, Frankfurt, Suhrkamp, 1979.

--- *Crítica de la estética idealista*, traducción de Ricardo Sánchez Ortiz de Urbina, Madrid, Visor, 1996.

--- "Problemas de investigación de la recepción", in BÜRGER, Peter; GUMBRECHT, H. U.; HOHENDAHL, P. U.; ISER, W.; JAUSS, H. R.; MAURER, K.; ROTHE, A.; STIERLE, K.; ZIMMERMANN, B.: *Estética de la recepción*, edited and with a bibliography by José Antonio Mayoral, Madrid, Arco Libros, 1987, pp. 177–211.

BURGUIÈRE, André: *L'École des Annales: une histoire intellectuelle*, Paris, Odile Jacob, 2006.

--- "Mentalités, histoire", in *Encyclopædia Universalis* (online edition), http://www.universalis.fr/encyclopedie/mentalites-histoire/ [last access: September 2014].

BURKE, Catherine; GROSVENOR, Ian: "The Hearing School: an exploration of sound and listening in the modern school", *Paedagogica Historica*, vol. 47, no. 3, June 2011, pp. 323–340.

BURKE, Peter: "Strengths and Weaknesses of the History of Mentalities", History of European Ideas, vol. 7, no. 5, 1986, pp. 439–451. (

--- *The French Historical Revolution: The Annales School, 1929–89*, Cambridge, Polity Press, 1990.

--- *The Art of Conversation*, Ithaca, NY, Cornell University Press, 1993.

--- *Varieties of Cultural History*, Cambridge, Polity Press, 1997.

--- *What Is Cultural History?*, Cambridge, Polity Press, 2005.

BURKE, Peter (ed.): *New Perspectives on Historical Writing*, Cambridge, Polity Press, 1992.

BURNETT, Charles; FEND, Michael; GOUK, Penelope (eds): *The Second Sense: Studies in Hearing and Musical Judgement from Antiquity to the Seventeenth-Century*, London, The Warburg Institute, 1991.

BUTLER, Katherine: "Myth, Science, and the Power of Music in the Early Decades of the Royal Society", *Journal of the History of Ideas*, vol. 76, no. 1, January 2015, pp. 47–68.

BUTTERFIELD, Matthew: "The Musical Object Revisited", *Musical Analysis*, 21/iii, London, Blackwell Publishing, 2002, pp. 327–380.

BYNUM, William F.; BROWNE, E. Janet; and PORTER, Roy (eds): *Dictionary of the History of Science*, Princeton, Princeton University Press, 2014 (reprint; originally published in London, Macmillan, 1981).

BYNUM, William F.; PORTER, Roy (eds): *Medicine and the Five Senses*, Cambridge, Cambridge University Press, 1993.

BYROS, Vasileios (Vasili): Foundations of Tonality as Situated Cognition, 1730–1830: An Enquiry into the Culture and Cognition of Eighteenth–Century Tonality with Beethoven's *Eroica* Symphony as a Case Study, Ph.D. dissertation, Yale University, December 2009, Dissertation Director: Richard Coh, December 2009.

CAGE, John: *Silence: Lectures and Writings by John Cage*, Hanover, NH, Wesleyan University Press-University Press of New England, 1961.

--- *A Year from Monday: New Lectures and Writings*, Middletown, CT, Wesleyan University Press, 1967.

--- *Escritos al oído*, edited, translated and with a preface by Carmen Pardo, Murcia, Colegio Oficial de Aparejadores y Arquitectos Técnicos, 1999.

CAGNIARD DE LA TOUR, Charles (Baron): "Sur la Sirène, nouvelle machine d'acoustique destinée à mesurer les vibrations de l'air qui constituent le son", *Annales de chimie et de physique*, vol. 12, 1819, pp. 167–171.

CAHAN, David (ed.): *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*, Berkeley, University of California Press, 1993.

CAHILL, Patricia A.: "Take Five: Renaissance Literature and the Study of the Senses", *Literature Compass*, 6/5, 2009, pp. 1014–1030.

CALVERT, Gemma; SPENCE, Charles; STEIN, Barry E. (eds): *The Handbook of Multisensory Processes*, Cambridge, MA, MIT Press, 2004.

CÁMARA DE LANDA, Enrique: *Etnomusicología*, Madrid, Ediciones del Instituto Complutense de Ciencias Musicales, 2003.

CAMPBELL, Gavin James: "'A Higher Mission Than Merely to Please the Ear': Music and Social Reform in America (1900–1925)", *The Musical Quarterly*, 84 (2), 2000, pp. 259–286.

CAMPOS, Rémy; DONIN, Nicolas; KECK, Frederick: "Musique, musicologie, sciences humaines: sociabilités intellectuelles, engagements esthétiques et malentendus disciplinaires (1870–1970), *Revue d'Histoire des Sciences Humaines*, 2006, 14, pp. 3–17.

CAMPOS, Rémy; DONIN, Nicolas: “La musicographie à l'oeuvre: écriture du guide d'écoute et autorité de l'analyste à la fin du XIXe siècle”, *Acta musicologica*, LXXVII/2, 2005, pp. 151–204.

CANGUILHEM, Georges: *Idéologie et rationalité dans les sciences de la vie: nouvelles études d’histoire et de philosophie des sciences*, Paris, J. Vrin, 1977.

--- *Études d’histoire et de philosophie des sciences concernant les vivants et la vie*, Paris, J. Vrin, 1994 (reimp. 2002).

CAPELLA, Martianus: *Le Nozze di Filologia e Mercurio*, with Latin text; introduction, traduction, comment and appendixes by Ilaria Ramelli, Milan, Bompiani, 2001.

CAPSHEW, James H.: *Psychologists on the March: Science, Practice, and Professional Identity in America, 1929–1969*, Cambridge-New York, Cambridge University Press, 1999.

CARMAN, Taylor; HANSEN, Mark B.N. (eds): *The Cambridge Companion to Merleau-Ponty*, Cambridge, Cambridge University Press, 2005.

CAROTHERS, J.C.: “Culture, Psychiatry, and the Written Word”, *Psychiatry*, vol. 22, no. 4, November 1959, pp. 307–320.

CARPENTER, Edmund: *Oh, What a Blow That Phantom Gave Me!*, New York-Chicago-San Francisco, Holt, Rinehart and Winston, 1972.

--- *Eskimo Realities*, New York, Holt, Rinehart and Winston, 1973.

CARPENTER, Patricia: “The Musical Object”, *Current Musicology*, 5, 1967, pp. 56–87.

CARPINTERO, Helio: “El Dr. Simarro y la Psicología Científica en España”, *Investigaciones Psicológicas*, no 4: “Los orígenes de la Psicología experimental en España: el Dr. Simarro”, edited by José Javier Campos Bueno and Rafael Llavona Uribelarrea (eds), 1987, pp. 189–207.

CARRERA, Elena (ed.): *Emotions and Health*, Leiden, Brill, 2013.

CARROY, Jacqueline; SCHMIDGEN, Henning: *Psychologies expérimentales: Leipzig–Paris (1890–1910)*, “Preprint 206”, Berlin, Max–Planck–Institut fur Wissenschaftsgeschichte, 2002, accessible online: https://www.mpiwg-berlin.mpg.de/en/resources/preprints [last access: October 2015].

CARTER, Tim; BUTT, John (eds.): *The Cambridge History of Seventeenth-Century Music*, Cambridge, Cambridge University Press, 2005.

CARTERETTE, Edward C.; FRIEDMAN, Morton P. (eds): *Handbook of Perception, vol. IV: Hearing*, New York-San Francisco-London, Academic Press, 1978.

CARVALHO, José Jorge de: “Transformaçôes da sensibilidade musical contemporânea”, *Horizontes Antropológicos. Música e Sociedade*, vol. 11, edited by Maria Elizabeth Lucas, Porto Alegre, 1999, pp. 53–91.

--- “O Olhar Etnográfico e a Voz Subalterna”, *Horizontes Antropológicos. Música e Sociedade*, vol. 15, 2001, pp. 107–147.

CASINI, Claudio: *El arte de escuchar la música*, trans. Manel Martí, Barcelona, Paidós, 2006, p. 15.

CASSIRER, Ernst: *The Philosophy of the Enlightenment*, with a new foreword by Peter Gay, Princeton, NJ-Oxford, Princeton University Press, 2009.

CATTELL, James McKeen: “The Psychological Laboratory at Leipsic [sic]”, *Mind*, no. 13, 1888, pp. 37–51, accessible online: http://psychclassics.yorku.ca/Cattell/leipsic.htm [last access: October 2015].

--- “Early Psychological Laboratories”, *Science*, no. 67, 1928, pp. 543–548, accessible online: http://psychclassics.yorku.ca/Cattell/earlylabs.htm [last access: October 2015].

CAVELL, Richard: *McLuhan in Space: A Cultural Geography*, Toronto, University of Toronto Press, 2002.

CAVICCHI, Daniel: *Tramps Like Us: Music and Meaning Among Springsteen Fans*, New York–Oxford: Oxford University Press, 1998.

--- *Listening and Longing: Music Lovers in the Age of Barnum*, Middletown, CT, Wesleyan University Press, 2011.

CERTEAU, Michel de: *L’écriture de l’histoire*, Paris, Gallimard, 1975.

--- *L'invention du quotidien*, Paris, Gallimard, 1990–1994 (2 vols.)

--- *The Practice of Everyday Life*, translated by Steven Rendall, Berkeley, University of California Press, 1984.

CHABANON, Michel-Paul-Guy de: *Observations sur la musique, et principalement sur la métaphysique de l’art*, Paris, Pissot, Père et Fils, 1779, accessible online: http://gallica.bnf.fr/ark:/12148/bpt6k108142t [last access: October 2015].

--- *De la Musique considerée en elle-même et dans ses rapports avec la parole, les langues, la poésie et le théâtre*, Paris, Pissot, 1785, accessible online: http://gallica.bnf.fr/ark:/12148/bpt6k1081402.r=chabanon%20musique%20consider%C3%A9e [last access: October 2015].

CHAMBERS, Iain: *Popular Culture: the Metropolitan Experience*, London, Routledge, 1986.

--- “Maps, Movies, Musics and Memory”, in CLARKE, David (ed.): *The Cinematic City*, London, Routledge, 1997, pp. 230–240.

CHANAN, Michael: *Musica Practica: The Social Practice of Western Music from* Gregorian *Chant to Postmodernism*, London, Verso, 1994.

--- *Repeated Takes: A History of Recording and Its Effects on Music*, London, Verso, 1995.

CHARRAK, André: *Raison et perception, fonder l’harmonie au XVIII siècle*, Paris, Vrin, 2001.

CHARTIER, Roger: “Le monde comme représentation”, *Annales. Économies, Sociétés, Civilisations*, 44e année, no. 6, 1989, pp. 1505–1520.

--- *The Order of Books*, Stanford, Stanford University Press, 1994.

--- *Cultural History: Between Practices and Representations*, Ithaca, NY, Cornell University Press, 1998.

CHERNOFF, John M.: *African Rhythm and African Sensibility: Aesthetics and Social Action in African Musical Idioms*, Chicago, University of Chicago Press, 1979.

--- “‘Hearing’ in West African idioms”, *The World of Music*, vol. XXXIX, no. 2, 2006, pp. 19–25.

CHION, Michel*: L'Audio-vision*, Paris, Nathan, 1990.

--- *Audio-Vision: Sound on Screen*, edited and translated by Claudia Gorbman, with a foreword by Walter Murch, New York, Columbia University Press, 1994.

--- *El arte de los sonidos fijados*, trans. Carmen Pardo, Cuenca, Taller de Ediciones, 2002.

--- *Le Promeneur écoutant: essais d’acoulogie*, 1st ed. Paris, Plume, 1993, 2nd ed. revised and updated by the author, 2009, accessible online: http://michelchion.com/books/42-le-promeneur-ecoutant [last access: August 2015].

CHLADNI, Ernst F.F.: *Traité d’acoustiqu*e, translated by the author, Paris, Courcier, 1809, digital edition accessible online: http://gallica.bnf.fr/ark:/12148/bpt6k61977h [last access: October 2015].

CHOPYAK, James D.: “Hearing and Seeing in the Electronic Age: Preliminary Comparisons Between Malaysia and California”, *The World of Music*, vol. XXXIX, no. 2, 1997, pp. 27–39.

CHOUILLET, Jacques: *La Formation des idées esthétiques de Diderot, 1745-1763*, Paris, Armand Colin, 1973.

CHRISTENSEN, Thomas: “Eighteenth-Century Science and the ‘Corps Sonore’: The Scientific Background to Rameau’s ‘Principle of Harmony’”, *Journal of Music Theory*, vol. 31, no. 1, Spring 1987, pp. 23–50.

--- *Rameau and Musical Thought in the Enlightenment*, Cambridge, Cambridge University Press, 1993.

CHRISTENSEN, Thomas (ed.): *The Cambridge History of Western Music Theory*, Cambridge, Cambridge University Press, 2002.

CHYBOWSKI, Julia J.: Developing American Taste: A Cultural History of the Early Twentieth-Century Music Appreciation Movement, Ph.D. dissertation, University of Wisconsin, Madison, 2008.

CICERO: *De Re Publica. De Legibus,* with an English translation by Clinton Walker Keyes, Cambridge, MA, Harvard University Press, 1928.

--- *De Oratore*, with an English translation by E.W. Sutton, completed with an introduction by H. Rackham, Cambridge, MA-London, Harvard University Press-Heinemann, 1942, 2 vols.

--- *De Inventione. De Optimo Genere Oratorum. Topica*, with and English translation by H.M. Hubbell, Cambridge, MA-London, Harvard University Press-Heinemann, 1949.

Circuit: musiques contemporaines, vol. 14, numéro 1: “Qui écoute? 2”, Montréal, Les Presses de l'Université de Montréal, 2004.

CLARK, Andy: *Being There. Putting Brain, Body, and World Together Again*, Cambridge, MA, MIT Press, 1997.

CLARK, Suzannah; REHDING, Alexander (eds): *Music Theory and Natural Order from the Renaissance to the Early Twentieth-Century*, Cambridge-New York, Cambridge University Press, 2005.

CLARKE, Edwin: “The Doctrine of the Hollow Nerve in the Seventeenth and Eighteenth Centuries”, in STEVENSON, Lloyd G.; MULTHAUF, Robert P. (eds): *Medicine, Science and Culture: Historical Essays in Honor of Owsei Temkin*, Baltimore, MD, Johns Hopkins University Press, 1968, pp. 123–141.

CLARKE, Edwin; O’MALLEY, Charles D. (eds): *The Human Brain and Spinal Cord: A Historical Study Illustrated by Writings from the Antiquity to the Twentieth Century*, San Francisco, Norman Publishers, 1996.

CLARKE, Eric F.: “Levels of Structure in the Organization of Musical Time”, *Contemporary Music Review*, vol. 2, part 1, edited by Stephen McAdams, London, Harwood Academic Publishers, 1987, pp. 211–239.

--- “Mind the Gap: Formal Structures and Psychological Processes in Music”, *Contemporary Music Review*, vol. 3, part 1 (issue editors: Eric Clarke and Simon Emmerson), London, Harwood Academic Publishers, 1989, pp. 1–14.

--- *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*, Oxford, Oxford University Press, 2005.

--- “The Impact of Recording on Listening”, *Twentieth-Century Music*, 41, 2007, pp. 47–70.

CLARKE, Eric; COOK, Nicholas (eds): *Empirical Musicology: Aims, Methods, Prospects*, New York, Oxford University Press, 2004.

CLASSEN, Constance: “Sweet Colors, Fragrant Songs: Sensory Models of the Andes and the Amazon*, American Ethnologist*, vol. 17, no. 4, November 1990, pp. 722–735.

--- “La perception sauvage. Étude sur les ordres sensoriels des enfants ‘sauvages’”, *Anthropologie et Sociétés*, vol. 14, n. 2, 1990, pp. 47–56.

--- *Worlds of Sense: Exploring the Senses in History and Across Cultures*, London-New York, Routledge, 1993.

--- “Foundations for an Anthropology of the Senses,” *International Social Science Journal*, n. 153, 1997, pp. 401–412.

--- *The Color of Angels: Cosmology, Gender and the Aesthetic Imagination*, London, Routledge, 1998.

--- “The Senses”, in STEARNS, Peter (ed.): *Encyclopedia of European Social History from 1350 to 2000,* vol. IV, New York, Charles Scribner & Sons, 2001, pp. 355–364.

--- *The Deepest Sense: A Cultural History of Touch*, Champaign, IL, University of Illinois Press, 2012.

CLASSEN, Constance (ed.): *The Book of Touch*, Oxford and New York, Berg Publishers, 2005.

--- *A Cultural History of the Senses*, 6 vols., London, Bloomsbury, 2014.

CLASSEN, Constance; HOWES, David; SYNNOTT, Anthony: *Aroma: The Cultural History of Smell*, London and New York, Routledge, 1994.

CLAYTON, Martin; HERBERT, Trevor; MIDDLETON, Richard (ed.): *The Cultural Study of Music*, London, Routledge, 2003.

CLAYTON, Martin; SAGER, Rebecca; WILL, Udo: “In Time with the Music: The Concept of Entrainment and Its Significance for Ethnomusicology” *European Meetings in Ethnomusicology*, 11 (ESEM Counterpoint 1), 2005 pp.3–75.

CLIFFORD, James: *The Predicament of Culture: Twentieth-Century Ethnography, Literature, and Art*, Cambridge, MA, Harvard University Press, 1988.

CLIFFORD, James; MARCUS, George E. (eds.): *Writing Culture: The Poetics and Politics of Ethnography*, Berkeley, University of California Press, 1986.

CLIFTON, Thomas: *Music as Heard: A Study in Applied Phenomenology*, New Haven, CT, Yale University Press, 1983.

COCKAYNE, Emily: *Hubbub: Filth, Noise & Stench in England, 1600-1770*, New Haven, CT-London, Yale University Press, 2007.

COELHO, Victor (ed.): *Music and Science in the Age of Galileo*, Dordrecht, Kluwer Academic Publishers, 1992.

COHEN, Albert: *Music in the French Royal Academy of Sciences: A Study in the Evolution of Musical Thought*, Princeton, NJ, Princeton University Press, 1981.

COHEN, H.F.: *Quantifying Music: The Science of Music at the First Stage of the Scientific Revolution, 1580–1650*, Dordrecht-Boston-Lancaster, D.Reidel Publishing Company, 1984.

--- "Music as a Test-Case", *Studies in History and Philosophy of Science*, vol. 16, no. 4, 1985, pp. 351–378.

COHEN, Sara: "Ethnography and Popular Music Studies", *Popular Music*, vol. 12, nº 2, mayo 1993, pp. 123–138.

--- "Sounding Out the City: Music and the Sensuous Production of Place", *Transactions of the Institute of British Geographers*, New Series, vol. 20, no. 4 (1995), pp. 434–446

CONDILLAC, Étienne Bonnot de: *Traité des sensations*, Paris, Librairie Arthème Fayard, 1984.

--- *Condillac's Treatise on the Sensations*, translated by Geraldine Carr, London, Favil Press, 1930.

--- *Essai sur l'origine des connaissances humaines*, Avers-sur-l'Oise, Galilée, 1973.

--- *Essay on the Origin of Human Knowledge*, translated and edited by Hans Aarsleff, Cambridge, Cambridge University Press, 2001.

CONE, Edward T.: *Musical Form and Musical Performance*, New York, W. W. Norton & Company, 1968.

CONNELL, John; GIBSON, Chris (eds): *Sound Tracks: Popular Music, Identity, and Place*, London, Routledge, 2002.

CONNOR, Steven: “The Modern Auditory I”, in PORTER, Roy (ed.): *Rewriting the Self. Histories from the Renaissance to the present*, London, Routledge, 1997, pp. 203–223.

--- “Voice, Technology and the Victorian Ear”, paper given at the conference on *Science and Culture 1780–1900* at Birkbeck College, London, 12th September 1997, http://www.stevenconnor.com/phones.htm [last access: October 2015].

--- “CP: or, A Few Don’ts By a Cultural Phenomenologist”, *Parallax,* vol. 5, no. 2, 1999*,* pp. 17–31.

--- “Intersensoriality”, a talk given at the conference on The Senses, Thames Valley University, 6th February 2004, http://stevenconnor.com/intersensoriality.html [last access: July 2015].

--- “Strings in the Earth And Air”, lecture given at the Music and Postmodern Cultural Theory Conference, Melbourne, December 5, 2006, http://stevenconnor.com/strings/strings.pdf [last access: July 2015].

--- “Atmospherics”, in BIRDSALL, Carolyn; ENNS, Anthony (ed.): *Sonic Mediations: Body, Sound, Technology*, Newcastle Upon Tyne, Cambridge Scholars Publishing, 2008, pp. 159–174.

COOK, Harold J.: “The New Philosophy and Medicine in Seventeenth-Century England”, in LINDBERG, David G.; WESTMAN, Robert S. (eds): *Reappraisals of the Scientific Revolution*, Cambridge, Cambridge University Press, 1990, pp. 397–436.

COOK, Nicholas: *A Guide to Musical Analysis*, Oxford, Oxford University Press, 1987.

--- *Music, Imagination, and Culture*, Oxford, Oxford University Press, 1990.

--- “Theorizing Musical Meaning”, *Music Theory Spectrum*, vol. 23, n. 2, 2001, 170–195

--- “Between Process and Product: Music and/as Performance”, *Music Theory Online*, vol. 7, no. 2, 2001, http://www.mtosmt.org/issues/mto.01.7.2/mto.01.7.2.cook.html?q=mto/issues/mto.01.7.2/mto.01.7.2.cook.html#Beginning [last access: October 2015]

--- “Music and Meaning in the Commercials”, *Popular Music*, vol. 13, n. 1, January 1994, pp. 27–40.

--- “The Domestic *Gesamtkunstwerk*, or Record Sleeves and Reception” in THOMAS, Wyndham (ed.): *Composition–Performance–Reception. Studies in the Creative Process in Music*, Aldershot, Ashgate, 1998, pp. 105–117.

--- “Encountering the Other, Redefining the Self: Hindostannie Airs, Haydn's Folksong Settings, and the ‘Common Practice’”, in CLAYTON, Martin; ZON, Bennett (eds): *Music and Orientalism in the British Empire, 1780s–1840s: Portrayal of the East*, Aldershot, Ashgate, 2007, pp. 13–37.

COOK, Nicholas; EVERIST, Mark (eds): *Rethinking Music*, Oxford, Oxford University Press, 1999.

COOK, Perry R. (ed.): *Music, Cognition, and Computerized Sound. An Introduction to Psychoacoustics*, Cambridge, MA, MIT Press, 1999.

COOKE, Deryck: *The Language of Music*, Oxford, Oxford University Press, 1963.

COPLAND, Aaron: *Music and Imagination*, "The Charles Eliot Norton Lectures 1951–1952", Cambridge, MA, Harvard University Press, 1980.

--- *What to Listen for in* Music, with a foreword and epilogue by Alan Rich, introduction by William Schuman and a new appreciation by Leonard Slatkin, New York, Signet Classics, 2011

CORBETT, John: "Free, Single, and Disengaged. Listening Pleasure and the Popular Music Object", *October 54 (Fall 1990)*, pp. 79–101.

CORBIN, Alain: *Le miasme et la jonquille: L'odorat et l'imaginaire social XVIIIe–XIXe siècles*, Paris, Aubier Montaigne, 1982.

--- *The Foul and the Fragrant: Odor and the French Social Imagination*, Cambridge, MA, Harvard University Press, and Leamington Spa, UK, Berg Publishers, 1986.

--- *Le Temps, le désir et l'horreur. Essais sur le dix–neuvième siècle*, Paris, Aubier, 1991.

--- *Time, Desire and Horror: Towards a History of the Senses*, Cambridge, Polity Press, 1995.

--- "'Le Vertige des foisonnements'. Esquisse panoramique d'une histoire sans nom", *Revue d'histoire moderne et contemporaine*, 39–1, janvier-mars 1992, pp. 103–126.

--- "De l'histoire des représentations à l'histoire sans nom. Entretien avec Alain Corbin", propos recueillis par Yves Déloye et Florence Haegel, *Politix*, vol. 6, no. 21, premier trimestre 1993, pp. 7–14.

--- *Les Cloches de la terre: paysage sonore et culture sensible dans les campagnes au XIXe siècle*, Paris, Albin Michel, 1994.

--- *Village Bells: The Culture of the Senses in the Nineteenth-Century French Countryside*, translated by Martin Thom, New York, Columbia University Press, 1998.

--- "Désir, subjectivité et limites, l'impossible synthèse…", *Espaces Temps*, no. 59–61 ("Le temps réfléchi. L'histoire au risque des historiens"), 1995, pp. 40–46.

CORDEMOY, Géraud de: *Discours physique de la parole* (1704), facsimile edition, Paris, Presses du Copèdith, 1970.

COREN, Stanley: “Sensation and Perception”, in FREEDHEIM, Donald K.; WEINER, Irving B. (eds): *Handbook of Psychology, vol. 1: History of Psychology*, Hoboken, NJ, John Wiley & Sons, 2003, pp. 85–108.

CORSI, Pietro (ed.): *The Enchanted Loom: Chapters in the History of Neuroscience*, New York–Oxford, Oxford University Press, 1991.

COSTALL, Alan: “‘Introspectionism’ and the Mythical Origins of Scientific Psychology”, *Consciousness and Cognition*, 15, 2006, pp. 634–654.

COSTALL, Alan; STILL, Arthur: “Gibson’s Theory of Direct Perception and the Problem of Cultural Relativism”, *Journal of the Theory of Social Behaviour*, 19, 4, 1989, pp. 433–441.

COTTINGHAM, John (ed.): *The Cambridge Companion to Descartes*, Cambridge, Cambridge University Press, 1992.

COULDRY, Nick; McCARTHY, Anna (ed.): *Mediaspace: Place, Scale and Culture in a Media Age*, London–New York, Routledge, 2004.

COWAN, Alexander; STEWARD, Jill (eds): *The City and the Senses: Urban Culture Since 1500*, Aldershot, Ashgate, 2007.

COWART, Georgia J.: “Sense and Sensibility in Eighteenth-Century Musical Thought”, *Acta Musicologica*, vol. 56, no. 2, July-December 1984, pp. 251–266.

COWART, Georgia J. (ed.): *French Musical Thought, 1600–1800*, Ann Arbor, MI, UMI Research Press, 1989.

COX, Christoph; WARNER, Daniel (eds): *Audio Culture: Readings in Modern Music*, London-New York, Continuum Publishers, 2004.

CRAFTS, Susan D.; CAVICCHI, Daniel; KEIL, Charles, and the MUSIC IN DAILY LIFE PROJECT: *My Music: Explorations of Music in Daily Life*, foreword by George Lipsitz, Middletown, CT, Wesleyan University Press, 1993.

CRANE, Tim; PATTERSON, Sarah (eds): *History of the Mind-Body Problem*, London–New York, Routledge, 2000.

CRAPANZANO, Vincent: “Réflexions sur une anthropologie des émotions”, *Terrain*, no. 22, March 1994, pp. 109–117, accessible online: http://terrain.revues.org/3089 [last access: March 2015].

CRARY, Jonathan: “The Eclipse of the Spectacle” in WALLIS, B. (ed.): *Art After Modernism*, New York, New Museum Press, 1984.

--- *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Cambridge, MA, MIT Press, 1990.

--- “Attention and Modernity in the Nineteenth Century”, in JONES, Caroline A.; GALISON, Peter (eds): *Picturing Science, Producing Art*, New York, Routledge, 1998, pp. 475–499.

--- *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, Cambridge, MA, MIT Press, 1999.

CROCE, Benedetto: *Aesthetic as Science of Expression and General Linguistic*, translated by Douglas Ainslie with a new introduction by John McCormick, New Brunswick, Transaction Publishers, 1995.

CROMBIE, A.C.: “Early Concepts of the Senses and the Mind”, *Scientific American*, vol. 210, no. 5, May 1964, pp. 108–116.

--- *Science, Optics and Music in Medieval and Early Modern Thought*, London-Ronceverte, The Hambledon Press, 1990.

--- *Styles of Scientific Thinking in the European Tradition: The History of Argument and Explanation Especially in the Mathematical and Biomedical Sciences and Arts*, vol. II, London, Duckworth, 1994.

--- *Science, Art and Nature in Medieval and Modern Thought*, London, Hambledon Press, 1996.

CROSS, Ian: “Is Music the Most Important Thing We Ever Did? Music, Development and Evolution”, in SUY WON YI (ed.): *Music, Mind and Science*, Seoul, Seoul National University Press, 1999, pp. 10–39.

--- “Listening as Covert Performance”, *Journal of the Royal Musical Association*, vol. 135, special issue n. 1, 2009, pp. 67–77.

--- “The Evolutionary Basis of Meaning in Music: Some Neurological and Neuroscientific Implications”, in ROSE, Frank Clifford (ed.): *The Neurology of Music*, London, Imperial College Press, 2010.

CROUSAZ, Jean-Pierre de: *Traité du beau, où l'on montre en quoi consiste ce que l'on nomme ainsi, par des exemples tirés de la plupart des arts et des sciences* (Amsterdam, 1715), Geneva, Slatkine Reprints, 1970.

CRUCES, Francisco: “Niveles de coherencia musical. La aportación de la música a la construcción de mundos”, *Antropología. Revista de Pensamiento antropológico y estudios etnográficos*, vol. 15–16, 1998, pp. 33–57.

CRUCES, Francisco (ed.): *Las culturas musicales. Lecturas de etnomusicología*, Madrid, Trotta, 2001.

CSORDAS, Thomas J.: “Embodiment as a Paradigm for Anthropology”, *Ethos*, vol. 18, no. 1, March 1990, pp. 5–47.

--- “Somatic Modes of Attention”, *Cultural Anthropology*, vol. 8, no. 2., May 1993, pp. 135–156.

--- “The Body’s Career in Anthropology”, in MOORE, Henrietta L. (ed.): *Anthropological Theory Today*, Cambridge, Polity Press, 1999.

CSORDAS, Thomas J. (ed.): *Embodiment and Experience: The Existential Ground of Culture and Self*, Cambridge, Cambridge University Press, 1994.

CUBITT, Sean: “'Maybellene': Meaning and the Listening Subject”, *Popular Music*, vol. 4: “Performers and Audiences”, 1984, pp. 207–224.

CUMMING, Naomi: *The Sonic Self: Musical Subjectivity and Signification*, Bloomington, Indiana University Press, 2000.

CUNNINGHAM, Andrew: *The Anatomical Renaissance: The Resurrection of the Anatomical Projects of the Ancients*, Aldershot, Scolar Press, 1997.

--- “The Pen and the Sword: Recovering the Disciplinary Identity of Physiology and Anatomy Before 1800, I: Old Physiology—the Pen”, *Studies in History and Philosophy of Biological and Biomedical Sciences*, no. 33, 2002, pp. 631–665.

--- “The Pen and the Sword: Recovering the Disciplinary Identity of Physiology and Anatomy Before 1800, II: Old Anatomy—the Sword”, *Studies in History and Philosophy of Biological and Biomedical Sciences*, no. 34, 2003, pp. 51–76.

CUSICK, Suzanne G.: “Feminist Theory, Music Theory, and the Mind/Body Problem”, *Perspectives of New Music*, vol. 32, no. 1, Winter 1994, p. 8– 27.

CUTLER, Chris: *The Road to Plunderphonia*, “Quaderns d’Àudio, 4”, Barcelona, MACBA, 2011, accessible online: http://rwm.macba.cat/en/quaderns–audio [last access: October 2015].

CYTOWIC, Richard E.; EAGLEMAN, David M.: *Wednesday Is Indigo Blue: Discovering the Brain of Synesthesia*, with an Afterword by Dmitri Nabokov, Cambridge, MA, MIT Press, 2009.

DAHLHAUS, Carl: *Die Idee der absoluten Musik*, Kassel, Bärenreiter, 1978.

--- *Die Musiktheorie im 18. und 19. Jahrhundert, I: Grundzüge einer Systematik*, Wissenschaftliche Buchgesellschaft, Darmstadt, 1984.

--- *The Idea of Absolute Music,* translated by Roger Lustig, Chicago-London, University of Chicago Press, 1989.

--- *Nineteenth-Century Music*, Berkeley, University of California Press, 1989.

--- *Foundations of Music History*, translated by J. B. Robinson, Cambridge, Cambridge University Press, 1983.

--- *Esthetics of Music*, translated by William W. Austin, Cambridge, Cambridge University Press, 1982.

--- "Eduard Hanslick und der musikalische Formbegriff", *Die Musikforschung*, X, 1967, pp. 145–153.

DAHLHAUS, Carl; EGGEBRECHT, Hans Heinrich: *Che cos'è la musica?*, Bologna, Il Mulino, 1988.

DAHLHAUS, Carl; KATZ, Ruth (eds): *Contemplating Music: Source Readings in the Aesthetics of Music, vol. 1*, New York, Pendragon Press, 1986.

--- *Contemplating Music: Source Readings in the Aesthetics of Music, vol. 2*, New York, Pendragon Press, 1987.

DAMASIO, Antonio R.: *Descartes' Error: Emotion, Reason, and the Human Brain*, New York, G.P. Putnam's Sons, 1994.

--- *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, London, Vintage, 2000. (originally published in 1999)

--- *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain*, London, William Heinemann, 2003.

DANIUS, Sara: *The Senses of Modernism: Technology, Perception, and Aesthetics*, Ithaca, NY, Cornell University Press, 2002.

DANZIGER, Kurt: *Constructing the Subject: Historical Origins of Psychological Research*, Cambridge, Cambridge University Press, 1990.

--- *Marking the Mind: A History of Memory*, Cambridge, Cambridge University Press, 2008.

--- "Origins of the Schema of Stimulated Motion: Towards a Pre-history of Modern Psychology", *History of Science*, vol. 21, n. 2, June 1983, pp. 183–210.

DARWIN, Charles: *The Expression of the Emotions in Man and Animals*, with a new introduction by Konrad Lorenz, Chicago, University of Chicago Press, 1965.

DASTON, Lorraine: "The Theory of Will versus the Science of Mind", in WOODWARD, William R.; ASH, Mitchell G. (eds): *The Problematic Science: Psychology in Nineteenth-Century Thought*, New York, Praeger, 1982, pp. 88–115.

--- *Eine kurze Geschichte der wissenschaftlichen Aufmerksamkeit*, Munich, Carl Friedrich von Siemens Stiftung, 2000.

--- "Attention and the Values of Nature in the Enlightenment", in DASTON, Lorraine; VIDAL, Fernando (eds): *The Moral Authority of Nature*, Chicago, University of Chicago Press, 2004, pp. 100–126.

--- “On Scientific Observation”, *Isis*, vol. 99, no. 1, 2008, pp. 97–110.

DASTON, Lorraine; PARK, Katharine: *Wonders and the Order of Nature, 1150–1700*, New York, Zone Books, 2001.

DASTON, Lorraine; GALISON, Peter: *Objectivity*, New York, Zone Books, 2007.

DAVENPORT, Thomas H.; BECK, John C.: *The Attention Economy: Understanding the New Currency of Business*, Watertown MA, Harvard Business Press, 2002.

DAVIS, Audrey B.; MERZBACH, Uta C.: *Early Auditory Studies: Activities in the Psychology Laboratories of American Universities*, Washington D.C., Smithsonian Institution, 1975.

DAVIS, Hallowell: “Psychological and Physiological Acoustics: 1920–1942”, *Journal of the Acoustical Society of America*, vol. 61, no. 2, 1977, pp. 264–266.

--- “The Development of Auditory Neurophysiology”, in DAWSON, W.W.; ENOCH, J.M. (eds): *Foundations of Sensory Science*, Berlin, Springer Verlag, 1984, pp. 25–64.

DAY, Timothy: *A Century of Recorded Music: Listening to Musical History*, New Haven, CT, Yale University Press, 2000.

DAYÉ, Christian; DE CAMPO, Alberto: “Sounds Sequential: Sonification in the Social Sciences”, *Interdisciplinary Science Reviews*, vol. 31, no. 4, 2006, pp. 349–364.

DEAR, Peter: *Mersenne and the Learning of the Schools*, Ithaca, NY, Cornell University Press, 1988.

--- “The Uses of Experience”, in *Discipline and Experience. The Mathematical Way in the Scientific Revolution*, Chicago, Chicago University Press, 1995, pp. 124–150.

DEBRU, Claude: “Helmholtz and the Psychophysiology of Time”, *Science in Context*, 14(3), 2001, pp. 471–492.

DE BUZON, Frédéric: “L’esprit. Le dualisme en questions: sur la troisième notion primitive et la glande pinéales chez Descartes”, *Philopsis*, 2004, http://www.philopsis.fr/spip.php?article204 [last access: June 2015].

DÉCULTOT, Élisabeth: “Métaphysique ou physiologie du beau? La théorie des plaisirs de Johann Georg Sulzer (1751–1752)”, *Revue germanique internationale*, no. 4, 2006: “Estétiques de l’Aufklärung”, pp. 93–106.

DEGENAAR, Marjolein: *Molyneux’s Problem: Three Centuries of Discussion on the Perception of Forms*, translated from the Dutch by Michael J. Collins, Dordrecht, Kluwer Academic Publishers, 1996.

DELALANDE, François: “L'analyse des conduites musicales : Une étape du programme sémiologique?”, *Semiotica*, vol. 66, 1/3, Amsterdam, Mouton de Gruyter, 1987, pp. 99–107.

--- “La terrasse des audiences du clair de lune: essai d'analyse esthésique”, *Analyse musicale* , 16, 1989, pp. 75–84.

--- “Sense and Intersensoriality”, *Leonardo*, vol. 36, no. 4, 2003, pp. 313–316.

DELEUZE, Gilles: “¿Qué es un dispositivo?”, in BALBIER E.; DELEUZE, G.; DREYFUS, H.L., et al. (eds): *Michel Foucault, filósofo*, Barcelona, Gedisa, 1990, pp. 155–163.

DELEUZE, Gilles; GUATTARI, Félix: *Mille Plateaux: capitalisme et schizophrénie*, Paris, Éditions du Minuit, 1980.

--- *Qu’est-ce que la philosophie?*, Paris, Éditions du Minuit, 1991.

DELIÈGE, Irène: “Le parallélisme, support d'une analyse auditive de la musique: Vers un modèle des parcours cognitifs de l'information musicale”, *Analyse Musicale*, VI, 1987, pp. 73–79.

DELIÈGE, Irène; SLOBODA, John (eds): *Perception and Cognition of Music*, Hove, Psychology Press, 1997.

DELL’ANTONIO, Andrew (ed.): *Beyond Structural Listening: Postmodern Modes of Hearing*, Berkeley, University of California Press, 2004.

DELUERMOZ, Quentin; FUREIX, Emmanuel; MAZUREL, Hervé; and OUALDI, M’hamed: “Écrire l’histoire des émotions: de l’objet à la catégorie d’analyse”, *Revue d'histoire du XIXe siècle*, no. 47, 2013, accessible online: http://rh19.revues.org/4573 [last access: February 2015].

DELUMEAU, Jean: *La Peur en Occident (XIVe – XVIIIe siècles)*, Paris, Fayard, 1978.

DENORA, Tia: “How is Extra-Musical Meaning Possible? Music as a Place and Space for ‘Work’”, *Sociological Theory*, vol. 4, n. 1, 1986, pp. 84–94.

--- *Beethoven and the Construction of Genius: Musical Politics in Vienna, 1792–1803*, Berkeley, University of California Press, 1997.

--- *Music in Everyday Life*, Cambridge, Cambridge University Press, 2000.

--- *After Adorno: Rethinking Music Sociology*, Cambridge, Cambridge University Press, 2003.

DESCARTES, René: *Oeuvres de Descartes, I: Correspondance avril 1622 – février 1638*, edited by Charles Adam and Paul Tannery, Paris, J. Vrin, 1996.

Oeuvres de Descartes, III: Correspondance janvier 1640 – juin 1643, edited by Charles Adam and Paul Tannery, Paris, J. Vrin, 1996.

Oeuvres de Descartes, IV: Correspondance juillet 1643 – avril 1647, edited by Charles Adam and Paul Tannery, Paris, J. Vrin, 1996.

Oeuvres de Descartes, VI: Discours de la méthode et essais, edited by Charles Adam and Paul Tannery, Paris, J. Vrin, 1996.

Oeuvres de Descartes, VII: Meditationes de prima philosophia, edited by Charles Adam and Paul Tannery, Paris, J. Vrin, 1996.

Oeuvres de Descartes, XI: Le Monde-Description du corps humain-Passions de l'âme-Anatomica-Varia, edited by Charles Adam and Paul Tannery, Paris, J. Vrin, 1996.

--- *Les Passions de l'âme*, précedé de "La Pathétique cartésienne" par Jean-Maurice Monnoyer, Paris, Gallimard, 1988.

--- *Écrits physiologiques et médicaux*, notes, présentation, textes, traduction, notes et annexes par Vincent Aucante, Paris, PUF, 2000.

--- *The Philosophical Writings of Descartes*, *vol. 1*, edited by John Cottingham, Robert Stoothoff and Dugald Murdoch, Cambridge, Cambridge University Press, 1985.

--- *The Philosophical Writings of Descartes*, *vol. 2*, edited by John Cottingham, Robert Stoothoff and Dugald Murdoch, Cambridge, Cambridge University Press, 1985.

--- *The Philosophical Writings of Descartes*, *vol. 3: The Correspondence*, edited by John Cottingham, Robert Stoothoff, Dugald Murdoch and Anthony Kenny, Cambridge, Cambridge University Press, 1991.

--- *Compendium of Music*, translated by Walter Robert, notes by Charles Kent, Rome, American Institute of Musicology, 1961.

--- *The Correspondence between Princess Elisabeth of Bohemia and Rene Descartes*, edited and translated by Lisa Shapiro, Chicago, University of Chicago Press, 2007.

DESCHÊNES, Bruno: "Toward an Anthropology of Music Listening", *International Review of Aesthetics and Sociology of Music*, vol. 29, no. 2, 1998, pp. 135–153.

DE SOUSA, Roland: *The Rationality of Emotion*, Cambridge, MA, MIT Press, 1987.

DEUTSCH, Diana (ed.): *The Psychology of Music*, San Diego, Academic Press, 1982, 1999 (2nd ed.).

DEWEY, John: *Art as Experience*, New York, Perigee Books, 1980.

DIAS, Nélia: *La Mesure des sens: les anthropologues et le corps humain au XIX siècle*, Mayenne, Aubier, 2004.

DIBBEN, Nicola: "What Do We Hear When We Hear Music? Music Perception and Musical Material", *Musicae Scientiae,* 5, 2001, pp. 161–194.

DIDEROT, Denis: *Oeuvres complètes (DPV), tome II: Philosophie et mathématique. Idées I*, critical and annotated edition, with an introduction by Robert Niklaus et al., Paris, Hermann, 1975.

--- *Oeuvres complètes (DPV), tome IV: Le nouveau Socrâte. Idées II*, critical and annotated edition, with an introduction by Yvon Belaval et al., Paris, Hermann, 1978.
pp. 15–72: "Lettre sur les aveugles à l'usage de ceux qui voient"
pp. 129–228: "Lettre sur les sourds et muëts à l'usage de ceux qui entendent et qui parlent"

--- *Oeuvres complètes (DPV), tome XVII: Le Rêve de d'Alembert. Idées IV*, critical and annotated edition, with an introduction by Jean Varloot with Michel Delon, Georges Dulac, Jean Mayer, Paris, Hermann, 1987.

--- *Oeuvres complètes, tome XIX: Musique*, critical and annotated edition, with an introduction by Jean Mayer, Pierre Citron, co-edited by Jean Varloot, Paris, Hermann, 1983.

--- *Correspondance, tome I*, collected, established and annotated by Georges Roth, Paris, Minuit, 1955.

--- *Letter on the Blind for the Use of Those Who See* and *Letter on the Deaf and Dumb for the Use of Those Who Hear and Speak*, in *Early Philosophical* Works, translated and edited by Margaret Jourdain, Chicago-London, Open Court Publishing, 1916, pp. 68–141, and pp. 158–218.

DIDEROT, Denis; D'ALEMBERT, Jean Le Rond (eds): *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, etc.,* University of Chicago: ARTFL Encyclopédie Project (Spring 2013 Edition), Robert Morrissey (ed.), http://encyclopedie.uchicago.edu/.

DIDIER, Béatrice: *La Musique des Lumières. Diderot, l'Encyclopédie, Rousseau*, Paris, PUF, 1985.

--- "La réception de l'opéra par les Philosophes", *Lumen: Selected Proceedings form the Canadian Society for Eighteenth-Century Studies/Lumen: travaux choisis de la Société canadienne d'étude du dix-huitième siècle*, vol. 17, 1998, pp. 1–10.

DIXON, Thomas: *From Passions to Emotions: The Creation of a Secular Psychological Category*, Cambridge, Cambridge University Press, 2003.

--- "'Emotion': The History of a Keyword in Crisis", *Emotion Review*, vol. 4, no. 4, October 2012, pp. 338–344.

DÖMLING, Wolfgang: "'Die kranken Ohren Beethovens' oder Gibt es eine Geschichte des musikalischen Hörens?", in FLOROS, Constantin; MARX, Hans Joachim; PETER, Peters (eds): *Hamburger Jahrbuch für Musikwissenschaft*, Hamburg, Verlag der Musikalie, 1975, pp. 181–194.

DOOLING, Robert J.; HULSE, Stewart H. (ed.): *The Comparative Psychology of Audition: Perceiving Complex Sounds*, Hillsdale, NJ, Lawrence Erlbaum Associates, 1989.

DOSSE, François: *L'Histoire en miettes: des "Annales" à la "nouvelle histoire"*, Paris, La Découverte, 1987.

DOUGLAS, Mary: *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo*, London, Ark, 1966.

--- *Natural Symbols: Explorations in Cosmology*, Harmondsworth, Penguin Books, 1978. (First edition: Barrie & Rockliff, London, 1970).

DOUGLAS, Susan J.: *Listening In: Radio and the American Imagination*, New York, Times Books, 1999.

DOWLING, W. Jay; HARWOOD, Dane L.: *Music Cognition*, Orlando, Academic Press, 1986.

DOWNEY, Greg: "Listening to Capoeira: Phenomenology, Embodiment, and the Materiality of Music", *Ethnomusicology*, vol. 46, n. 3, Fall 2002, pp. 487–509.

--- "'Practice without Theory': A Neuroanthropological Perspective on Embodied Learning", *Journal of the Royal Anthropological Institute*, special number: "Making knowledge" (guest editor: Trevor H.J. Marchand), 2010, pp. 22–40.

DRAAISMA, Douwe: *Las metáforas de la memoria. Una historia de las ideas sobre la mente*, trans. Catalina Ginard, Madrid, Alianza Editorial, 1998.

DRAKE, Stillman: "Renaissance Music and Experimental Science", *Journal of the History of Ideas*, vol. 31, no. 4, October-December 1970, pp. 483–500.

DRESHER, B. Elan: "The Phoneme", in VAN OOSTENDORP, Marc; EWEN, Colin J.; HUME, Elizabeth; RICE, Keren Rice (eds): *The Blackwell Companion to Phonology, vol. 1*, Malden, MA and Oxford, Wiley–Blackwell, 2011, pp. 241–266.

DREYFUS, Hubert L.: "Merleau-Ponty and Recent Cognitive Science", in CARMAN, Taylor; HANSEN, Mark B.N. (eds): *The Cambridge Companion to Merleau-Ponty*, Cambridge Cambridge University Press, 2005, pp. 129–150.

DREYFUS, Hubert L.; RABINOW, Paul: *Michel Foucault: Beyond Structuralism and Hermeneutics*, Chicago, Chicago University Press, 1982.

DROR, Otniel E.: "Techniques of the Brain and the Paradox of Emotions, 1880–1930", *Science in Context*, 14(4), 2001, pp. 643–660.

DUBOIS, Danièle: "Les 'mots' et les catégories cognitives du sensible: des rapports problématiques. Des couleurs, des odeurs et des bruits", *Cahiers du LCPE*, no. 7, September 2006, accessible online:

http://www.lam.jussieu.fr/Publications/CahiersLCPE/cahier7.pdf [last access: February 2015].

DU BOS, Abbé (Jean-Baptiste): *Réflexions critiques sur la poésie et sur la peinture*, préface de Dominique Désirat, Paris, École nationale supérieure des Beaux-Arts, 1993.

DUCHESNEAU, François: *Les Modèles du vivant de Descartes à Leibniz*, Paris, J. Vrin, 1998.

DUFFIN, Ross W.: *How Equal Temperament Ruined Harmony (and Why You Should Care)*, New York, W.W. Norton, 2007.

DU GAY, Paul; HALL, S.; MACKAY, H.; NEGUS, K.: *Doing Cultural Studies: The Story of the Sony Walkman*, London, SAGE, 1997.

DURAND-SENDRAIL, Béatrice: *La Musique de Diderot. Essai sur le hiéroglyphe musical*, Paris, Kimé, 1994.

DURANT, Alan: *Conditions of Music*, London, Macmillan, 1984.

--- "A New Day for Music? Digital Technologies in Contemporary Music-Making", in HAYWARD, Philip (ed.): *Culture, Technology and Creativity in the Late Twentieth Century*, London, John Libbey & Company, 1990, pp. 175–196.

DURANTI, Alessandro: "The Audience as Co-Author: An Introduction", *Text: An interdisciplinary journal for the study of discourse*, special issue: "The Audience as Co-Author", edited by Alessandro Duranti and Donald Brenneis, vol. 6–3 (1986), pp. 239–247.

--- "Language as Culture in U.S. Anthropology", *Current Anthropology*, vol. 44, no. 3, June 2003, pp. 323–347.

DURANTI, Alessandro; GOODWIN, Charles (eds): *Rethinking Context: Language as an Interactive Phenomenon*, Cambridge, Cambridge University Press, 1992.

DURIE, Bruce: "Doors to Perception", *New Scientist*, issue 2484, 29 January 2005, pp. 34–36.

DURING, Jean: *Musique et extase: l'audition mystique dans la tradition soufie*, Paris, Albin Michel, 1988.

--- "L'oreille mondiale et la voix de l'Orient", Congrès des Musiques dans le monde de l'Islam, Assilah, 8–13 août 2007, accessible online: http://www.maisondesculturesdumonde.org/actualite/congres-des-musiques-dans-le-monde-de-lislam [last access: October 2015].

DUVERNEY, Guichard Joseph: *Traité de l'organe de l'ouïe contenant la structure, les usages et les maladies de toutes les parties de l'oreille*, Paris, Estienne Michallet, 1683; accessible on Google Books:

http://books.google.es/books/ucm?vid=UCM5323755763&printsec=frontcover&redir_esc=y#v=onepage&q&f=false [last access: October 2015].

--- *A Treatise of the Organ of Hearing* (1737), reprinted in New York, AMS Press, 1973.

DYER, Joseph: "The Place of *Musica* in Medieval Classifications of Knowledge", *The Journal of Musicology*, vol. 24, no. 1, 2007, pp. 3–71.

EAGLETON, Terry: *The Ideology of the Aesthetic*, Oxford, Basil Blackwell, 1990.

ECO, Umberto: "La musica e la macchina", in *Apocalittici e integrati*, Milano, Bompiani, 1964, págs. 295–307.

--- *A Theory of Semiotics*, Bloomington, Indiana University Press, 1976.

--- *Tratado de semiótica general*, trans. Carlos Manzano, Barcelona, Lumen, 1977.

--- *The Role of the Reader: Explorations in the Semiotics of Texts*, Bloomington, Indiana University Press, 1979.

--- *Lector in fabula. La cooperazione interpretativa nei testi narrativi*, Milano, Bompiani, 1979.

--- *Semiotics and the Philosophy of Language*, Bloomington, Indiana University Press, 1984.

--- *The Limits of Interpretation*, Bloomington-Indianapolis, Indiana University Press, 1994.

--- *Kant and the Platypus: Essays on Language and Cognition*, Harcourt Brace & Company, New York, 2000.

EDWARDS, Paul N.: *The Closed World: Computers and the Politics of Discourse in Cold War America*, Cambridge, MA, MIT Press, 1996.

EILAND, Howard: "Reception in Distraction", *boundary 2*, vol. 30, no. 1, Spring 2003, pp. 51–66.

EISENBERG, Evan: *The Recording Angel: The Experience of Music from Aristotle to Zappa*, New York, Penguin, 1987.

EISENSTEIN, Elizabeth L.: *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe*, 2 vols, Cambridge, Cambridge University Press, 1979.

EKMAN, Paul: "The Argument and Evidence About Universals in Facial Expressions of Emotion", in WAGNER, Hugh L.; MANSTEAD, Anthony (eds): *The Handbook of Social Psychophysiology*, New York, John Wiley & Sons, 1989, pp. 143–164.

--- “An Argument for Basic Emotions”, *Cognition and Emotion*, vol. 6, no. 3–4, 1992, pp. 169–200.

--- “Afterword: Universiality of Emotional Expression? A Personal History of the Dispute”, in DARWIN, Charles: *The Expression of the Emotions in Man and Animals*, with an introduction, afterword and commentaries by Paul Ekman, and an essay on the history of the illustrations by Phillip Prodger, New York-Oxford, Oxford University Press, 1998, pp. 363–393.

EKMAN, Paul; DAVIDSON, Richard J. (eds): *The Nature of Emotion: Fundamental Questions*, New York-Oxford, Oxford University Press, 1994.

ELIAS, Norbert: *The Civilizing Process, vol. 1: The History of Manners*, translated by Edmund Jephcott with some notes and revisions by the author, Oxford, Blackwell, 1978.

--- *The Civilizing Process, vol. 2: State Formation and Civilization*, translated by Edmund Jephcott with some notes and revisions by the author, Oxford, Blackwell, 1982.

--- *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*, translated by Edmund Jephcott with some notes and corrections by the author, edited by Eric Dunning, Johan Goudsblom and Stephen Mennell, Oxford, Blackwell, 2000.

--- *The Court Society*, translated by Edmund Jephcott, Oxford, Blackwell, 1983.
ELLIS, Alexander; MENDEL, Arthur: *Studies in the History of Musical Pitch*, Amsterdam, Frits Knuf, 1968.

ELKINS, James: *Master Narratives and Their Discontents*, with an introduction by Anna Sigrídur Arnar, New York-London, Routledge, 2005.

ERLMANN, Veit: “The Politics and Aesthetics of Transnational Musics”, *The World of Music*, vol. XXXV, no. 2, 1993, pp. 3–15.

--- *Reason and Resonance: A History of Modern Aurality*, New York, Zone Books, 2010.

--- “Descartes’ Resonant Subject”, *differences: A Journal of Feminist Cultural Studies*, 2011, vol. 22, no. 2–3, pp. 10–30.

ERLMANN, Veit (ed.): *Hearing Cultures: Essays on Sound, Listening and Modernity*, Oxford-New York, Berg Publishers, 2004.

Ernst Chladni – Monoskop, http://monoskop.org/Ernst_Chladni [last access: November 2015].

ESCAL, Françoise: *Espaces sociaux, espaces musicaux*, Paris, Payot, 1979.

EULER, Leonhard: *Tentamen novae theoriae musicae ex certissismis harmoniae principiis dilucide expositae*, in *Opera Omnia, vol. I seriei tertiae*, Leipzig, Teubner, 1926, pp. 197–427.

--- *Il "Tentamen novae theoriae musicae" di Leonhard Euler (Pietroburgo 1739)*, translation and introduction by Alvise de Piero, "Memorie della Accademia delle Scienze di Torino, Classe di Scienze Morali, Storiche e Filologiche", series V, vol. 34, Torino, Accademia delle Scienze di Torino, 2010.

--- "Conjecture sur la raison de quelques dissonances généralement reçues dans la musique", in *Opera Omnia, vol. I seriei tertiae*, Leipzig, Teubner, 1926, pp. 508–515.

--- *Letters of Euler to a German Princess: On Different Subjects in Physics and Philosophy*, translated by Henry Hunter, with an introduction by Andrew Pyle, facsimile edition of the 1795 edition, London, Thoemmes Continuum, 1997 (2 vols).

--- *Cartas a una princesa de Alemania sobre diversos temas de Física y Filosofía*, edición preparada por Carlos Mínguez Pérez, Zaragoza, Universidad de Zaragoza, 1990.

EVANS, J. R.; CLYNES, M. (eds): *Rhythm in Psychological, Linguistic and Musical Processes*, Springfield, Charles Thomas Publishers, 1986.

EVANS, Nicholas; WILKINS, David: "The Knowing Ear: An Australian Test of Universal Claims about the Semantic Structure of Sensory Verbs and their Extension into the Domain of Cognition", *Arbeitspapiere von Institut für Sprachwissenschaft Universität zu Köln (Neue Folge)*, no. 32, Köln, Institut für Sprachwissenschaft, 1998, pp. 1–63, accessible online at: http://publikationen.ub.uni-frankfurt.de/frontdoor/index/index/docId/24544 [last access: February 2015].

--- "In the Mind's Ear: The Semantic Extensions of Perception Verbs in Australian Languages", *Language*, vol. 76, no. 3, September 2000, pp. 546–592.

FABBRI, Franco: "A Theory of Musical Genres: Two Applications", in HORN, David and TAGG, Philip (eds), *Popular Music Perspectives*, Göteborg and Exeter, IASPM, 1981.

--- "What Kind Of Music?", *Popular Music*, no. 2, 1982, pp. 131–144.

---*L'ascolto tabù. Le musiche nello scontro globale*, Milano, Il Saggiatore, 2005.

--- "Browsing Music Spaces: Categories And The Musical Mind", in MOORE, Allan F.: *Critical Essays in Popular Musicology*, Aldershot, Ashgate, 2007, pp. 49–62.

--- *Il suono in cui viviamo. Studi sulla popular music*, Milano, Il Saggiatore, 2008 (3rd ed.).

--- "How Genres Are Born, Change, Die: Conventions, Communities and Diachronic Processes", in Stan Hawkins (ed.), *Critical Musicological Reflections*, Aldershot, Ashgate, 2012, pp. 179–191.

--- “La musica come forma dell'interrelazione sociale”, *Musica Realtà*, 89, luglio 2009, pp. 67–90.

--- “Hi-Fi Revisited: High, Low, or Just Right Fi?”, paper presented at the international conference “Transnational Mediascapes: Sound and Vision in Europe”, organized by the Facoltà di Lettere e Filosofia and Facoltà di Scienze Linguistiche e Letterature Straniere, Università del Sacro Cuore, Milan, 14–15 May 2013.

FABIAN, Johannes: *Time and the Other: How Anthropology Makes its Object*, New York, Columbia University Press, 1983.

FALTIN, Peter; REINECKE, Hans-Peter (eds): *Musik und Verstehen. Aufsätze zur semiotischen Theorie, Ästhetik und Soziologie der musikalischen Rezeption,* Köln, Arno Volk Verlag – Hans Gerig KG, 1973.

FASTL, Hugo; ZWICKER, Eberhard: *Psychoacoustics: Facts and Models*, Heidelberg, Springer Verlag, 2007 (3rd ed.) (1st ed. 1990, 2nd ed. 1999).

FAVIER, Thierry; COUVREU, Manuel (eds): *Le plaisir musical en France au XVIIe siècle*, Paris, Mardaga, 2006.

FEBVRE, Lucien: *Combats pour l’histoire*, Paris, Armand Colin, 1953.

--- *A New Kind of History: From the Writings of Febvre*, edited by Peter Burke, translated by K. Folca, New York, Harper & Row, 1973.

--- *Le problème de l'incroyance au XVI^e siècle: la religion de Rabelais*, Paris, Albin Michel, 1947.

--- *The Problem of Unbelief in the Sixteenth Century: The Religion of Rabelais*, translated by Beatrice Gottlieb, Cambridge, MA, and London, Harvard University Press, 1982.

FEBVRE, Lucien; MARTIN, Jean-Hubert: *L’Apparition du livre*, avec le concours de Anne Basanoff, Henri Bernanrd-Maître, Moché Catalne, Marie-Roberte Guignard et Marcel Thomas, Paris, Albin Michel, 1958 et 1971.

--- *The Coming of the Book: The Impact of Printing, 1450–1800*, trans. David Gerard, ed. Geoffrey Nowell-Smith and David Wootton, London, New Left Books, 1976.

FEHER, Michel; NADDAFF, Ramona; TAZI, Nadia (eds): *Fragmentos para una historia del cuerpo humano: parte primera*, Madrid, Taurus, 1990.

FELD, Steven: “Linguistic Models in Ethnomusicology”, *Ethnomusicology*, vol. 18, no. 2, May 1974, pp. 197–217.

--- *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression*, Philadelphia, University of Pennsylvania Press, 1990, 2nd ed. (1st ed. 1982).

--- “Communication, Music, and Speech about Music”, *Yearbook for Traditional Music*, vol. 16, 1984, pp. 1–18.

--- “Sound Structure as Social Structure”, *Ethnomusicology*, vol. 28, n. 3, 1984, pp. 383–409.

--- “Aesthetics as Iconicity of Style; or, Lift-up-over-Sounding: Getting into the Kaluli Groove”, *Yearbook for Traditional Music*, vol. 20, 1988, pp. 74–113.

--- “Wept Thoughts: The Voicing of Kaluli Memories”, *Oral Tradition*, vol. 5, no. 2-3, 1990, pp. 241–266.

--- “From Ethnomusicology to Echo-muse-ecology: Reading R. Murray Schafer in the Papua New Guinea Rainforest”, presentation at The Tuning of the World Conference on Acoustic Ecology, held at the Banff Centre for the Arts, Banff, Canada, in August 1993, http://www.acousticecology.org/writings/echomuseecology.html [last access: July 2015]

--- “Waterfalls of Song: An Acoustemology of Place Resounding in Bosavi, Papua New Guinea”, in FELD, Steven; BASSO, Keith (eds): *Senses of Place*, Santa Fe, NM, School of American Research Press, 1996, pp. 91–135.

--- “Sound Worlds”, in KRUTH, Patricia; STOBART, Henry (eds): *Sound*, Cambridge, Cambridge University Press, 2000, pp. 173–200.

FELD, Steven; BRENNEIS, Donald: “Doing Anthropology in Sound”, *American Ethnologist*, vol. 31, no. 4, 2004, pp. 461–474.

FELD, Steven; FOX, Aaron A.: “Music and Language”, *Annual Review of Anthropology*, vol. 23, 1994, pp. 25–53.

FELDMAN, Martha: “Music and the Order of the Passions”, in MEYER, Richard (ed.): *Representing the Passions: Histories, Bodies, Visions*, Los Angeles, Getty Research Institute, 2003, pp. 37–67.

FELDMANN, Harald: “A History of Audiology: A Comprehensive Report and Bibliography from the Earliest Beginnings to the Present”, *Translations of the Beltone Institute for Hearing Research*, no. 22, January 1970.

FELISATI, Dino; SPERATI, Giorgio: *Italian ORL Society: Past and Present*, Genova, Società Italiana di Otorinolaringologia e Chirurgia Cervico-Facciale, 2005.

FERNÁNDEZ JAÉN, Jorge: “Verbos de percepción sensorial en español: una clasificación cognitiva”, *Interlingüística*, vol. 16 (1), 2005, pp. 391–405, accessible online: http://dialnet.unirioja.es/servlet/articulo?codigo=2514236 [last access: March 2014].

FERNANDEZ-DUQUE, Diego; JOHNSON, Mark L.: “Cause and Effect Theories of Attention: The Role of Conceptual Metaphors”, *Review of General Psychology*, 2002, vol. 6, n. 2, pp. 153–165.

FICINO, Marsilio: *Three Books on Life*, a critical edition and translation with introduction and notes by Carol V. Kaske and John R. Clark, Binghamton, Medieval & Renaissance Texts & Studies-The Renaissance Society of America, 1989.

FIGLIO, Karl M.: "Theories of Perception and the Physiology of Mind in the Late Eighteenth Century", *History of Science*, 13 (3), S
eptember 1975, pp. 177–212.

--- "The Metaphor of Organization: An Historiographical Perspective on the Biomedical Sciences of the Early Nineteenth–Century"*, History of Science*, vol. 14, n. 1, March 1976, pp. 17–53.

FINGER, Stanley: *Origins of Neuroscience: A History of Explorations into the Brain Function*, New York, Oxford University Press, 1994.

FINK, Robert: *Repeating Ourselves: American Minimal Music as Cultural Practice*, Berkeley, University of California Press, 2005.

FINNEGAN, Ruth: *Literacy and Orality: Studies in the Technology of Communication*, Oxford-New York, Blackwell, 1988.

--- "Música y participación", *Revista Transcultural de Música / Transcultural Music Review*, 7, 2003
http://www.sibetrans.com/trans/articulo/210/musica-y-participacion [last access: October 2015]

--- *Communicating: The Multiple Modes of Human Interconnection*, London, Routledge, 2002.

--- *The Hidden Musicians: Music–Making in an English Town*, Wesleyan University Press, Middletown, CT, 2007 (originally published by Cambridge University Press, Cambridge, 1989).

FISH, Stanley E.: *Is There a Text in this Class? The Authority of Interpretative Communities*, Cambridge, MA, Harvard University Press, 1980.

FLETCHER, Harvey: *Speech and Hearing in Communication*, edited by Jont B. Allen, Woodbury, NY, Acoustical Society of America, 1995. (Original edition: New York, Van Nostrand, 1953).

FOLEY, William: *Anthropological Linguistics: An Introduction*, Oxford-Malden, MA, Blackwell, 1997.

FOREST, Denis: "Le concept de proprioception dans l'histoire de la sensibilité interne", *Revue d'histoire des sciences*, vol. 57, no 1, 2004, pp. 5–31.

FORKEL, Johann Nikolaus: *Ueber die Theorie der Musik, insofern sie Liebhabern und Kennern nothwendig und nützlich ist: Eine Einladungsschrift zu musikalischen Vorlesungen*, Göttingen, Vandenhoeck, 1777, accessible online on the website of the

Bayerische StaatsBibliothek: http://www.mdz-nbn-resolving.de/urn/resolver.pl?urn=urn:nbn:de:bvb:12-bsb10527183-1 [last access: October 2015].

FORSYTH, Michael: *Buildings for Music: The Architect, the Musician, and the Listener from the Seventeenth Century to the Present Day*, Cambridge, Cambridge University Press, 1985.

FOUCAULT, Michel: *Les Mots et les choses*, Paris, Gallimard, 1966.

--- *The Order of Things: An Archaeology of the Human Sciences*, London, Tavistock, 1970.

--- *The Order of Things: An Archaeology of the Human Sciences*, New York-London, Routledge, 2002.

--- *L'Archéologie du savoir*, Paris, Gallimard, 1969.

--- *The Archaeology of Knowledge*, translated by A.M. Sheridan Smith, London, Tavistock, 1972.

--- *The Archaeology of Knowledge*, translated by A.M. Sheridan Smith, New York-London, Routledge, 2002.

--- *L'Ordre du discours*, leçon inaugurale au Collège de France prononcée le 2 décembre 1970, Paris, Gallimard, 1970.

--- *Surveiller et punir: Naissance de la prison*, Paris, Gallimard, 1975.

--- *Discipline and Punish: The Birth of the Prison*, translated by Alan Sheridan, New York, Vintage Books, 1995.

--- *Histoire de la sexualité, I: La volonté de savoir*, Paris, Gallimard, 1976.

--- *The History of Sexuality, vol. 1: An Introduction*, translated by Robert Hurley, London, Allen Lane, 1979; later on reprinted with the subtitle *The Will to Knowledge*.

--- *Naissance de la clinique: une archéologie du regard médical*, Paris, PUF, 1978.

--- "Le jeu de Michel Foucault (1977)", in *Dits et écrits, vol. III*, edited by Daniel Defert and François Ewald with the assistance of Jacques Lagrange, Paris, Gallimard, 1994, pp. 298–329.

--- "The Confession of the Flesh", in Michel Foucault, *Power/Knowledge: selected interviews and other writings 1972–1977*, edited by Colin Gordon, translated by Colin Gordon et al., Brighton, The Harvester Press, 1980.

--- *Histoire de la sexualité, II: L'usage des plaisirs,* Paris, Gallimard, 1984.

--- *The History of Sexuality, vol. 2: The Use of Pleasure*, translated by Robert Hurley, London, Viking, 1986.

--- *Histoire de la sexualité, III: Le souci de soi*, Paris, Gallimard, 1984.

--- *The History of Sexuality, vol. 3: The Care of the Self,* translated by Robert Hurley, New York, Pantheon Books, 1986.

FOX, Christopher; PORTER, Roy; WOKLER, Robert (eds): *Inventing Human Science: Eighteenth–Century Domains*, Berkeley, University of California Press, 1995.

FRANCÈS, Robert: *La Perception de la musique*, Paris, Librairie Philosophique J. Vrin, 1984, 2nd ed.

FRAYLING, Christopher: *On Craftsmanship: Towards a New Bauhaus*, London, Oberon Books, 2011.

FRENCH, Roger: *Dissection and Vivisection in the European Renaissance*, Aldershot, UK-Brookfield, USA-Singapore-Sidney, Ashgate, 1999.

FREUD, Sigmund: "Recommendations to Physicians Practising Psychoanalysis" (1912), in *The Standard Edition of the Complete Psychological Works of Sigmund Freud,* vol. 12, edited by James Stratchey in collaboration with Anna Freud, assisted by Alix Strachey and Alan Tyson, London, Hogarth Press and the Institute of Psycho-Analysis, 1958, pp. 109–120.

--- *Civilization and Its Discontents*, in *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, vol. 21, edited by James Stratchey in collaboration with Anna Freud, assisted by Alix Strachey and Alan Tyson, London, Hogarth Press and the Institute of Psycho-Analysis, 1964, pp. 59–145.

FRIEDMAN, Susan W.: *Marc Bloch, Sociology and Geography: Encountering Changing Disciplines*, Cambridge, Cambridge University Press, 1996.

FRITH, Simon: *La sociología del rock*, trans. Mariano Antolín Rato, Madrid, Júcar, 1978.

--- *Performing Rites: Evaluating Popular Music*, Oxford, Oxford University Press, 1996.

FRITZ, Thomas; JENTSCHKE, Sebastian; GOSSELIN, Nathalie; SAMMLER, Daniela; PERETZ, Isabelle; TURNER, Robert; FRIEDERICI, Angela D.; KOELSCH, Stefan: "Universal Recognition of Three Basic Emotions in Music", *Current Biology*, 19, April 14, 2009, pp. 573–576.

FRIXIONE, Eugenio: "Irritable Glue: the Haller-Whytt Controversy on the Mechanism of Muscle Contraction", in WHITAKER, Harry; SMITH, C.U.M.; FINGER, Stanley (eds): *Brain, Mind and Medicine: Essays in Eighteenth–Century Neuroscience*, New York, Springer, 2007, pp. 115–124.

FRYE, Northrop: “Towards Defining an Age of Sensibility”, *ELH*, vol. 23, no. 2, June 1956, pp. 144–152.

FUBINI, Enrico: *L'estetica musicale dal Settecento a oggi*, new enlarged edition, Torino, Einaudi, 1964.

--- *Gli enciclopedisti e la musica*, Torino, Einaudi, 1971.

--- *Musica e pubblico dal Rinascimento al Barrocco*, Torino, Einaudi, 1984.

--- *Estética de la música*, trans. Francisco Campillo, Madrid, A. Machado Libros, 2001.

--- *Música y lenguaje en la estética contemporánea*, Madrid, Alianza Editorial, 1994.

FUBINI, Enrico (ed.): *Music and Culture in Eighteenth-Century Europe: A Source Book*, translated by Wolfgang Freis, Lisa Gasbarrone and Michael Louis Leone, translation edited by Bonnie J. Blackburn, Chicago-London, University of Chicago Press, 1994.

FUCHS, Alfred H.; MILAR, Katharine S.: “Psychology as a Science”, in FREEDHEIM, Donald K.; WEINER, Irving B. (eds): *Handbook of Psychology, vol. 1. History of Psychology*, Hoboken, NJ, John Wiley & Sons, 2003, pp. 1–26.

FUMAROLI, Marc: *L’Âge de l’éloquence: rhétorique et “res literaria”, de la Renaissance au seuil de l’époque classique*, Paris, Albin Michel, 1994.

GABRIELSSON, Alf; JUSLIN, Patrik N.: “Emotional Expression in Music”, in DAVIDSON, Richard J.; SCHERER, Klaus R.; GOLDSMITH, H. Hill (eds): *Handbook of Affective Sciences*, Oxford-New York, Oxford University Press, 2003, pp. 503–534.

GAFFURIUS, Franchinus: *Practica musicae*, translation and transcription by Clement A. Miller, Dallas, American Institute of Musicology, 1968.

GALAMBOS, Robert: *Hallowell Davis 1896–1992. A Biographical Memoir*, Washington D.C., National Academies Press, 1998.

GALILEI, Galileo: *Two New Sciences, Including Centers of Gravity and Force of Percussion*, translated, with a new introduction and notes by Stillman Drake, Toronto, Wall & Thopson, 1989.

GALILEI, Vincenzo: *Dialogue on Ancient and Modern Music*, translated, with introduction and notes by Claude V. Palisca, New Haven, CT, Yale University Press, 2003.

GALTON, Francis: *Inquiries into Human Faculty and its Development* (1883), edited by Gavan Tredoux, based on the text in the Everyman second edition (London, J.M. Dent & Co., 1907), accessible online on the website of the Galton Archives: http://galton.org/ [last access: October 2015].

GANN, Kyle: *No Such Thing as Silence: John Cage's 4'33''*, New Haven, CT-London, Yale University Press, 2010.

GARBER, Daniel: *Descartes Embodied: Reading Cartesian Philosophy Through Cartesian Science*, Cambridge, Cambridge University Press, 2001.

GARCÍA-BALLESTER, Luis; OLAGÜE, Guillermo; CIGES, Miguel (eds): *Classics in Modern Otology*, Granada, University Press of Granada, 1978.

GARCÍA QUIÑONES, Marta (ed.): *La música que no se escucha: aproximaciones a la escucha ambiental*, Barcelona, Orquestra del Caos, 2008.

GARCÍA QUIÑONES, Marta; KASSABIAN, Anahid; BOSCHI, Elena (eds): *Ubiquitous Musics: The Everyday Sounds That We Don't Always Notice*, Farnham, UK, Ashgate, 2013.

GARDNER, Howard: *The Mind's New Science: A History of the Cognitive Revolution*, New York, Basic Books, 1985.

GAROFALO, Reebee: "Whose World, What Beat: The Transnational Music Industry, Identity, and Cultural Imperialism", *The World of Music*, vol. XXXV, no. 2, 1993, pp. 16–32.

GARRATT, James: *Music, Culture and Social Reform in the Age of Wagner*, Cambridge, Cambridge University Press, 2010.

GARRIOCH, David: "Sounds of the City: the Soundscape of Early Modern European Towns", *Urban History*, vol. 30, no. 1, 2003, pp. 5–25.

GAUKROGER, Stephen: *Descartes: An Intellectual Biography*, Oxford, Clarendon Press, 1995.

--- *The Collapse of Mechanism and the Rise of Sensibility: Science and the Shaping of Modernity, 1680–1760*, Oxford, Clarendon Press, 2010.

GAUKROGER, Stephen; SCHUSTER, John; and SUTTON, John (eds): *Descartes' Natural Philosophy*, London, Routledge, 2000.

GAVER, William W.: "What in the World Do We Hear? An Ecological Approach to Auditory Event Perception", *Ecological Psychology*, 5(1), 1993, pp. 1–29.

--- "How Do We Hear in the World? Explorations in Ecological Acoustics", *Ecological Psychology*, 5(4), 1993, pp. 285–313.

GAY, Peter: *The Bourgeois Experience Victoria to Freud, vols I–V*, New York-London, W.W. Norton & Co., 1984–1998.

GAZZANIGA, Michael; HEATHERTON, Todd; HALPERN, Diane (eds): *Psychological Science*, New York, W.W. Norton & co., 2011.

GEERTZ, Clifford: *The Interpretation of Cultures: Selected Essays by Clifford Geertz*, New York, Basic Books, 1973.

--- "'From the Native's Point of View: On the Nature of Anthropological Understanding", *Bulletin of the American Academy of Arts and Sciences*, vol. 28, no. 1, October 1974, pp. 26–45; later included in *Local Knowledge*, New York, Basic Books, 1983, pp. 55–72.

--- *Negara: The Theatre State in Nineteenth-Century Bali*, Princeton, NJ, Princeton University Press, 1980.

--- "Art as a Cultural System", in *Local Knowledge: Further Essays in Interpretive Anthropology*, New York, Basic Books, 1983, pp. 94–120, accessible online at http://hypergeertz.jku.at/GeertzTexts/Art_Cultural.htm [last access: April 2015].

GEERTZ, Hildred: "The Vocabulary of Emotions: A Study of Javanese Socialization Processes", *Psychiatry* , vol. 22, 1959, pp. 225–237; later republished in LEVINE, Robert (ed.): *Culture and Personality*, Chicago, Aldine, 1974, pp. 249–264.

GEISLER, C. Daniel: *From Sound to Synapse: Physiology of the Mammalian Ear*, New York-Oxford, Oxford University Press, 1998.

GELFAND, Stanley A.: *Hearing: An Introduction to Psychological and Physiological Acoustics*, New York, Marcel Dekker, 1990.

--- *Essentials of Audiology*, New York–Stuttgart, Thieme, 2009 (3rd ed).

GELL, Alfred: "Magic, Perfume, Dream", in LEWIS, I.M. (ed.): *Symbols and Sentiments: Cross-Cultural Studies in Symbolism*, London, Academic, 1977.

--- "The Language of the Forest: Landscape and Phonological Iconism in Umeda", in HIRSCH, Eric; O'HANLON, Michael (eds): *The Anthropology of Landscape. Perspectives on Place and Space*, Oxford, Clarendon Press, 1995, pp. 232–254.

GERHARD, David B.: "Perceptual Features for a Fuzzy Speech-Song Classification", *Proceedings of the International Conference on Acoustics, Speech and Signal Processing*, vol. 4, 2002, pp. 4160–4163.

GHAZANFAR, Asif A.; SCHROEDER, Charles E.: "Is Neocortex Essentially Multisensory?", *TRENDS in Cognitive Sciences*, vol. 10. no. 6, June 2006, pp. 278–285.

GHIDONI, Sonia: "Bernard Lamy e le parole musicali. Un caso di ricezione del *Compendium musicae* di Descartes", *Dianoia*, no. 18, 2013, pp. 191–210.

GIATTI, Anna; MINIATI, Mara (eds): *L'acustica e i suoi strumenti: La collezione dell'Istituto Tecnico Toscano/ Acoustics and Its Instruments: The Collection of the Istituto Tecnico Toscano*, volume issued on the occasion of the exhibition "Music at the Grand-ducal Court", Firenze, Galleria dell'Accademia, 28 May-11 November 2001, Firenze, Giunti, 2001.

GIBSON, Eleanor J.: “Exploratory Behavior in the Development of Perceiving, Acting, and the Acquiring of Knowledge”, *Annual Review of Psychology*, vol. 39, 1988, pp. 1–41.

--- *An Odyssey in Learning and Perception*, Cambridge, MA, MIT Press, 1991.

GIBSON, James J.: “The Problem of Temporal Order in Stimulation and Perception”, *Journal of Psychology*, 62/2, 1966, pp. 141–149.

--- *The Senses Considered as Perceptual Systems*, Westport, Greenwood Press, 1983 (1st ed. Boston, Houghton Mifflin, 1966).

--- *The Ecological Approach to Visual Perception*, Boston, Houghton Miffil, 1979.
--- *Reasons for Realism: Selected Essays of James J. Gibson*, edited by Edward Reed and Rebecca Jones, Hillsdale, NJ, Lawrence Erlbaum, 1982.

GIBSON, James J.; GIBSON, Eleanor J.: “Perceptual Learning: Differentiation or Enrichment?”, *Psychological Review*, 62, 1955, pp. 32–41.

GIBSON, Jonathan: “‘A Kind of Eloquence Even in Music’: Embracing Different Rhetorics in Late Seventeenth-Century France”, *The Journal of Musicology*, vol. 25, no. 4, Fall 2008, pp. 394–433.

GIBSON, Kathleen R.; INGOLD, Tim (eds): *Tools, Language and Cognition in Human Evolution*, Cambridge, Cambridge University Press, 1993.

GILLESPIE, Charles (ed.): *Complete Dictionary of Scientific Biography*, Detroit, MI, Charles Scribner's Sons, 2008.

GILLHAM, Nicholas Wright: *A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics*, Oxford University Press, 2001.

GINZBURG, Carlo: *Il formaggio e I vermi. Il cosmo di un mugnaio del ’500*, Torino, Einaudi, 1976.

--- “Microhistory: Two or Three Things That I Know about It”, translated by John and Anne C. Tedeschi, *Critical Inquiry*, vol. 20, no. 1, Autumn, 1993, pp. 10–35.

GIRDLESTONE, Cuthbert: *Jean-Philippe Rameau: His Life and Work*, New York, Dover Publications, 1969.

GITELMAN, Lisa: *Always Already New: Media, History and the Data of Culture*, Cambridge, MA, MIT Press, 2006.

GJERDINGEN, Robert O.: “Meter as a Mode of Attending: A Network Simulation of Attentional Rhythmicity in Music”, *Integral*, 3, 1989, pp. 67–92.

GOEHR, Lydia: *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music*, Oxford, Clarendon Press, 1992.

GOFFMAN, Erving: *The Presentation of Self in Everyday Life*, New York, Anchor Books, 1959.

--- *Behavior in Public Places: Notes on the Social Organization of Gatherings*, New York, The Free Press, 1963.

--- *Frame Analysis: An Essay on the Organization of Experience*, with a foreword by Bennett M. Berger, Boston, Northeastern University Press, 1986 (1st edition: 1974, New York, Harper & Row).

GOLDSTEIN, E. Bruce: *Sensation and Perception (8th edition)*, Belmont, CA, Wadsworth-Cendage Learning, 2010.

GOLINSKI, Jan: *Making Natural Knowledge: Constructivism and the History of Science*, Chicago, Chicago University Press, 1998.

GOMBRICH, Ernst H.: *Art and Illusion: A Study in the Psychology of Pictorial Representation*, Princeton, Princeton University Press, 1969.

GOODENOUGH, Florence: "The Measurement of Mental Functions in Primitive Groups", American Anthropologist, vol. 38, no. 1, January–March 1936, pp. 1–11.

GOODY, Jack: *The Domestication of the Savage Mind*, Cambridge, Cambridge University Press, 1977.

--- *The Interface Between the Written and the Oral*, Cambridge, Cambridge University Press, 1987.

GOODY, Jack; WATT, Ian: "The Consequences of Literacy", in *Comparative Studies in Society and History*, vol. 5, no. 3, April 1963, pp. 304–345.

GOOLEY, Dana: *The Virtuoso Liszt*, Cambridge, Cambridge University Press, 2004.

GORDON, Edwin E.: *Learning Sequences in Music: Skill, Content, and Patterns: A Music Learning Theory: Study Guide*, Chicago, GIA Publications, 1997.

GOUK, Penelope: *Music, Science and Natural Magic in Seventeenth-Century England*, New Haven, CT, Yale University Press, 1999.

--- "Music and the Emergence of Experimental Science in Early Modern Europe", *SoundEffects. An Interdisciplinary Journal of Sound and Sound Experience*, vol. 2, no. 1, 2012, pp. 6–21, http://www.soundeffects.dk [last access: October 2015].

GOUK, Penelope (ed.): *Musical Healing in Cultural Contexts*, Aldershot, Ashgate, 2000.

GOUK, Penelope; HILLS, Helen (eds): *Representing Emotions: New Connections in the Histories of Art, Music and Medicine*, Aldershot, Ashgate, 2005.

GOUK, Penelope; SYKES, Ingrid: "Hearing Science in Mid-Eighteenth-Century Britain and France", *Journal of the History of Medicine and Allied Sciences*, vol. 66, no. 4, 2010, pp. 507–545.

GOULD, Glenn: *The Glenn Gould Reader*, edited by Tim Page, London, Faber and Faber, 1987.

GOURLAY, Kenneth A.: "The Non-Universality of Music and the Universality of Non-Music", *The World of Music*, vol. XXVI, no. 2, 1984, pp. 25–36.

GOZZA, Paolo (ed.): *Number to Sound: The Musical Way to the Scientific Revolution*, Dordrecht, Kluwer Academic Publishers, 2000.

GRACYK, Theodore: *Rhythm and Noise: An Aesthetics of Rock*, London-New York, I.B. Tauris & Co., 1996.

--- *I Wanna Be Me: Rock Music and the Politics of Identity*, Philadelphia, Temple University Press, 2001.

--- *Listening to Popular Music: Or, How I Learned to Stop Worrying and Love Led Zeppelin*, Ann Arbor, University of Michigan Press, 2007.

GRAMIT, David: "Musicology, Commodity Structure, and Musical Practice", in BROMAN, P.F.; ENGEBRETSEN, N.A.; ALPHONCE, B. (ed.): *Crosscurrents and Counterpoints: Offerings in honor of Bengt Hambraeus at 70*, Göteborg, University of Göthenburg, 1998, pp. 22–34.

--- *Cultivating Music: The Aspirations, Interests, and Limits of German Musical Culture, 1770–1848*, Berkeley, University of California Press, 2002.

--- "Music Scholarship, Musical Practice, and the Art of Listening", in BURCKHARDT QURESHI, Regula (ed.): *Music and Marx. Ideas, Practice, Politics*, New York–London, Routledge, 2002, pp. 3–22.

GRASSENI, Cristina (ed.): *Skilled Visions: Between Apprenticeship and Standards*, London, Berghan Books, 2007.

GRATZER, Wolfgang (ed.): *Perspektiven einer Geschichte abendländischen Musikhörens*, Laaber, Laaber–Verlag, 1997.

GREEN, Lucy: *Music on Deaf Ears: Musical Meaning, Ideology, Education*, Manchester, Manchester University Press, 1988.

--- "Why 'Ideology' is Still Relevant for Critical Thinking in Music Education", *Action, Criticism & Theory for Music Education*, vol. 2, nº 2, December 2003, http://act.maydaygroup.org/articles/Green2_2.pdf [last access: October 2015].

GREENE, Paul D.: "Sound Engineering in a Tamil Village: Playing Audio Cassettes as Devotional Performance", *Ethnomusicology*, vol. 43, n. 3, Autumn 1999, pp. 459–489.

GREENWOOD, John D.: “Understanding the ‘Cognitive Revolution’ in Psychology”, *Journal of the History of the Behavioral Sciences*, vol. 35, no. 1, Winter 1999, pp. 1–22.

GREGORY, Richard L.: “Knowledge in Perception and Illusion”, *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, vol. 352, 1997, pp. 1121–1128.

--- “Brainy Mind”, *British Medical Journal*, vol. 137, 19–26 December 1998, pp. 1693–1695.

--- “Perceptions as Hypotheses”, in NOË, Alva and THOMPSON, Evan (eds): *Vision and Mind: Selected Reading in the Philosophy of Perception*, Cambridge, MA, MIT Press, 2002, pp. 111–133.

--- “Loss of Innocence in the Torres Strait”, *The Psychologist*, vol. 23, part 12, December 2010, pp. 982–983.

GREGORY, Richard L.; COLMAN, Andrew M. (eds): *Sensation and Perception*, Harlow, Longman, 1995.

GRIFFITHS, Timothy D.; WARREN, Jason D.: “What is an Auditory Object?”, *Nature Reviews/Neuroscience,* 5, November 2004, pp. 887–892.

GROSRICHARD, Alain: “L’air de Venise”, *Ornicar*, no. 25, 1982, pp. http://www.unige.ch/lettres/framo/articles/ag_venise.html [last access: October 2015].

GROSS, Daniel M.: “Listening Culture”, in STRECKER, Ivo; TYLER, Stephen; HARIMAN, Robert (eds): *Culture and Rhetoric*, Berghahn Books Studies in Rhetoric and Culture I, New York-Oxford, Berghahn, 2009, pp. 59–73.

GROSS, Steffen W.: “The Neglected Programme of Aesthetics”, *British Journal of Aesthetics*, vol. 42, no. 4, October 2002, pp. 403–414.

GULICK, W. Lawrence; GESCHEIDER, George A.; FRISINA, Robert D.: *Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics*, New York, Oxford University Press, 1989.

GUTTING, Gary (ed.): *The Cambridge Companion to Foucault*, Cambridge, Cambridge University Press, 1994.

HABERMAS, Jürgen: *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, translated by Thomas Burger with the assistance of Frederick Lawrence, Cambridge, Polity Press, 1989.

HAGNER, Michael: “Aufmerksamkeit als Ausnahmezustand”, in HAAS, Norbert; NÄGELE, Rainer; RHEINBERGER, Hans-Jörg (eds): *Aufmerksamkeit*, “Liechtensteiner Exkurse III”, Eggingen, Edition Isele, 1998, pp. 273–294.

--- Review of Jonathan Crary's *Suspensions of Perception*, *Annals of Science*, vol. 60, n. 4, 2003, pp. 449–452.

--- "Toward a History of Attention in Culture and Science", *MLN*, 118, 2003, pp. 670–687.

HALBWACHS, Maurice: *La Mémoire collective chez les musiciens (1939)*, electronic edition in the series "Les classiques des sciences sociales", http://classiques.uqac.ca, Montréal, Université du Quebec 2001, published originally in *Revue philosophique*, March-April 1939, pp. 136–165 [last access: October 2015].

--- *La Mémoire collective (1950)*, *)*, electronic edition in the series "Les classiques des sciences sociales", http://classiques.uqac.ca, Montréal, Université du Quebec 2001, from Maurice Halbwachs, *La mémoire collective,* Paris, PUF, 1967, 2nd ed. updated (and enlarged) [last access: October 2015].

--- *On Collective Memory*, edited, translated, and with an introduction by Lewis A. Coser, Chicago, University of Chicago Press, 1992.

HALL, Edward T.: *The Silent Language*, New York, Doubleday, 1959.

--- *The Hidden Dimension,* New York, Doubleday, 1966.

--- *Beyond Culture,* New York, Doubleday, 1976.

HALLAM, Susan; CROSS, Ian; THAUT, Michael (eds): *The Oxford Handbook of Music Psychology*, Oxford, Oxford University Press, 2009.

HALLYN, Fernand: *Les Structures rhétoriques de la science*, Paris, Seuil, 2004.

HAMLYN, D.W.: *Sensation and Perception: A History of the Philosophy of Perception*, London, Routledge & Kegan Paul, 1961.

HAMM, Charles; NETTL, Bruno; BYRNSIDE, Ronald: *Contemporary Music and Music Cultures*, Englewood Cliffs, Prentice Hall, 1975.

HAMY, E.-T.; HOVELACQUE, A.; VINSON, Julien; LETOURNEAU, Charles: *Questionnaire de sociologie et ethnographie, extrait des Bulletins de la Société d'anthropologie, séance du 21 juin 1883*, 2nd ed., Paris, Typographie A. Hennuyer, 1889.

HANDEL, Stephen: *Listening: An Introduction to the Perception of Auditory Events*, Cambridge, MA, MIT Press, 1989.

HANKINS, Thomas L.; SILVERMAN, Robert J.: *Instruments and the Imagination*, Princeton, Princeton University Press, 1995

HANNING, Barbara: "Conversation and Musical Style in the Late Eighteenth-Century Parisian Salon", *Eighteenth-Century Studies*, vol. 22, no. 4 (Summer, 1989), pp. 512–528.

HANSLICK, Eduard: *De lo bello en la música*, trans. Alfredo Cahn, Buenos Aires, Ricordi Americana, 1947.

--- *The Beautiful in Music: A Contribution to the Revival of MusicalAaesthetics*, translated by Gustav Cohen from the seventh edition, enlarged and revised (Leipzig, 1885), New York, Da Capo Press, 1974.

--- *The Beautiful in Music*, translated by Gustav Cohen; edited, with an introduction by Morris Weitz, New York, Liberal Arts Press, 1957.

HARDIN, C.L. ; MAFFI, Luisa (eds): *Color Categories in Thought and Language*, Cambridge, Cambridge University Press, 1997.

HARDT, Michael and NEGRI, Antonio: *Empire*, Cambridge, MA-London, Harvard University Press, 2000.

HARGREAVES, David J.; NORTH, Adrian C.: *The Social Psychology of Music*, Oxford, Oxford University Press, 1997.

--- "The Functions of Music in Everyday Life: Redefining the Social in Music Psychology", *Psychology of Music*, nº 27, 1999, pp. 71–83.

HARRÉ, Rom (ed.): *The Social Construction of Emotions*, Oxford, Basil Blackwell, 1986.

HARRÉ, Rom; GILLETT, Grant: *The Discursive Mind*, Thousand Oaks, CA, SAGE, 1994.

HARRÉ, Rom; PARROTT, W. Gerrod (eds): *The Emotions: Social, Cultural and Biological Dimensions*, London-Thousand Oaks, CA-New Delhi, SAGE, 1999.

HARRIS, Roy: "How Does Writing Restructure Thought?", *Language & Communication*, vol. 9, no. 2/3, 1989, pp. 99–106.

HARRISON, Frank (ed.): *Time, Place and Music: An Anthology of Ethnomusicological Observation c. 1550 to c. 1800*, Amsterdan, Frits Knuf, 1973.

HARVEY, William: *On The Motion Of The Heart And Blood In Animals*, translated by Robert Willis, in *Scientific Papers: Physiology, Medicine, Surgery, Geology*, with introductions, notes and illustrations, New York, P. F. Collier & son, 1910, and is now accessible online: http://www.fordham.edu/halsall/mod/1628harvey–blood.asp [last access: October 2015].

HARWOOD, Dane L.: "Universals in Music: a Perspective from Cognitive Psychology", *Ethnomusicology*, vol. 20, no. 3 (September 1976), pp. 521–533.

HASSAN, Nedim: "He'll Have To Go': Popular Music and the Social Performing of Memory", Journal of the International Association for the Study of Popular Music I@J, vol. 1, no. 1 (2010),

http://www.iaspmjournal.net/index.php/IASPM_Journal/article/view/328 [last access: October 2015].

HASSAN, Nedim; TESSLER, Holly (eds): *Sounds of the Overground: Selected Papers from a Postgraduate Colloquium on Ubiquitous Music and Music in Everyday Life*, Turku, University of Turku, 2010.

HATFIELD, Gary: "Remaking the Science of Mind: Psychology as Natural Science", in COX, Christopher, PORTER, Roy, and WOKLER, Robert (eds): *Inventing Human Science: Eighteenth-Century Domains*, Berkeley, California University Press, 1995, pp. 184–231.

HATTEN, Robert S.: *Musical Meaning in Beethoven: Markedness, Correlation, and Interpretation*, Bloomington, Indiana University Press, 1994.

HAVELOCK, Eric A.: *Preface to Plato*, Cambridge, MA, Harvard University Press, 1963.

--- *The Muse Learns to Write: Reflections on Orality and Literacy from Antiquity to the Present*, New Haven, CT-London, Yale University Press, 1986.

HEIDEGGER, Martin: "The Age of the World Picture", in *Off the Beaten Track*, edited and translated by Julian Young and Kenneth Haynes, Cambridge, Cambridge University Press, 2002, pp. 57–85.

HEILBRON, John L. (ed.): *Oxford Companion to the History of Modern Science*, Oxford–New York, Oxford University Press, 2003.

HEISTER, Hanns-Werner: "Music in Concert and Music in Background: Two Poles of Musical Realization", in PAYNTER, John; HOWELL, Tim; ORTON, Richard; and SEYMOUR, Peter (eds): *Companion to Contemporary Musical Thought*, vol. 1, London-New York, Routledge, 1992.

HELLER-ROAZEN, Daniel: *The Inner Touch: Archaeology of a Sensation*, New York, Zone Books, 2009.

HELMHOLTZ, Hermann von: *Handbuch der physiologischen Optik*, Leipzig, Leopold Voss, 1867.

--- "On the Physiological Causes of Harmony in Music", in *Science and Culture. Popular and Philosophical Essays*, edited with an introduction by David Cahan, Chicago and London, University of Chicago Press, 1995, pp. 46–75.

--- *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, translated by Alexander J. Ellis, London, Longmans, Green & Co., 1895.

HENNION, Antoine: *La pasión musical. Una sociología de la mediación*, Barcelona, Paidós, 2002.

--- “L'écoute musicale à la question”, *Revue de Musicologie*, 88–1, 2002, pp. 95–149.

HENRICH, Joseph; HEINE, Steven J.; NORENZAYAN, Ara: “The Weirdest People in the World?”, *RatSWD Working Paper Series*, no. 139, German Data Forum (RatSWD), April 2010, http://hci.ucsd.edu/102b/readings/WeirdestPeople.pdf; [last access: July 2015].

HENRIQUES, Julian: *Sonic Bodies: Reggae Sound Systems, Performance Techniques, and Ways of Knowing*, New York, Continuum, 2011.

HERNDON, Marcia: “The Cherokee Ballgame Cycle: An Ethnomusicologist's View”, *Ethnomusicology*, vol. 15, n. 3, 1971, pp. 339–352.

--- “Cultural Engagement: The Case of the Oakland Symphony Orchestra”, *Yearbook for Traditional Music*, vol. 20, 1988, pp. 134–145.

HERDER, Johann Gottfried von: *Philosophical Writings*, translated and edited by Michael N. Forster, Cambridge, Cambridge University Press, 2002.

HERMANN, Thomas; HUNT, Andy; NEUHOFF, John G. (eds): *The Sonification Handbook*, Logos Verlag, Berlin, 2011.

HERNDON, Marcia; McLEOD, Norma: *Music as Culture*, Pt. Richmond, MRI Press, 1990.

HERZFELD, Michael: *Anthropology: Theoretical Practice in Culture and Society*, Malden, MA, and Oxford, Blackwell, 2001.

HIEBERT, Erwin & Elfrida: “Musical Thought and Practice: Links to Helmoltz’s *Tonemfpindungen*, in KRÜGER, Lorenz (ed.): *Universalgenie Helholmtz: Rückblick nach 100 Jahren*, Berlin, Akademia Verlag, pp. 295–311.

HILMES, Michele: “Is There a Field Called Sound Culture Studies? And Does It Matter?”, *American Quarterly*, vol. 57, no. 1, March 2005, pp. 249–259.

HINTON, Devon E.; HOWES, David; KIRMAYER, Laurence J.: “The Medical Anthropology of Sensations”, *Transcultural Psychiatry*, vol. 45, no. 2, 2008, pp. 139–141.

--- "Toward a Medical Anthropology of Sensations: Definitions and Research Agenda", *Transcultural Psychiatry*, vol. 45, no. 2, 2008, pp. 142–162.

HIRSCHKIND, Charles: *The Ethical Soundscape: Cassette Sermons and Islamic Counterpublics*, New York, Columbia University Press, 2006.

HJELMSLEV, Louis: *Prolegomena to a Theory of Language*, translated by Francis J. Whitfield, Madison, University of Wisconsin Press, 1963.

HOCHSCHILD, Arlie Russell: "Emotion Work, Feeling, Rules, and Social Structure", *American Journal of Sociology*, vol. 85, no. 3, November 1979, pp. 551–575.

--- *The Managed Heart: Commercialization of Human Feeling*, Berkeley, University of California Press, 1983 (new updated edition: Berkeley, University of California Press, 2012).

HOFFER, Charles R.: *A Concise Introduction to Music Listening*, Belmont, CA, Wadsworth Publishing Company, 1992 (5th edition).

HOFFMANN, E.T.A.: *E.T.A. Hoffmann's Musical Writings. Kreisleriana. The Poet and the Composer. Music Criticism*, edited, annotated and introduced by David Charlton, translated by Martyn Clarke, Cambridge, Cambridge University Press, 1989.

HOLLINGHAM, Richard: "In the Realm of Your Senses", *New Scientist*, vol. 181, issue 2432, 31 January 2004, pp. 40–43.

HONIGSHEIM, Paul: *Sociologists and Music: An Introduction to the Study of Music and Society*, edited with a new preface and bibliographic update by K. Peter Etzkorn, New Brunswick, NJ, Transaction Books, 1989.

HOOD, Mantle: *The Ethnomusicologist*, New York, McGraw–Hill Book Company, 1971.

HORDEN, Peregrine (ed.): *Music as Medicine: The History of Music Therapy since Antiquity*, Aldershot, Ashgate, 2000.

HORNBOSTEL, Erich M. von: "The Unity of the Senses (1927)", translated by Elizabeth Koffka and Warren Vinton, in ELLIS, Willis D. (ed.): *A Source Book of Gestalt Psychology*, with and introduction by Kurt Koffka, New York, Harcourt Brace, 1938, pp. 210–216.

HOROWITZ, Joseph: *Understanding Toscanini: How He Became an American Culture-God and Helped Create a New Audience for Old Music*, New York, Alfred A. Knopf, 1987.

HOSOKAWA, Shuhei: "Considérations sur la musique mass–médiatisée", *International Review of the Aesthetics and Sociology of Music*, vol. 12, nº 1, juny 1981, pp. 21–50.

--- "The Walkman Effect", *Popular Music*, vol. 4: "Performers and Audiences", 1984, pp. 165–180.

--- "L'ascolto debole", in ABRUZZESE, A.; CALABRESE, O.; CHAMBERS, I. et al.: *Estetiche del Walkman*, a cura di Angela Ferraro e Gabriele Montagano, Napoli, Flavio Pagano Editore, 1990, pp. 81–109.

HOWES, David: "On the Odour of the Soul: Spatial Representation and Olfactory Classification in Eastern Indonesia and Western Melanesia", *Bijdragen tot de Taal-, Land- en Volkenkunde*, no. 1, 1988, pp. 84–113.

--- "Sense and Non-Sense in Contemporary Ethno/Graphic Practice and Theory", *Culture*, XI (1–2), 1991, pp. 65–76.

--- *Sensual Relations: Engaging the Senses in Culture & Social Theory*, Ann Arbor, University of Michigan Press, 2003.

--- "Can These Dry Bones Live? An Anthropological Approach to the History of the Senses", *The Journal of American History*, vol. 95, no. 2, 2008, pp. 442–451.

--- "Scent, Sound and Synaesthesia. Intersensoriality and Material Culture Theory", in TILLEY, Chris; KEANE, Webb; KUECHLER, Susan; ROWLANDS, Mike; and SPYER, Patricia (eds): *Handbook of Material Culture*, London, SAGE, 2006, pp. 161–172.

--- "Hearing Scents, Tasting Sights: Toward a Cross-Cultural Multimodal Theory of Aesthetics", in BACCI, Francesca; MELCHER, David (eds): *Art and the Senses*, New York, Oxford University Press, 2011, pp. 161–182.

--- "The Social Life of the Senses", *Ars Vivendi Journal*, no. 3, February 2013, pp. 4–23, accessible online: http://www.ritsumei-arsvi.org/uploads/publications_en/20/2013AVJ_no3_Howes.pdf [last access: January 2015].

--- "The Expanding Field of Sensory Studies", version 1.0, August 2013, http://www.sensorystudies.org/sensorial-investigations/the-expanding-field-of-sensory-studies/ [last access: October 2015].

HOWES, David (ed.): *The Varieties of Sensory Experience: A Sourcebook in the Anthropology of the Senses*, Toronto, University of Toronto Press, 1991.

--- *Empire of the Senses: The Sensual Culture Reader*, Oxford, Berg Publishers, 2005.

--- *The Sixth Sense Reader*, London, Berg Publishers, 2009.

HOWES, David; CLASSEN, Constance: *Ways of Sensing: Understanding the Senses in* Society, Milton Park, UK, and New York, Routledge, 2014.

HUGH-JONES, Stephen; LAIDLAW, James (eds): *The Essential Edmund Leach, vol. 1: Anthropology and Society*, New Haven, CT, Yale University Press, 2001.

HUGHES, Howard C.: *Sensory Exotica: A World Beyond Human Experience*, Cambridge, MA, MIT Press, 1999.

HÜHN, H.; SCHIEMANN, Gregor: "Zerstreuung", in RITTER, J.; GRÜNDER, K. (eds): *Historisches Wörterbuch der Philosophie*, Darmstadt Wissenschaftliche Buchgesellschaft, 1971, vol. 12, col. 1310–1316.

HUI, Alexandra: "Sound Objects and Sound Products: Standarizing a New Culture of Listening in the First Half of the Twentieth Century", *Culture Unbound*, vol. 4, 2012, pp. 599–616.

--- "The Bias of "Music-Infected Consciousness": the Aesthetics of Listening in the Laboratory and on the City Streets of Fin–de–Siècle Berlin and Vienna", *Journal of the History of the Behavioral Sciences*, vol. 48, no. 3, Summer 2012, pp. 236–250.

--- *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840–1910*, Cambridge, MA, MIT Press, 2013.

HUI, Alexandra; KURSELL, Julia; JACKSON, Myles W. : Introduction to *Osiris,* special issue on "Music, Sound, and the Laboratory from 1750 to 1980", vol. 28, 2013, pp. 1–11.

HUIZINGA, Johan: *The Waning of the Middle Ages: A Study of the Forms of Life, Thought and Art in France and the Netherlands in the Fourteenth and Fifteenth Centuries*, translated by F. Hopman, Harmondsworth, Penguin, 1976.

HULAK, Florence: "En avons-nous fini avec l'histoire des mentalités?", *Philonsorbonne*, 2 (2008), année 2007–2008, pp. 89–109, http://philonsorbonne.revues.org/173 [last access: September 2014].

HUNT, Frederick V.: *Electroacoustics: The Analysis of Transduction, and Its Historical Background*, Cambridge, MA, Harvard University Press, and New York, John Wiley and Sons, 1954.

--- *Origins in Acoustics: The Science of Sound from Antiquity to the Age of Newton*, with a foreword by Robert Edmund Apfel, Woodbury, NY, Acoustical Society of America–American Institute of Physics, 1992.

HUNT, Lynn (ed.): *The New Cultural History*, Berkeley, University of California Press, 1989.

HURON, David: "Music in Advertising: an Analytic Paradigm", *Musical Quarterly*, vol. 73, nº 4,1989, pp. 557–574, http://www.musiccog.ohio-state.edu/Huron/Publications/huron.advertising.text.html [last access: March 2015].

--- *Sweet Anticipation: Music and the Psychology of Expectation*, Cambridge, MA, MIT Press, 2006.

HUTCHESON, Francis: *An Inquiry into the Original of Our Ideas of Beauty and Virtue*, revised edition, edited with and introduction by Wolfgang Leidhold, Indianapolis, IN, Liberty Fund, 2008.

HYMES, Dell H.: *Foundations in Sociolinguistics: An Ethnographic Approach*, Philadelphia, University of Pennsylvania Press, 1974.

IBARRETXE-ANTUÑANO, Iraide: Polysemy and Metaphor in Perception Verbs: A Cross–Linguistic Study, Ph.D. dissertation, University of Edinburgh, 1999, accessible online: http://www.unizar.es/linguisticageneral/articulos/Ibarretxe-PhD-Thesis-99.pdf [last access: October 2015].

--- "Vision Metaphors for the Intellect: Are they Really Cross-Linguistic?", *Atlantis. Journal of the Association of Anglo–American Studies*, vol. 30, no. 1, June 2008, pp. 15–33.

--- "Metáforas de la percepción: una aproximación desde la Lingüística Cognitiva", in SANTIBÁÑEZ, Cristian and OSORIO, Jorge (eds): *Recorridos de la metáfora: mente, espacio y diálogo*, Concepción, Chile, EUDEC, 2011.

--- "The Power of the Senses and the Role of Culture in Metaphor and Language", in CABALLERO, Rosario; DÍAZ VERA, Javier E. (eds): *Sensuous Cognition: Explorations in Human Sentience, Imagination, (E)motion and Perception*, Berlin, Walter de Gruyter, 2013.

IGES, José: "Un approccio alla storia del paesaggio sonoro", *Musica/Realtà 65*, 2000, pp. 55–66.

IHDE, Don: *Instrumental Realism: The Interface Between Philosophy of Science and Philosophy of Technology*, Bloomington, Indiana University Press, 1991.

--- *Listening and Voice: Phenomenologies of Sound*, Albany, State University of New York Press, 2007, 2nd edition. (First published as *Listening and Voice: A Phenomenology of Sound*, Athens, Ohio University Press, 1976 >> it corresponds to the first 16 chapters of the second edition).

IMBERTY, Michel: *Entendre la musique. Sémantique psychologique de la musique, tome 1*, Paris, Dunod, 1979.

--- *Les Écritures du temps. Sémantique psychologique de la musique, tome 2*, Paris, Dunod, 1981.

--- "De la perception du temps musical à sa signification psychologique : à propos de *la Cathédrale engloutie* de C. Debussy", *Analyse musicale*, 1er trimestre 1987, pp. 28–79.

--- "How do we perceive atonal music? Suggestions for a theoretical approach", *Contemporary Music Review*, vol. 9 (Music and the Cognitive Sciences 1990. Proceedings of the Cambridge Conference on Music and the Cognitive Sciences, 1990, issue editors: Ian Cross and Irène Deliège), London, Harwood Publishers, 1993, pp. 325–337.

IMBERTY, Michel (ed.): *De l'écoute à l'oeuvre: Études interdisciplinaires: Actes du colloque tenu en Sorbonne les 19 et 20 février 1999*, Paris, L'Harmattan, 2001.

IMBERTY, Michel: "Qu'est–ce que le mouvement d'une oeuvre musicale?", in IMBERTY, Michel; ESCAL, Françoise (ed.): La *Musique au regard des sciences humaines et des sciences sociales*, 2 vols., Paris, L'Harmattan, 1997, pp. 21–44.

INGARDEN, Roman: *The Work of Music and the Problem of its Identity*, translated from the original Polish by Adam Czerniawski, edited by Jean G. Harrell, Berkeley, University of California Press, 1986.

INGOLD, Tim: "Culture and the Perception of the Environment", in CROLL, E.; PARTIN, D. (eds): *Bush Base. Forest Farm Culture, Environment and Development*, London, Routledge, 1992.

--- *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*, London–New York, Routledge, 2000.
--- "From the Transmission of Representations to the Education of Attention", in WHITEHOUSE, Harvey (ed.): *The Debated Mind. Evolutionary Psychology vs. Ethnography*, New York, Berg Publishers, 2001, pp. 113–154.

--- "Beyond Art and Technology: The Anthropology of Skill", in SCHIFFER, M.B. (ed.): *Anthropological Perspectives on Technology*, Albuquerque, University of New Mexico Press, 2001, pp. 17–31.

--- "Debate Section: Worlds of Sense and Sensing the World: a Response to Sarah Pink and David Howes", *Social Anthropology/Anthropologie Sociale*, vol. 19, no. 3, 2011, pp. 313–317.

INNIS, Harold: *Empire and Communication*, revised by Mary Q. Innis, foreword by Marshall McLuhan, Toronto, University of Toronto Press, 1972 (1st ed. Oxford, Oxford University Press, 1950).

ISER, Wolfgang: *The Act of Reading: A Theory of Aesthetic Response*, Baltimore, MD-London, Johns Hopkins University Press, 1978.

JACKENDOFF, Ray: *Consciousness and the Computational Mind*, Cambridge, MA, MIT Press, 1987.

--- *Languages of the Mind: Essays on Mental Representation*, Cambridge, MA, MIT Press, 1992.

JACKSON, Michael: "Knowledge of the Body", *Man*, New Series, vol. 18, no. 2, June 1983, pp. 327–345.

--- *Paths Toward a Clearing: Radical Empiricism and Ethnographic Inquiry*, Bloomington and Indianapolis, Indiana University Press, 1989.

JACKSON, Myles W.: *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany*, Cambridge, MA, and London, MIT Press, 2006.

JAHN, Anthony F.; SANTOS-SACCHI, Joseph (eds): *Physiology of the Ear*, New York, Raven Press, 1988.

JAMES, Susan: *Passion and Action: The Emotions in Seventeenth-Century Philosophy*, Oxford, Clarendon Press, 1997.

JAMES, William: "What Is an Emotion?" (1884), *Mind*, vol. 9, no. 34, April 1884, pp. 188–205.

--- *The Principles of Psychology*, Chicago, Encyclopedia Britannica, 1952 (1st ed. New York, Holt, 1890).

JAMESON, Fredric: *The Political Unconscious: narrative as a socially symbolic act*, Ithaca, NY, Cornell University Press, 1981.

JAUSS, Hans Robert: *Pour une esthétique de la réception*, trans. Claude Maillard, foreword by Jean Starobinski, Paris, Gallimard, 1978.

JAY, Martin: "Scopic Regimes of Modernity", in LASH, Scott and FRIEDMAN, Jonathan (eds), *Modernity and Identity*, Oxford, Blackwell, 1992, pp. 178–195.

--- *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought*, Berkeley, University of California Press, 1993.

--- *Cultural Semantics: Keywords of Our Time*, Amherst, University of Massachusetts Press, 1998.

--- *Songs of Experience: Modern American and European Variations on a Universal Theme*, Berkeley, University of California Press, 2005.

--- "In the Realm of the Senses: An Introduction", *The American Historical Review*, vol. 116, no. 2, April 2011, pp. 307–315.

JENNER, Mark S. R.: "Follow Your Nose? Smell, Smelling, and Their Histories", *American Historical Review*, 2011, vol. 116, no. 2, pp. 335–351.

JOHNSON, James H.: *Listening in Paris: A Cultural History*, Berkeley, University of California Press, 1995.

JOHNSON, Mark L.: *The Body in the Mind: The Bodily Basis of Meaning, Imagination and Reason*, Chicago, University of Chicago Press, 1987.

--- "Embodied Musical Meaning", *Theory and Practice*, n. 19, 1997, pp. 95–102.

JOHNSON, Mark L., FERNANDEZ-DUQUE, Diego: "Attention Metaphors: How Metaphors Guide the Cognitive Psychology of Attention", *Cognitive Science*, vol. 23, no. 1, 1999, pp. 83–116.

JOHNSTON, William A.; DARK, Veronica J.: "Selective Attention", *Annual Review of Psychology*, vol. 37, 1986, pp. 43–75.

JONES, Caroline A. (ed.): *Sensorium: Embodied Experience, Technology, and Contemporary Art*, Cambridge, MA, MIT Press, 2006.

JONES, Mari Riess: "Time, Our Lost Dimension: Toward a New Theory of Perception, Attention, and Memory", *Psychological Review*, 83, 1976, pp. 323–335.

--- "Only Time Can Tell: On the Topology of Mental Space and Time", *Critical Inquiry*, vol. 7, no. 3, Spring 1981, pp. 557–576.

--- "Musical Events and Models of Musical Time", in BLOK, Richard A.: *Cognitive Models of Psychological Time*, Hillsdale, NJ, Lawrence Erlbaum, 1990, pp. 207–240. *Journal of the Royal Musical Association*, vol. 134, special issue no. 1, 2009.

JUDD, Cristle Collins: *Reading Renaissance Theory: Hearing with the Eyes*, Cambridge, Cambridge University Press, 2000.

JUSLIN, Patrik N.; SLOBODA, John A. (eds): *Music and Emotion: Theory and Research*, Oxford, Oxford University Press, 2001.

JUSLIN, Patrik N.; SLOBODA, John A. (eds): *Handbook of Music and Emotion: Theory, Research, Applications*, Oxford, Oxford University Press, 2010.

JÜTTE, Robert: *A History of the Senses*, translated by James Lynn, Oxford, Polity Press, 2005.

KADEN, Christian: *Des Lebens wilder Kreis. Musik im Zivilisationsprozess*, Kassel, Bärenreiter, 1993

--- "Zerbrochene Herzlichkeit. Krisen der musikalischen Kommunikation um 1800", in HEINEN, Sandra; NEHR, Harald (eds): *Krisen des Verstehens um 1800*, Starnberg, Stiftung für Romantikforschung, 2004, pp. 223–236.

KAHN, Douglas: *Noise, Water, Meat: A History of Sound in the Arts*, Cambridge, MA, MIT Press, 1999.

KAHN, Douglas; WHITEHEAD, Gregory: *Wireless Imagination: Sound, Radio and the Avantgarde*, Cambridge, MA, MIT Press, 1992.

KALTENECKER, Martin: "À propos du contexte philosophique et physiologique du paradigme rhétorique au XVIII e siècle", *Revue de Musicologie*, vol. 95, no. 1, 2009, pp. 65–96.

--- *L'Oreille divisée. Les discours sur l'écoute musicale au XVIIIe et XIXe siècles*, Paris, Éditions MF, 2010.

KARNES, Kevin C.: *Music, Criticism, and the Challenge of History: Shaping Modern Musical Thought in Late Nineteenth-Century Vienna*, New York, Oxford University Press, 2008.

KAHNEMANN, Daniel: *Atención y esfuerzo*, translation, with an introduction and notes by Juan Botella, Madrid, Biblioteca Nueva, 1997.

--- *Attention and Effort*, Englewood Cliffs NJ, Prentice Hall, 1973.

KANDEL, Eric R.; SCHWARTZ, James H.; JESSELL, Thomas M.; SIEGELBAUM, Steven A. ; and HUDSPETH, A. J. (eds): *Principles of Neural Science*, 5th ed, New York, McGraw-Hill, 2012.

KASSABIAN, Anahid: "Popular", in HORNER, Bruce; SWISS, Thomas (ed.): *Key Terms in Popular Music and Culture*, Oxford, Blackwell, 1999.

--- "Ubisub: Ubiquitous Listening and Networked Subjectivity", *ECHO*, 3 (2), 2001.

--- "Ubiquitous Listening", in HESMONDHALGH, David; NEGUS, Keith (ed.): *Popular Music Studies*, London, Arnold, 2002, pp. 131–142.

--- *Ubiquitous Listening: Affect, Attention, and Distributed Subjectivity*, Berkeley, University of California Press, 2013.

KASSLER, Jamie C.: "Man-A Musical Instrument: Models of the Brain and Mental Functioning Before the Computer", *History of Science*, vol. 22, no. 1, 1984, pp. 59–92.

--- "Musicology and the Problem of the Musical Ear", *Musicology Australia*, vol. XXII, 1999, pp. 18–30.

--- *Music, Science, Philosophy: Models in the Universe of Thought*, Aldershot, Ashgate, 2001.

--- *The Beginnings of the Modern Philosophy of Music in England: Francis North's "A Philosophical Essay of Musick" (1677) with comments of Isaac Newton, Roger North and in the "Philosophical Transactions"*, Aldershot, Ashgate, 2004.

KATZ, Mark: *Capturing Sound: How Technology Has Changed Music*, Berkeley, University of California Press, 2004.

KAY, Paul; BERLIN, Brent; MAFFI, Luisa; MERRIFIELD, William R.; COOK, Richard: *World Color Survey*, Stanford CA, CSLI Publications, 2010.

KEIGHTLEY, Keir: "'Turn It Down', She Shrieked: Gender, Domestic Space, and High Fidelity, 1948–59", *Popular Music*, vol. 15, no. 2, May 1996, pp. 149–177.

KEIL, Charles M. H.: "Motion and Feeling through Music", *The Journal of Aesthetics and Art Criticism*, vol. 24, no. 3. (Spring, 1966), pp. 337–349.

--- *Tiv Song*, Chicago-London, University of Chicago Press, 1979.

---"The Theory of Participatory Discrepancies: A Progress Report", *Ethnomusicology*, vol. 39, n. 1, Special Issue: Participatory Discrepancies, 1995, pp. 1–19.

KEIL, Charles; FELD, Steven: *Music Grooves*, Chicago, University of Chicago Press, 1994.

KELMAN, Ari Y.: "Rethinking the Soundscape: A Critical Genealogy of a Key Term in Sound Studies", *Senses & Society*, vol. 5, no. 2, 2010, pp. 212–234.

KEMP, Anthony E.: *The Musical Temperament: Psychology and Personality of Musicians*, Oxford, Oxford University Press, 1996.

KEMP, Simon; FLETCHER, Garth J.O.: "The Medieval Theory of the Inner Senses", *American Journal of Psychology*, vol. 106, no. 4, 1993, pp. 559–576.

KENNAWAY, James: "From Sensibility to Pathology: The Origins of the Idea of Nervous Music around 1800", *Journal of the History of Medicine and Allied Sciences*, vol. 65, no. 3, 2010, pp. 396–426.

--- "Musical Hypnosis: Sound and Selfhood from Mesmerism to Brainwashing", *Social History of Medicine*, vol. 25, issue 2, 2012, pp. 271–289.

KENNAWAY, James (ed.): *Music and the Nerves, 1700–1900*, Basingstoke, UK, Palgrave Macmillan, 2014.

KENNEDY: "Listen", in *Keywords of Media Theory*, edited by W. J. T. Mitchell, Eduardo de Almeida and Rebecca Reynolds, The Chicago School of Media Theory, University of Chicago, 2004, https://lucian.uchicago.edu/blogs/mediatheory/keywords/listen/ [last access: October 2015].

KENNEY, William H.: *Recorded Music in American Life: The Phonograph and Popular Memory, 1890–1945*, New York, Oxford University Press, 2003.

KERCKHOVE, Derrick de: "McLuhan and the 'Toronto School of Communication'", *Canadian Journal of Communication*, special issue, 1989, pp. 73–79.

KESTENBERG, Leo: "Music Education Goes Its Own Way", *The Musical Quarterly*, vol. 25, no. 4, October 1939, pp. 442–454.

KIHLSTROM, John F.: “The Cognitive Unconscious”, *Science*, vol. 237, nº 4821, 18th September 1987, pp. 1445–1452.

KIM, Youn: Theories of Musical Hearing, 1863–1931: Helmholtz, Stumpf, Riemann and Kurth in Historical Context, Ph.D. dissertation, Columbia University, 2003 (UMI Microform 3104819, Ann Arbor, UMI Research Press, 2003).

KIRCHER, Athanasius: *Musurgia universalis* (Rome, Corbelletti, 1650), facsimile edition, Hildesheim, Olms, 1970.

KITTLER, Friedrich: *Discourse Networks 1800/1900*, translated by Michael Metteer, with Chris Cullens, foreword by David E. Wellbery, Stanford, CA, Stanford University Press, 1990.

--- “The History of Communication Media”, *CTheory*, special issue ga114, July 1996, accessible online: http: //www.ctheory.net/text_file.asp?pick=45/ [last access: January 2015].

--- *Gramophone, Film, Typewriter*, translated, with an introduction by Geoffrey Winthrop–Young and Michael Wutz, Stanford, Stanford University Press, 1999.

KLEMPE, Sven Hroar: “The Role of Tone Sensation and Musical Stimuli in Early Experimental Psychology”, *Journal of the History of the Behavioral Sciences*, vol. 47, no. 2, Spring 2011, pp. 187–199.

KNORR CETINA, Karin: *Epistemic Cultures: How the Sciences Make Knowledge*, Cambridge, MA-London, Harvard University Press, 1999.

KOCH, Erec R.: *The Aesthetic Body: Passion, Sensibility, and Corporeality in Seventeenth–Century France*, Cranbury, NJ, Associated University Presses, 2008.

--- “Perfect Pitch: Sound, Aurality, and Rhetoric from Marin Mersenne’s *Harmonie Universelle* to Bernard Lamy’s *La Rhetorique, ou l’art de parler*”, *EMF: Studies in Early Modern France*, vol. 12: Perfection (editor: Anne L. Birberick), 2008, pp. 185–213.

KOSKOFF, Ellen: “Thoughts on Universals in Music”, *The World of Music*, vol. XXVI, no. 2, 1984, pp. 66–83.

KOSTELANETZ, Richard (ed.): *John Cage: an Anthology*, New York, Da Capo, 1991.

KÖVECSES, Zoltán: *Metaphor and Emotion: Language, Culture, and Body in Human Feeling*, Cambridge, Maison des Sciences de l’Homme-Cambridge University Press, 2000.

KRAMER, Lawrence: *Music as Cultural Practice, 1800–1900*, Berkeley, University of California Press, 1990.

--- *Classical Music and Postmodern Knowledge*, Berkeley, University of California Press, 1995.
--- *After the Lovedeath: Sexual Violence and the Making of Culture*, Berkeley, University of California Press, 1997.

--- "Ein Phantasiestück zur Jahrtausendwende", *Archiv für Musikwissenschaft*, 57, Jahrg., H. 1., 2000, pp. 101–107.

--- *Musical Meaning: Toward a Critical History*, Berkeley, University of California Press, 2002.

KRISTELLER, Paul Oskar: "The Modern System of the Arts: A Study in the History of Aesthetics Part I", *Journal of the History of Ideas*, vol. 12, no. 4 (October 1951), pp. 496–527.

--- "The Modern System of the Arts: A Study in the History of Aesthetics Part II", *Journal of the History of Ideas*, vol. 13, no. 1 (January 1952), pp. 17–46.

--- *Renaissance Thought and the Arts: Collected Essays*, Princeton, NJ, Princeton University Press, 1980 (originally published by Harper & Row, 1965).

KROHN, William O.: "Facilities in Experimental Psychology at the Various German Universities", *The American Journal of Psychology*, vol. 4. no. 4, August 1892, pp. 585–594.

--- "Facilities in Experimental Psychology in the Colleges of the United States", first published in *Report of the Commissioner of Eduation for the Year 1890–91*, vol. 2, 1894, pp. 1139–1151, accessible online: http://psychclassics.yorku.ca/Krohn/report.htm [last access: October 2015].

KRUMHANSL, Carol L.: "Music Psychology and Music Theory: Problems and Prospects", *Music Theory Spectrum*, vol. 17, n. 1, 1995, pp. 53–80.

KRUPNIK, Igor; MÜLLER-WILLE, Ludger: "Franz Boas and Inuktitut Terminology for Ice and Snow: From the Emergence of the Field to the 'Great Eskimo Vocabulary Hoax', chapter in KRUPNIK, Igor et al. (eds): *SIKU: Knowing Our Ice: Documenting Inuit Sea Ice Knowledge and Use*, New York, Dordrecht-Heidelberg-London-New York, Springer Verlag, 2010, pp. 377–400.

KU, Ja Hyon: "British Acoustics and its Transformation from the 1860s to the 1910s", *Annals of Science*, vol. 63, no. 4, 2006, pp. 395–423.

KUBOVY, Michael; VAN VALKENBURG, David: "Auditory and visual objects", *Cognition*, n. 80, 2001, pp. 97–126.

KUHN, Thomas: *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1962.

KUKLICK, Henrika: *The Savage Within: The Social History of British Anthropology, 1885–1945*, Cambridge, Cambridge University Press, 1991.

KUNST, Jaap: *Ethnomusicology. A study of its nature, its problems, methods and representative personalities to which is added a bibliography*, The Hague, Martins Nijhoff, 1959 (3rd much enlarged edition of *Musicologica*).

KUPER, Adam: *Culture: The Anthropologists' Account*, Cambridge, MA, Harvard University Press, 1999.

KURSELL, Julia (ed.): *Sounds of Science – Schall im Labor (1800–1930)*, "Preprint 346", Berlin, Max–Planck–Institut für Wissenschaftsgeschichte, 2008, accessible online: h https://www.mpiwg-berlin.mpg.de/en/resources/preprints [last access: October 2015].

--- "Hermann von Helmholtz und Carl Stumpf über Konsonanz und Dissonanz" in KURSELL, Julia (ed.): *Sounds of Science – Schall im Labor (1800–1930)*, "Preprint 346", Berlin, Max–Planck-Institut für Wissenschaftsgeschichte, 2008, PP. 130–143, accessible online: https://www.mpiwg-berlin.mpg.de/en/resources/preprints [last access: October 2015].

LABAJO, Joaquina: "Musical Ethnography under Spanish Colonial Power in the Modern Age", *Journal of Musical Anthropology of the* Mediterranean, no. 2, 1997, http://www.umbc.edu/MA/index/number2/labajo/joa0.htm [last access: October 2015].

LACEY, Kate: "Towards a Periodization of Listening: Radio and Modern Life", *International Journal of Cultural Studies*, vol. 3, n. 2, 2000, pp. 279–288.

--- *Listening Publics: The Politics and Experience of Listening in the Media Age*, Cambridge, and Malden, MA, Polity Press, 2013.

LACHMUND, Jens: "Making Sense of Sound: Auscultation and Lung Sound Codification in Nineteenth–Century French and German Medicine", *Science, Technology, & Human Values*, vol. 24, no. 4, Autumn 1999, pp. 419–450.

LAKOFF, George: *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind*, Chicago, University of Chicago Press, 1987.

LAKOFF, George; JOHNSON, Mark: *Metaphors We Live by*, Chicago, University of Chicago Press, 1980.

--- *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*, New York, Basic Books, 1999.

LAMBERTI, Elena: *Marshall McLuhan's Mosaic: Probing the Literary Origins of Media Studies*, Toronto, University of Toronto Press, 2012.

LA METTRIE, Julien Offray de: *L'Homme-machine*, edited with an introduction by Paul-Laurent Assoun, Paris, Denoël, 1981.

--- *L'home màquina*, trans. Joan Soler i Amigó, edited by Miquel Morey, Barcelona, Laia, 1983.

--- *Machine Man and other Writings*, edited by Ann Thompson, Cambridge, Cambridge University Press, 1996.

LAMY, Bernard: *La Rhetorique ou l'art de parler*, critical edition by Benoît Timmermans, with an introduction by Michel Meyer, Paris, PUF, 1998.

LAMY, Guillaume: *Explication mécanique et physique des fonctions de l'âme sensitive*, Paris, Lambert Roulland, 1681, accessible online on Gallica.fr: http://gallica.bnf.fr/ark:/12148/bpt6k75787f.r=explication+m%C3%A9canique+et+physique+lamy.langFR [last access: September 2015].

LANGER, Susanne K.: *Philosophy in a New Key: A Study in the Symbolism of Reason, Rite and Art*, New York, The New American Library, 1942 (2nd printing, 1949).

--- *Feeling and Form: A Theory of Art Developed from "Philosophy in a New Key"*, New York, Charles Scribner's Sons, 1953.

LANZA, Joseph: *Elevator Music: A Surreal History of Muzak, Easy–Listening and other Moodsong*, London, Quartet Books, 1995.

LARGE, Edward W.; JONES, Mari Riess: "The Dynamics of Attending: How People Track Time-Varying Events", *Psychological Review*, vol. 106, n. 1, 1999, pp. 119–159.

LARGE, Edward W.; PALMER, Caroline: "Perceiving Temporal Regularity in Music", *Cognitive Science*, 26, 2002, pp. 1–37.

LAYTON, Edwin T., Jr.: "Technology as Knowledge", *Technology and Culture*, January 1974, vol. 15, no. 1, pp. 31–41.

LAZARUS, Richard: *Emotion and Adaptation*, Oxford, Oxford University Press, 1994.

LAZZARATO, Maurizio: "Immaterial Labor", in Paolo Virno and Michael Hardt (eds), *Radical Thought in Italy: A Potential Politics*, Minneapolis, University of Minnesota Press, 2006, pp. 133–147.

LEARY, David E. (ed.): *Metaphors in the History of Psychology*, Cambridge, Cambridge University Press, 1990.

LEAVITT, John: "Meaning and Feeling in the Anthropology of Emotions", *American Ethnologist*, vol. 23, no. 3, 1996, pp. 514–539.

--- *Linguistic Relativities: Language Diversity and Modern Thought*, Cambridge, Cambridge University Press, 2010.

LEAVITT, John; HART, Lynn M.: "Critique de la 'raison' sensorielle. L'élaboration esthétique des sens dans une société himalayenne", *Anthropologie et Sociétés*, vol. 14, no. 2, 1990, pp. 77–98.

LE BRETON, David: *Anthropologie du corps et modernité*, Paris, PUF, 1990.

LE CAT, Claude Nicolas: *Traité des sens*, new corrected and enlarged edition, with illustrations, Amsterdam, J. Wetstein, 1744, accessible online: https://archive.org/details/traitdessens00leca [last access: September 2015]

--- *A Physical Essay on the Senses*, London, R. Griffiths, 1750 (New York, Readex Microprint Corporation, 1969).

LE CERF DE LA VIÉVILLE, Jean Laurent: *Comparaison de la musique italienne et de la musique française*, Brussels, 1705–1706, reprint. Geneva, Minkoff, 1972.

LEECH-WILKINSON, Daniel: *The Modern Invention of Medieval Music*, Cambridge, Cambridge University Press, 2002.

LEENHARDT, Maurice: *Do Kamo: Person and Myth in a Melanesian* World, translated by Basia Miller Gulati, Chicago, University of Chicago Press, 1947/1979.

LEFEBVRE, Georges: *La Grande Peur de 1789, suivi de Les foules révolutionnaires*, présentation de Jacques Revel, Paris, Armand Colin, 1988.
publicat originalment el 1932

LEFEBVRE, Henri: *Élements de rythmanalyse: introduction à la connaissance des rythmes*, préface de René Lourau, Paris, Syllepse, 1992.

LE GOFF, Jacques; CHARTIER, Roger; REVEL, Jacques Revel (eds): *La Nouvelle Histoire*, Paris, Retz, 1978.

LE GUIN, Elisabeth: "Uneasy Listening", *Repercussions*, Spring 1994, pp. 5–19.

--- *Boccherini's Body. An Essay in Carnal Musicology*, Berkeley, University of California Press, 2006.

LE HURAY, Peter; DAY, James (eds): *Music and Aesthetics in the Eighteenth- and Early-Nineteenth Centuries*, abridged edition, Cambridge, Cambridge University Press, 1981.

LEMAN, Marc; SCHNEIDER, Albrecht: "Origin and Nature of Cognitive and Systematic Musicology: An Introduction", in LEMAN, Marc (ed.): *Music, Gestalt, and Computing: Studies in Cognitive and Systematic Musicology*, Berlin, Springer Verlag, 1997, pp. 13–29.

LEMAN, Marc: *Embodied Music Cognition and Mediation Technology*, Cambridge, MA, MIT Press, 2008.

LENNEBERG, Hans: "Johann Mattheson on Affect and Rhetoric in Music (I)", *Journal of Music Theory*, vol. 2, no. 1, April 1958, pp. 193–236.

---"Johann Mattheson on Affect and Rhetoric in Music (II)", *Journal of Music Theory*, *Journal of Music Theory*, vol. 2, no. 2, November 1958, pp. 47–84.

LENOIR, Timothy: "Models and Instruments in the Development of Electrophysiology, 1845–1912", Historical Studies in the Physical and Biological Sciences, no. 17, 1986, pp. 1–54.

--- "Helmholtz and the Materialities of Communication", *Osiris*, no. 9, 1994, pp. 185–207.

LEPPERT, Richard: "'Pushed to the Edge of Existence' (Adorno, Listening, and the Question of Hope)", *Cultural Critique*, 60, Spring 2005, pp. 92–133.

--- *The Sight of Sound: Music, Representation, and the History of the Body*, Berkeley, University of California Press, 1995.

--- "The Social Discipline of Listening", in DROBNICK, Jim (ed.): *Aural Cultures*, Toronto, YYZ Books, 2004, pp. 19–35.

LEPPERT, Richard; McCLARY, Susan (ed.): *Music and Society: The Politics of Composition, Performance and Reception*, Cambridge, Cambridge University Press, 1987, pp. 173–197.

LERDAHL, Fred; JACKENDOFF, Ray: *Teoría generativa de la música tonal*, trans. Juan González Castelao, Madrid, Akal, 2003.

LE ROY LADURIE, Emmanuel: *Montaillou, village occitan de 1294 à 1324*, Paris, Gallimard, 1975.

LETERRIER, Sophie-Anne: "Musique populaire et musique savante au XIXe siècle. Du 'peuple' au 'public'", *Revue d'histoire du XIXe siècle*, 19, 1999, pp. 89–103.

LÉVI-STRAUSS, Claude: *La Pensée sauvage,* Paris, Plon, 1962.

--- *The Savage Mind*, London, Weidenfeld and Nicolson, 1966.

--- *Le Cru et le cuit (Mythologiques, t. I)*, Paris, Plon, 1964.

--- *The Raw and the Cooked: Mythologiques, vol. 1*, trans. by John and Doreen Weightman, Chicago, University of Chicago Press, 1969.

LEVIN, David Michael (ed.): *Modernity and the Hegemony of Vision*, Berkeley-Los Angeles-Oxford, University of California Press, 1993.

LEVIN, Thomas Y. : "For the record: Adorno on music in the age of its technological reproducibility", *October*, 55, Winter 1990, pp. 23–47.

LEVIN, Thomas Y.; VON DER LINN, Michael: "Elements of a Radio Theory: Adorno and the Princeton Radio Research Project", *The Musical Quarterly*, vol. 78, nº 2, 1994, pp. 316–324.

LEVINSON, Jerrold: *Music, Art, & Metaphysics: Essays in Philosophical Aesthetics*, Ithaca, NY, Cornell University Press, 1990.

--- *The Pleasures of Aesthetics: Philosophical Essays*, Ithaca, NY-London, Cornell University Press, 1996.

--- *Music in the Moment*, Ithaca, NY, Cornell University Press, 1997.

LEVINSON, Stephen C.; MAJID, Asifa: "Differential Ineffability and the Senses", *Mind & Language*, vol. 29, no. 4, September 2014, pp. 407–427.

LEVY, Robert I.: *Tahitians: Mind and Experience in the Society Islands*, Chicago, University of Chicago Press, 1973.

LÉVY-BRÜHL, Lucien: *Les fonctions mentales dans les sociétés inférieures*, Paris, Presses Universitaires de France, 1910.

--- *How Natives Think*, London, Allen and Unwin, 1926.

LEYS, Ruth: "How Did Fear Become a Scientific Object and What Kind of Object Is It?", *Representations*, 110, Spring 2010, pp. 66–104.

--- "The Turn to Affect: A Critique", *Critical Inquiry*, no. 37, Spring 2011, pp. 434–472.

LINDBERG, David C.; WESTMAN, Robert S. (eds): *Reappraisals of the Scientific Revolution*, Cambridge, Cambridge University Press, 1990.

LINDSAY, R. Bruce (ed.): *Acoustics: Historical and Philosophical Development*, Stroudsbourg, PA, Dowden, Hutchinson and Ross, 1973.

LIPPMAN, Edward A.: *A History of Western Musical Aesthetics*, Lincoln–London, University of Nebraska Press, 1992.

LISSA, Zofia: "On the Evolution of Musical Perception", translated by Eugenia Tanska, *The Journal of Aesthetics and Art Criticism*, vol. 24, no. 2 (Winter 1965), pp. 273–286.

--- "Zur Theorie der musikalischen Rezeption", *Archiv für Musikwissenschaft*, 31.Jahrg., H.3, 1974, pp. 157–169.

LIST, George: "The Boundaries of Speech and Song", *Ethnomusicology*, vol. 7, no. 1, January 1963, pp. 1–16.

--- "On the Non-Universality of Musical Perspectives", *Ethnomusicology*, vol. 15, no. 3, September 1971, pp. 399–402.

LITTLEFIELD, Richard: "The Silence of the Frames", in KRIMS, Adam (ed.): *Music/Ideology. Resisting the Aesthetic*, "Critical Voices in Art, Theory and Culture", Amsterdam, Gordon and Breach, 1998, pp. 213–231.

LOCK, Margaret: "Cultivating the Body: Anthropology and Epistemologies of Bodily Practice and Knowledge", *Annual Review of Anthropology*, vol. 22, 1993, pp. 133–155.

LOCKE, John: *An Essay Concerning Human Understanding*, edited with a foreword by Peter H. Nidditch, Oxford, Clarendon Press, 1975.

LÓPEZ CANO, Rubén: "Entre el giro lingüístico y el guiño hermenéutico: tópicos y competencia en la semiótica musical actual", 2001, accessible online: *www.redalyc.org/pdf/351/35102509.pdf* [October 2015].

--- De la retórica a la ciencia cognitiva. Un estudio de los *Tonos Humanos* de José Marín (ca. 1618–1699), Ph.D. thesis, University of Valladolid, 2004, pp. 328–405, accessible online: http://lopezcano.org/Articulos/DRCC/3.competencia.pdf [last access: November 2013].

--- "Elementos para el estudio semiótico de la cognición musical. Teorías cognitivas, esquemas, tipos cognitivos y procesos de categorización", n/d http://www.eumus.edu.uy/amus/lopezcano/articulo2.html [last access: October 2015]
LORD, Albert B.: *The Singer of Tales,* Cambridge, MA, Harvard University Press, 1960.

LORTAT–JACOB, Bernard: "L'oreille de l'ethnologue", *Cahiers de musiques traditionnelles*, vol. 8 "Terrains", pp. 159–172.

LOVE, Harold: "How Music Created a Public", *Criticism*, vol. 46, no. 2, Spring 2004, pp. 257–271.

LOWE, Donald M.: *History of Bourgeois Perception*, Chicago, University of Chicago Press, 1982.

LUCY, John A.: "The Linguistics of 'Color'", in HARDIN, C. L.; MAFFI, Luisa (eds): *Color Categories in Thought and Language*, Cambridge, Cambridge University Press, 1996, pp. 320–346.

--- "Linguistic Relativity", *Annual Review of Anthropology*, vol. 26, 1997, pp. 291–312.

LUTZ, Catherine A.: *Unnatural Emotions: Everyday Sentiments on a Micronesian Atoll and Their Challenge to Western Theory*, Chicago, University of Chicago Press, 1988.

LUTZ, Catherine A.; ABU-LUGHOD, Lila (eds): *Language and the Politics of Emotion*, Cambridge, Cambridge University Press, 1990.

LUTZ, Catherine A.; WHITE, Geoffrey M.: "The Anthropology of Emotions", *Annual Review of Anthropology*, vol. 15, 1986, pp. 405–436.

LYSLOFF, René T. A. and GAY Jr., Leslie C.: *Music and Technoculture*, Middletown, CT, Wesleyan University Press, 2003.

MALIN, Brenton J.: Feeling Mediated: A History of Media Technology and Emotion in America, New York-London, New York University Press, 2014.

McALLESTER, David P: "Some Thoughts on Universals on Music", Ethnomusicology, vol. 15, no. 3, September 1971, pp. 379–380.

McCLARY, Susan: *Feminine Endings. Music, Gender, and Sexuality*, with a new introduction, Minneapolis, University of Minnesota Press, 2002 (1st ed. 1991).
--- *Conventional Wisdom: The Content of Musical Form*, Berkeley, University of California Press, 2000.

--- "Terminal Prestige: The Case of Avant–Garde Music Composition", in SCHWARZ, David; KASSABIAN, Anahid; SIEGEL, Lawrence (eds): *Keeping score: Music, disciplinarity, culture*, Charlottesville, University Press of Virginia, 1997, pp. 54–74.

McADAMS, Stephen: "Music: A Science of the Mind?", *Contemporary Music Review*, vol. 2, part 1, issue editor: Stephen McAdams, London, Harwood Academic Publishers, 1987, pp. 1–62.

McADAMS, Stephen; BIGAND, Emmanuel (eds): *Thinking in Sound: Cognitive Perspectives on Human Audition*, Oxford, Clarendon Press, 1993.

McADAMS, Stephen; DELIÈGE, Irène (eds): *La Musique et les sciences cognitives*, Liège, Pierre Mardaga, 1989.

McCULLOCH, Warren; PITTS, Walter: "A Logical Calculus of the Ideas Immanent in Nervous Activity", *Bulletin of Mathematical Biophysics*, vol. 5, 1943, pp. 115–133.

McDEVITT, Teresa M.; SPIVEY, Norm; SHEEHAN, Eugene P.; LENNON, Randy and Story, Rita: "Children's Beliefs about Listening: Is It Enough to Be Still and Quiet?, *Child Development*, vol. 61, no. 3, June 1990, pp. 713–721.

McLUHAN, Marshall: *The Gutenberg Galaxy: The Making of Typographic Man*, Toronto, University of Toronto Press, 1962.

--- *Understanding Media: The Extensions of Man*, introduction by Lewis H. Lapham, Cambridge, MA, MIT Press, 1994 (originally published in London, Routledge and Kegan Paul, 1964).

--- *Media Research: Technology, Art, Communication*, edited with commentary by Michel A. Moos, Amsterdam, G+B Arts International, 1997.

McLUHAN, Marshall; FIORE, Quentin: *The Medium Is the Massage*, coordinated by Jerome Agel, New York, Bantam Books, 1967.

McLUHAN, Marshall; POWERS, Bruce R.: *The Global Village: Transformations in World Life and Media in the 21st Century*, New York-Oxford, Oxford University Press, 1989.

McMAHON, Ciarán: The Prehistory of the Concept of 'Attention', Ph.D. thesis, College of Human Sciences, School of Psychology, University College Dublin, December, 2007.

MADRID, Alejandro L.: "Why Music and Performance Studies? Why Now?: An Introduction to the Special Issue", *Revista Transcultural de Música. Transcultural Music Review*, 13, 2009, accessible online: http://www.sibetrans.com/trans/articulo/1/why-music-and-performance-studies-why-now-an-introduction-to-the-special-issue [last access: October 2015].

MAGAUDDA, Paolo: "L'appropriazione delle tecnologie per ascoltare la musica: successi, problemi e fallimenti nelle pratiche degli ascoltatori", *Revista Transcultural de Música. Transcultural Music Review*, 14, 2010, accessible online: http://www.sibetrans.com [last access: November 2015].

MAISONNEUVE, Sophie: "La constitution d'une culture et d'une écoute musicale nouvelles. Le disque et ses sociabilités comme agents de changement culturel dans les années 1920 et 1930 en Grande–Bretagne", *Revue de Musicologie*, 88–1, 2002, pp. 43–66.

--- "Per una socio-storia dell'ascolto. Situazione, metodi, prospettive", *Studi culturali*, anno 1, giugno 2004, pp. 191–214.

--- "De la machine parlante au disque. Une innovation technique, commerciale et culturelle", *Vingtième siècle. Revue d'histoire*, 32, October-December 2006, pp. 17–31.

--- "'La Voix de son Maître': entre corps et technique, l'avènement d'une écoute musical nouvelle au XXe ciècle", *Communications*, vol. 81, 2007, pp. 47–59.

MAJID, Asifa; LEVINSON, Stephen C.: "The Senses in Language and Culture", *Senses & Society*, vol. 6, no. 1, 2011, pp. 5–18.

MAJID, Asifa; BURENHULT, Niclas: "Odors Are Expressible in Language, As Long as You Speak the Right Language", *Cognition,* 130, 2014, pp. 266–270.

MALET, Antoni; COZZOLI, Daniel: "Mersenne and Mixed Mathematics", *Perspectives on Science*, vol. 18, no. 1, 2010, pp. 1–8.

MANDLER, George: "Origins of the Cognitive (R)evolution", *Journal of the History of the Behavioral Sciences*, vol. 38, no. 4, 2002, pp. 339–353.

MANDRESSI, Rafael: *Le Regard de l'anatomisme. Dissections et invention du corps en Occident*, Paris, Seuil, 2003.

MANDROU, Robert: *Introduction à la France moderne, 1500–1640: essai de psychologie historique*, Paris, Albin Michel, 1974.

MANIATES, Maria Rika: "'Sonate, que me veux-tu?': The Enigma of French Musical Aesthetics in the 18th Century", *Current Musicology*, vol. 9, January 1969, pp. 117–140.

MANUEL, Peter: *Cassette Culture: Popular Music and Technology in North India*, Chicago–London, University of Chicago Press, 1993.

MARTÍ, Josep: *Más allá del arte. La música como generadora de realidades sociales*, Sant Cugat del Vallès, Deriva Editorial, 2000.

--- "When Music Becomes Noise. Sound and Music Which People in Barcelona Hear but Don't Want to Listen to", *The World of Music*, vol. XXXIX, no. 2, 1997, pp. 9–17.

MARTIN, Laura: "Eskimo Words for 'Snow': A Case Study in the Genesis and Decay of an Anthropological Example", *American Anthropologist*, New Series, vol. 88, no. 2, June 1986, pp. 418–423.

MARTIN, Peter J.: *Sounds and Society: Themes in the Sociology of Music*, Manchester, Manchester University Press, 1995.

MARTIN, Robert L.: "Musical Works in the Worlds of Performers and Listeners", in KRAUSZ, Michael (ed.): *The Interpretation of Music: Philosophical Essays*, Oxford, Clarendon Press, 1993.

MARX, A.B.: *Musical Form in the Age of Beethoven: Selected Writings on Theory and Method*, edited and translated by Scott Burnham, Cambridge, Cambridge University Press, 1997.

MARX, Karl: *Economic and Philosophic Manuscripts of 1844*, edited with an introduction by Dirk J. Struik, translated by Martin Milligan, New York, International Publishers, 1964.

MASSUMI, Brian: *Parables for the Virtual: Movement, Affect, Sensation*, Durham, NC, Duke University Press, 2002.

MASTROPASQUA, Mauro: *Logica musicale. Storia di un' idea*, Bologna, Bononia University Press, 2011.

MATTHESON, Johannes: *Der Vollkommene Capellmeister*, a revised translation with critical commentary by Ernest C. Harris, Ann Arbor, MI, UMI Research Press, 2005 (2 vols).

MATURANA, Humberto; VARELA, Francisco: *El árbol del conocimiento. Las bases biológicas del conocimiento humano*, Madrid, Debate, 1999 (3ª ed.)

MAUSS, Marcel: "Les Techniques du corps (1934)", electronic edition in the series "Les classiques des sciences sociales", http://classiques.uqac.ca, Montréal, Université du Quebec, 2003, originally published in *Journal de Psychologie*, XXXII, no. 3–4, March-April 1936, from a paper presented to the Société de Psychologie on 17th May 1934 [last access: October 2015].

--- “Body Techniques”, in *Sociology and Psychology: Essays*, translated by Ben Brewster, London, Routledge and Kegan Paul, 1979, pp. 95–123.

MAYR, Ernst: *Animal Species and Evolution*, Cambridge, MA, Harvard University Press, 1963.

MAZUREL, Hervé: “De la psychologie des profondeurs à l’histoire des sensibilités. Une généalogie intellectuelle”, *Vingtième Siècle. Revue d'histoire*, 2014/3, no. 123, p. 22–38.

MEAD, Andrew: “Bodily Hearing: Physiological Metaphors and Musical Understanding”, *Journal of Music Theory*, vol. 43, no. 1, Spring 1999, pp. 1–19.

MEAD, Margaret: *Coming of Age in Samoa: A Psychological Study of Primitive Youth for Western Civilisation*, New York, William Morrow & Co., 1928.

--- *Growing Up in New Guinea: A Comparative Study of Primitive Education*, New York, Blue Ribbon, 1930.

--- *Sex and Temperament in Three Primitive Societies*, New York, William Morrow & Co., 1935.

--- Review of Paul Ekman (ed.), *Darwin and Facial Expression: A Century of Research in Review* (New York, Academic Press, 1973), *Journal of Communication*, vol. 25, no. 1, 1975, pp. 209–213.

MEAD, Margaret; MÉTRAUX, Rhoda (eds): *The Study of Culture at a Distance*, edited by William O. Beeman, New York-London, Berghahn Books, 2000. (Published originally in 1953).

MEI, Girolamo: *Letters on Ancient and Modern Music: To Vincenzo Galilei and Giovanni Bardi*, a study with annotated texts by Claude V. Palisca, Dallas, American Institute of Musicology, 1977.

MELTON, James Van Horn: *The Rise of the Public in Enlightenment Europe*, Cambridge, Cambridge University Press, 2001.

MENEZES BASTOS, Rafael José de: “Apùap World Hearing: On the Kamayurá Phono–Auditory System and the Anthropological Concept of Culture”, *The World of Music*, special issue on “Hearing and Listening in Cultural Contexts”, edited by Max Peter Baumann and Linda Fujie, vol. 41, no. 1, 1999, pp. 85–96.

MERLEAU-PONTY, Maurice: *Phenomenology of Perception*, translated from the French by Colin Smith, London, Routledge and Kegan Paul, 1962.

--- *Phenomenology of Perception*, translated by Donald A. Landes, with a foreword by Taylor Carman and an introduction to Merleau–Ponty by Claude Lefort, Abingdon, UK–New York, Routledge, 2013.

MERRIAM, Alan P.: *The Anthropology of Music*, Evanston, IL, Northwestern University Press, 1964.

MERSENNE, Marin: *Harmonie universelle contenant la théorie et la pratique de la musique*, Paris, Sebastien Cramoisy, 1636, facsimile edition of the copy annotated by the author, edited by F. Lesure, Paris, Éditions du CNRS, 1965, 3 vols.
METZ, Christian: *Le Signifiant imaginaire. Psychanalyse et cinéma*, Paris, Christian Bourgois, 1984 (1st ed. Paris, Union Générale d'Éditions, 1977).

--- *Psychoanalysis and Cinema: the Imaginary Signifier*, trans. by Celia Britton, Basingstoke, UK, Macmillan, 1982.

MEYER, Leonard B.: *Emotion and Meaning in Music*, Chicago-London, University of Chicago Press, 1956.

--- *Style and Music: Theory, History, and Ideology*, Chicago-London, University of Chicago Press, 1989.

MEYROWITZ, Joshua: *No Sense of Place: The Impact of Electronic Media on Social Behavior*, New York/Oxford, Oxford University Press, 1985.

MIALET, Jean-Paul: *L'attention*, Col. "Que sais–je?", 3488, Paris, PUF, 1999.

MICHELL, Joel: *Measurement in Psychology: A Critical History of a Methodological Concept*, Cambridge, Cambridge University Press, 1999.

MIDDLETON, Richard: *Studying Popular Music*, Milton Keynes, Open University Press, 1990.

--- "'Over and Over'. Notes Towards a Politics of Repetition. Surveying the Ground, Charting Some Routes", *PopScriptum*, paper presented at the conference "Grounding Music", May 1996, accessible online: http://www2.hu–berlin.de/fpm/textpool/texts/middleton_notes–towards–a–politics–of–repetition.htm [last access: October 2015].

MIELL, Dorothy; MACDONALD, Raymond; HARGREAVES, David J.: *Musical Communication*, with a foreword by Evelyn Glennie, Oxford, Oxford University Press, 2005.

MINDELL, David A.: *Between Human and Machine: Computing Before Cybernetics*, Baltimore, MD, Johns Hopkins University Press, 2002.

MINSKY, Marvin: "A Framework for Representing Knowledge", in WINSTON, Patrick Henry (ed.): *The Psychology of Computer Vision*, New York, McGraw–Hill Book Company, 1975.

MODY, Cyrus C.M.: "The Sound of Science: Listening to Laboratory Practice", *Science, Technology and Human Values*, vol. 39, no. 2, Spring 2005, pp. 175–198.

MOLINO, Jean: “La musique et le geste: Prolegomènes à une anthropologie de la musique”, *Analyse Musicale*, no. 10, 1988, pp. 8–15.
MOLNAR-SZAKACS, Istvan; OVERY, Katie: “Music and Mirror Neurons: From Motion to ‘E’motion”, *Social Cognitive and Affective Neuroscience*, vol. 1, n. 3, 2007, pp. 235–241.

MONSON, Ingrid: “Hearing, Seeing, and Perceptual Agency”, *Critical Inquiry*, 34, suppl., Winter 2008, pp. S36–S58.

--- “On the Sensory Turn in Musical Scholarship”, lecture delivered at the 2011–2012 Mahindra Humanities Center Seminar on "Music, Sensory Ecologies and the Body", Harvard University, September 12, 2011.

MOORE, Allan F.: *Rock, the Primary Text: Developing a Musicology of Rock*, Aldershot, Ashgate, 2001 (1st ed. 1993).

--- *Analyzing Popular Music*, Cambridge, Cambridge University Press, 2003.

MOORE, Brian C.J: *An Introduction to the Psychology of Hearing*, Bingley, Emerald Group, 2012 (6th ed.).

MOORE, David R. (chief ed.): *Oxford Handbook of Auditory Science*, 3 vols (vol. 1: The Ear, vol. 2: The Auditory Brain, vol. 3: Hearing), Oxford, Oxford University Press, 2010.

MORAT, Daniel (ed.): *Sounds of Modern History: Auditory Cultures in 19th- and 20th-century Europe*, New York, Berghahn Books, 2014.

MORAVIA, Sergio: “From Homme Machine to Homme Sensible: Changing Eighteenth-Century Models of Man’s Image”, *Journal of the History of Ideas*, vol. 39, no. 1, January-March 1978, pp. 45–60.

MORENO, Jairo: *Musical Representations, Subjects and Objects: The Construction of Musical Thought in Zarlino, Descartes, Rameau, and Weber*, Bloomington, Indiana University Press, 2004.

MORGAN, David: *Visual Piety: A History and Theory of Popular Religious Images*, Berkeley, University of California Press, 1998.

MORROW, Mary Sue: *Concert Life in Haydn's Vienna: Aspects of a Developing Musical and Social Institution*, Hillsdale, NY, Pendragon Press, 1989.

--- *German Music Criticism in the Late Eighteenth Century: Aesthetic Issues in Instrumental Music*, Cambrideg, Cambridge University Press, 1997.

MOSCOSO SANABRIA, Javier; ZARAGOZA BERNAL, Juan Manuel: “Historia del bienestar. Desde la historia de las emociones a las políticas de la experiencia”, *Cuadernos de Historia Contemporánea*, vol. 36, 2014, pp. 73–88.

MUDRY, Albert; DODELÉ, Léon: "History of the Technological Development of Air Conduction Hearing Aids", *The Journal of Laryngology & Otology*, vol. 114, June 2000, pp. 418–423.

MUDRY, Albert; KRAFT, Marcel: "How Adam Politzer (1835–1920) Became an Otologist", accessible on the website of the Politzer Society, http://www.politzersociety.org/content.php?conid=686 [last access: October 2015].

MÜLBERGER, Annette: "Spanish Experience with German Psychology Prior to World War I", *Journal of the History of the Behavioral Sciences,* vol. 44, no. 2, Spring 2008, pp. 161–179.

MÜLLER, Bertrand: *Lucien Febvre, lecteur et critique*, Paris, Albin Michel, 2003.

MÜLLER, Johannes: *Elements of Physiology*, translated by Wm. Baly, and arranged from the second London edition by John Bell, Philadelphia, Lea & Blanchard, 1843, p. 588, accessible online: http://archive.org/details/elementsphysiol00mlgoog [last access: October 2015].

MUNAR, Enric; ROSSELLÓ, Jaume; MAS, Carmen; MORENTE, Pilar; QUETGLES, Miquel: "El desarrollo de la audición humana", *Psicothema*, vol. 14, no 2, 2002, pp. 247–254.

The Musical Quarterly, vol. 82, nº 3–4, special issue "Music as Heard", Autumn-Winter 1998.

Music Perception: An Interdisciplinary Journal, "The Angel of Death Project", edited by Daniel J. Levitin and Lola L. Cuddy, vol. 22, no. 2, 2004.

MYERS, David G.: *Exploring Psychology*, New York, Worth Publishers, 2009 (8th ed.).

MYERS, Fred: "Emotions and the Self: A Theory of Personhood and Political Order among the Pintupi Aborigines", *Ethos*, vol. 7, no. 4, Winter 1979, pp. 343–370.

MYERS, Helen (ed.): *Ethnomusicology, vol. 1: An Introduction*, London-Basingstoke, Macmillan, 1992.

NÄÄTÄNEN, Risto: *Attention and Brain Function*, Hillsdale, NJ, Lawrence Erlbaum Associates, 1992.

NAGY, Piroska: "Les émotions et l'historien. De nouveaux paradigmes", *Critique*, janvier-février 2007, tome LXIII, nº 716–717, pp. 10–22.

NAHOUM-GRAPPE, Véronique: "Le transport: une émotion surannée", *Terrain*, no. 22 ("Les émotions", edited by Gérard Ermisse), March 1994, pp. 69–78, accessible online: http://terrain.revues.org/3089 [last access: April 2015].

NANCY, Sarah: "Émotions lyriques, émotions publiques?", *Littératures classiques*, no. 68, 2009/1, pp. 211–224.

NARMOUR, Eugene: *The Analysis and Cognition of Basic Melodic Structures: The Implication–Realization Model*, Chicago, University of Chicago Press, 1990.

NATTIEZ, Jean-Jacques: *Fondaments d'une sémiologie de la musique*, Paris, Union Générale d'Éditions, 1976.

--- *De la sémiologie à la musique*, Montréal, Université du Québec–Service des publications, 1988.

--- *Music and Discourse: Towards a Semiology of Music*, trans. Carolyn Abbate, Princeton, Princeton University Press, 1990.

--- "Is the Search for Universals Incompatible with the Study of Cultural Specificity?," John Blacking Memorial Lecture, European Seminar in Ethnomusicology, Venice, 2 October 2004.

NATTIEZ, Jean-Jacques (ed.): *Musiques. Une encyclopédie pour le XXIe siècle, vol. 1: Musiques du XXe siècle*, with the collaboration of Margaret Bent, Rossana Dalmonte and Mario Baroni, Arles, Actes–Sud/Cité de la Musique, 2003.

--- *Musiques. Une encyclopédie pour le XXIe siècle, vol. 2: Les savoir musicaux*, Arles, Actes Sud/Cité de la Musique, 2004.

---*Musiques. Une encyclopédie pour le XXIe siècle, vol. 3: Musiques et cultures*, Arles, Actes Sud/Cité de la Musique, 2005.

NEGUS, Keith: "Globalization and the Music of the Public Spheres", in BRAMAN, Sandra (ed.): *Globalization, Communication and Transnational Civil Society*, Cresskill, NJ, Hampton Press, 1996, pp. 179–195.

--- *Popular Music in Theory: An Introduction*, Cambridge, Polity Press, 1996.

NEISSER, Ulrich: *Cognition and Reality: Principles and Implications of Cognitive Psychology*, San Francisco, W. H Freeman, 1976.

NETTL, Bruno: *The Study fo Ethnomusicology: Twenty–Nine Issues and Concepts*, Urbana–Chicago, University of Illinois Press, 1983.

--- *The Western Impact on World Music: Change, Adaptation and Survival*, New York, Schirmer Books, 1985.

--- "World Music in the Twentieth Century: A Survey of Research on Western Influence", *Acta Musicologica*, vol. 58, fasc. 2, 1986, pp. 360–373.

--- "An Ethnomusicologist Contemplates Universals in Musical Sound and Musical Culture", in WALLIN, Nils L.; MERKER, Björn; BROWN, Steven (eds): *The Origins of Music*, Cambridge, MA, MIT Press, 2000, pp. 463–472.

NETTL, Bruno; BOHLMAN, Philip V. (eds): *Comparative Musicology and Anthropology of Music. Essays on the History of Ethnomusicology*, Chicago, University of Chicago Press, 1991.

NEUBAUER, John: *The Emancipation of Music from Language: Departure from Mimesis in Eighteenth-Century Aesthetics*, New Haven, CT-London, Yale University Press, 1986.

NEUHOFF, John G. (ed.): *Ecological Psychoacoustics*, San Diego-London, Elsevier Academic Press, 2004.

NEUMANN, O.: "Aufmerksamkeit", in RITTER, J.; GRÜNDER, K. (eds): *Historisches Wörterbuch der Philosophie*, Darmstadt Wissenschaftliche Buchgesellschaft, 1971, vol. 1, col. 635–645.

NG, Matthew; JACKLER, Robert K.: "Early History of Tuning-Fork Tests", *The American Journal of Otology*, vol. 14, no. 1, January 1993, pp. 100–105.

NICHOLS, Stephen G.; KABLITZ, Andreas; CALHOUN, Alison (eds): *Rethinking the Medieval Senses*, Baltimore, MD, Johns Hopkins University Press, 2009.

NICOLAS, Serge: *Histoire de la psychologie française. Naissance d'une nouvelle science*, préface de Maurice Reuchlin, Paris, In Press, 2002.

NICOLAS, Serge; GYSELINCK, Valérie; MURRAY, David J.; and BANDOMIR, Christina A.: "French Descriptions of Wundt's Laboratory in Leipzig in 1886", *Psychological Research*, vol. 66, 2002, pp. 208–214.

NIETZSCHE, Friedrich: *Beyond Good and Evil*, edited by Rolf-Peter Horstmann and Judith Norman, Cambridge, Cambridge University Press, 2002.

NOË, Alva: *Action in Perception*, Cambridge, MA, MIT Press, 2004.

NORTH, Adrian C.; HARGREAVES, David J.: "Musical Preferences During and After Relaxation and Exercise", *The American Journal of Psychology*; vol. 113, nº 1, primavera 2000, pp. 43–66.

NOVAK, David: "2.5x6 Metres of Space: Japanese Music Coffeehouses and Experimental Practices of Listening", *Popular Music*, vol. 27/1, 2008, pp. 15–34.

NOVAK, David; SAKAKEENY, Matt (eds): *Keywords in Sound*, Durham, NC-London, Duke University Press, 2015.

NOVEMBER, Joseph: *Biomedical Computing: Digitizing Life in the United States*, Baltimore, MD, Johns Hopkins University Press, 2012.

NUGIER, Armelle: "Histoire et grands courants de recherche sur les émotions", *Revue électronique de Psychologie Sociale*, no. 4, 2009, accessible online: http://www.psychologiesociale.eu/files/RePS4.Nugier.pdf [last access: February 2015].

NÚÑEZ, Rafael; FREEMAN, Walter J. (eds): *Reclaiming Cognition: The Primacy of Action, Intention and Emotion*, Thoverton, Imprint Academic, 1999.

OBELKEVICH, James: "In Search of the Listener", *Royal Musical Association Journal*, 114:1, 1989, pp. 102–108.

O'HARA, Kenton; BROWN, Barry (eds): *Consuming Music Together: Social and Collaborative Aspects of Music*, Dordrecht, Springer, 2006.

OLBY, R.C.; CANTOR, G.N.; CHRISTIE, J.R.R.; HODGE, M.J.S. (eds): *Companion to the History of Modern Science*, London, Routledge, 1990.

OLSON, David R.: *The World on Paper: The Conceptual and Cognitive Implications of Writing and Reading*, Cambridge, Cambridge University Press, 1994.

O'NEAL, John C.: *The Authority of Experience: Sensationist Theory in the French Enlightenment*, University Park, Pennsylvania State University Press, 1996.

ONG, Walter J.: *The Presence of the Word: Some Prolegomena for Cultural and Religious History*, New Haven, CT-London, Yale University Press, 1967.

--- "World as View and World as Event", *American Anthropologist*, New Series, vol. 71, n. 4, 1969, pp. 634–647.

--- *Orality and Literacy: The Technologizing of the Word*, London and New York, Methuen, 1982.

ORTNER, Sherry B.: "Theory in Anthropology since the Sixties", *Comparative Studies in Society and History*, vol. 26, no. 1, January 1984, pp. 126–166.

ORY, Pascal: "L'histoire culturelle de la France contemporaine: question et questionnement", *Vingtième Siècle. Revue d'histoire*, no. 16, October–December 1987, pp. 67–82, at pp. 69–70.

OTERO URTAZA, Eugenio (ed.): *Las Misiones pedagógicas 1931–1936*, con la ayuda de María García Alonso, Madrid, SECC–Residencia de Estudiantes, 2006.

Oxford Dictionaries Online, http://oxforddictionaries.com

PADDISON, Max: *Adorno's Aesthetics of Music*, Cambridge, Cambridge University Press, 1993.

PALISCA, Claude V.: "Scientific Empiricism in Musical Thought", in RHYS, Hedley Howell (ed.): *Seventeenth Century Science and the Arts*, Princeton, NJ, Princeton University Press, 1960, pp. 91–137.

--- *Humanism in Italian Renaissance Thought*, New Haven, CT-London, Yale University Press, 1985.

--- *Studies in the History of Italian Music and Music Theory*, Oxford-New York, Oxford University Press, 1994.

--- *Music and Ideas in the Sixteenth and Seventeenth Centuries*, edited and with a foreword by Thomas J. Mathiesen, Urbana-Chicago, University of Illinois Press, 2006.

PALISCA, Claude V. (ed.): *The Florentine Camerata: Documentary Studies and Translations*, New Haven, CT-London, Yale University Press, 1989.

PANTALONY, David: *Altered Sensations: Rudolph Koenig's Acoustical Workshop in Nineteenth-Century Paris*, New York, Springer, 2009.

PAPENBURG, Jens Gerrit; SCHULZE, Holger (eds): *Sound as Popular Culture: A Research Companion*, Cambridge, MA, MIT Press, 2016 (forthcoming).

PAPPAS, Dennis G.: "Otology through the Ages", *Otolaryngology – Head and Neck Surgery*, no. 114 (2), 1996, pp. 173–196.

PARASURAMAN, Raja; DAVIES, D.R. (ed.): *Varieties of attention*, Orlando, Academic Press, 1984.

PARASURAMAN, Raja (ed.): *The Attentive Brain*, Cambridge, MA, MIT Press, 1998.

PAREZO, Nancy J.; FOWLER, Don D.: *Anthropology Goes to the Fair: The 1904 Louisiana Purchase Exposition*, Lincoln and London, University of Nebraska Press, 2007.

PARK, Katharine: "The Organic Soul", in SCHMITT, Charles B., SKINNER, Quentin; KESSLER, Eckhard Kessler; and KRAYE, Jill (eds.): *The Cambridge History of Renaissance Philosophy*, Cambridge, Cambridge University Press, 1988, pp. 464–484.

PARK, Katharine; DASTON, Lorraine (eds): *The Cambridge History of Science, vol. 3: Early Modern Science*, Cambridge, Cambridge University Press, 2006.

PARRY, Milman: *The Making of Homeric Verse: The Collected Papers of Milman Parry*, edited by Adam Parry, Oxford, Clarendon Press, 1971.

PASLER, Jann: "Concert Programs and their Narratives as Emblems of Ideology", *International Journal of Musicology*, 1993, 2, pp. 249–308.

PASHLER, Harold E.: *The Psychology of Attention*, Cambridge, MA, MIT Press, 1998.

PATEL, Aniruddh D.: *Music, Language, and the Brain*, Oxford-New York, Oxford University Press, 2008.

PAVLOV, Ivan Petrovich: *Conditioned Reflexes: an investigation of the physiological activity of the cerebral cortex*, translated and edited by G.V. Anrep, New York, Dover, 1960 (1st ed. 1926).

PELINSKI, Ramón: “Embodiment and musical experience”, *Revista Transcultural de Música. Transcultural Music Review*, 9, 2005, http://www.sibetrans.com/trans/articulo/178/embodiment-and-musical-experience htm [last access: November 2015].

--- “El oído alerta: modos de escuchar el entorno sonoro”, paper presented at the I Encuentro Iberoamericano sobre Paisajes Sonoros as part of the programme of the Festival América España, organized by Orquesta y Coro Nacionales de España (OCNE), Auditorio Nacional de Música, Madrid, 12th–15th June 2007, http://cvc.cervantes.es/artes/paisajes_sonoros/p_sonoros01/pelinski/pelinski_01.htm [last access: November 2015].

PEMBERTON, John: “Musical Politics in Central Java (or How Not to Listen to a Javanese Gamelan), *Indonesia*, vol. 44, October 1987, pp. 16–29.

PEÑALBA, Alicia: “El cuerpo en la música a través de la teoría de la Metáfora de Johnson: análisis crítico y aplicación a la música”, *Revista Transcultural de Música. Transcultural Music Review*, 9, 2005, disponible a: http://www.sibetrans.com/trans/articulo/176/el-cuerpo-en-la-musica-a-traves-de-la-teoria-de-la-metafora-de-johnson-analisis-critico-y-aplicacion-a-la-musica [last access: November 2015].

Perception, special issue on “Advances in Multisensory Perception”, edited by Fiona Newell and Ladan Shams, vol. 36, 2007.

PEREC, Georges: “Lire: esquisse sociophysiologique”, *Esprit*, January 1976, pp. 9–20.

PERELMAN, Chaïm: *L’Empire rhétorique. Rhétorique et argumentation*, Paris, Librairie Philosophique J. Vrin, 1997.

PERETZ, Isabelle; ZATORRE, Robert (eds): *The Cognitive Neuroscience of Music*, Oxford, Oxford University Press, 2003.

PERRAULT, Claude: *Du Bruit et de la musique des anciens*, *extrait des Oeuvres diverses de physique et de mécanique (tome 2) et préface manuscrite du Traité de la musique*, préface de François Lesure, Geneve, Minkoff, 2003.

PESIC, Peter: “Euler’s Musical Mathematics”, *The Mathematical Intelligencer*, vol. 35, issue 2, June 2013, pp. 35–43.

--- *Music and the Making of Modern Science*, Cambridge, MA, MIT Press, 2014.

PESTALOZZI, Johann Heinrich: *Kleine Schriften zur Volkserziehung und Menschenbildung*, Bad Heilbrunn, Germany, Verlag Julius Klinkhardt, 1998, 7th ed.

PETERS, John Durham: *Speaking Into the Air: A History of the Idea of Communication*, Chicago, University of Chicago Press, 1999.

--- “Helmholtz, Edison, and Sound History”, in RABINOVITZ, Lauren; GEIL, Abraham (eds): *Memory Bytes. History, Technology, and Digital Culture*, Durham, NC-London, Duke University Press, 2004, pp. 177–198.

PIAGET, Jean: *The Origins of Intelligence in Children*, translated by Margaret Cook, New York, International Universities Press, 1952. (Originally published in French as *La Naissance de l’intelligence chez l’enfant*, Neuchâtel, Delachaux & Niestlé, 1936).

--- *Les Mécanismes perceptifs*, Paris, PUF, 1961.

PICKER, John M.: *Victorian Soundscapes*, New York, Oxford University Press, 2003.

PICKERING, Andrew: *The Mangle of Practice: Time, Agency, and Science*, Chicago-London, University of Chicago Press, 1995.

PICKSTONE, John V.: *Ways of Knowing: A New History of Science, Technology and Medicine*, Chicago, University of Chicago Press, 2001.

PIKE, Kenneth L.: *Language in Relation to a Unified Theory of the Structure of Human Behavior*, The Hague, Mouton, 1967.

PINCH, Trevor; BIJSTERVELD, Karin: “Sound Studies: New Technologies and Music”, *Social Studies of Science*, vol. 34, no. 5, 2004, pp. 635–648.

PINCH, Trevor; BIJSTERVELD, Karin (eds): *The Oxford Handbook of Sound Studies*, Oxford, Oxford University Press, 2012.

PINK, Sarah: *Doing Sensory Ethnography*, Los Angeles-London-New Delhi-Singapore-Washington DC, SAGE, 2009.

PINK, Sarah; HOWES, David: “Debate Section: The Future of Sensory Anthropology/The Anthropology of the Senses”, *Social Anthropology/Anthropologie Sociale*, vol. 18, no. 3, 2010, pp. 331–340.

PITTS, Stephanie E.: “What Makes and Audience? Investigating the Roles and Experiences of Listeners at a Chamber Music Festival”, *Music & Letters*, vol. 86, no. 2, May 2005, pp. 257–269.

PLAMPER, Jan: “Emotional Turn? Feeling in Russian History and Culture. Introduction”, *Slavic Review*, vol. 68, no. 2, 2009, pp. 229–237, at p. 230, accessible online: http://research.gold.ac.uk/10131/ [last access: March 2015].

--- “Historia de las emociones: caminos y retos”, *Cuadernos de Historia Contemporánea*, vol. 36, 2014, pp. 17–29, accessible online: http://revistas.ucm.es/index.php/CHCO/article/view/46680 [last access: April 2015].

--- *The History of Emotions*, translated by Keith Tribe, Oxford, Oxford University Press, 2015.

PLOMP, Reinier: “Pitch of Complex Tones”, *Journal of the Acoustical Society of America*, vol. 41, no. 6, 1967, pp. 1526–1533.

--- *The Intelligent Ear: On the Nature of Sound Perception*, Mahwah, NJ, Lawrence Erlbaum, 2002.

POLITZER, Adam: *History of Otology*, translated by Stanley Milstein, Collice Portnoff and Antje Coleman, Phoenix, AZ, Columella Press, 1981.

POMIAN, Krzystof: *Collectionneurs, amateurs et curieux. Paris, Venise, XVIe – XVIIIe siècles*, Paris, Gallimard, 1987.

--- “Vision and Cognition”, in JONES, Caroline A.; GALISON, Peter (ed.): *Picturing Science, Producing Art*, New York, Routledge, 1998, pp. 211–231.

PORCELLO, Thomas; MEINTJES, Louise; OCHOA, Ana Maria; and SAMUELS, David W.: “The Reorganization of the Sensory World”, *Annual Review of Anthropology*, vol. 39, 2010, pp. 51–66.

PORTER, James I.: “Is Art Modern? Kristeller’s ‘Modern System of the Arts’ Reconsidered”, *British Journal of Asthetics*, vol. 49, no. 1, 2009, pp. 1–24.

PORTER, Roy: *Flesh in the Age of Reason: The Modern Foundations of Body and Soul*, with a foreword by Simon Schama, New York–London, W.W. Norton & Company, 2003.

PORTER, Roy (ed.): *The Cambridge History of Science, vol. 4: Eighteenth-Century Science*, Cambridge, Cambridge University Press, 2003.

POSNER, Michael I.: *The Cognitive Neuroscience of Attention*, New York/London, Guilford Press, 2004.

POSNER, Michael I.; PETERSEN, Steven E.: “The Attention System of the Human Brain”, *Annual Review of Neuroscience*, vol. 13, 1990, pp. 25–42.

POSNER, Michael I.; DIGIROLAMO, Gregory J.: “Attention in Cognitive Neuroscience: An Overview”, in GAZZANIGA, Michael (ed.): *The New Cognitive Neurosciences*, Cambridge, MA, MIT Press, 2000, pp. 622–631.

POZZI, Raffaele (ed.): *Tendenze e metodi nella ricerca musicologica. Atti del convegno internazionale (Latine, 27–29 settembre 1990)*, Firenze, Leo S. Olschki Editore, 1995.

PRENDERGAST, Mark J.: *The Ambient Century. From Mahler to Trance. The Evolution of Sound in the Electronic Age*, London, Bloomsbury, 2003.

PRINS, Harald E.L.; BISHOP, John: “Edmund Carpenter: Explorations in Media & Anthropology”, *Visual Anthropology Review*, vol. 17, no. 2, 2001–2002, pp. 110–140.

PRITCHARD, Matthew: “Who Killed the Concert? Heinrich Besseler and the Inter-War Politics of *Gebrauchsmusik*”, *twentieth–century music*, 8/1, 2012, pp. 29–48.

PSYCHOYOU, Théodora: “Du *psophos* au bruit: sur les origines et les transformations de l’objet au XVIIe siècle”, *Musurgia*, vol. XIII, no. 4, 2006, pp. 17–31.

QUINTILIAN: *The Orator’s Education*, 5 vols, edited and translated by Donald Russell, Cambridge, MA, Harvard University Press, 2001.

QURESHI, Regula Burckhardt: *Sufi Music of India and Pakistan. Sound, context and meaning in Qawwali*, Cambridge, Cambridge University Press, 1995 (1st edition: 1986).

--- “Musical sound and Contextual Input: A Performance Model for Musical Analysis” *Ethnomusicology*, vol. 31, no. 1,Winter, 1987, pp. 56–86.

RABINOWITZ, Peter J.: “Circumstantial Evidence: Musical Analysis and Theories of Reading”, *Mosaic*, 18: 4 (Fall 1985), pp. 159–173.

RABINOWITZ, Peter J.; REISE, Jay: “The Phonography behind the Door”, in LAWALL, Sarah (ed.): *Reading World Literature. Theory, History, Practice*, Austin, University of Texas Press, 1994, pp. 287–308.

RACY, A. J.: *Making Music in the Arab World. The Culture and Artistry of Tarab*, Cambridge, Cambridge University Press, 2003.

RADIN, Paul: *Primitive Man as Philosopher*, New York, Dover, 1927/1957.

RAGUENET, François: *Paralèle des italiens et des français, en ce qui regarde la musique et les opéras*, Paris, 1702, reprint. Geneva, Minkoff, 1976.

RAICHLE, Marcus E.: “Behind the Scenes of Functional Brain Imaging: A Historical and Physiological Perspective”, *Proceedings of the National Academy Sciences*, vol. 95, February 1998, pp. 765–772.

RAMEAU, Jean-Philippe: *Complete Theoretical Writings, 6 vols*, edited by Erwin R. Jacobi, [n.p.], American Institute of Musicology, 1967–1972.

--- *Treatise on Harmony*, translated with an introduction and notes by Philip Gossett, New York, Dover, 1971.

RATH, Richard Cullen: *How Early America Sounded*, Ithaca, NY, Cornell University Press, 2003.

--- “Hearing American History”, *The Journal of American History*, vol. 95, no. 2, September 2008, pp. 417–431.

RATLIFF, Floyd: “Georg von Békésy 1899–1972. A Biographical Memoir”, in *Biographical Memoirs vol. 48*, Washington D.C., National Academy of Sciences, 1976, pp. 24–49.

REDDY, William M.: “Against Constructionism: The Historical Ethnography of Emotions”, *Current Anthropology*, vol. 38, no. 3, June 1997, pp. 327–351.

--- *The Navigation of Feeling: A Framework for the History of Emotions*, Cambridge, Cambridge University Press, 2001.

--- "Historical Research on the Self and Emotions", *Emotion Review*, vol. 1, no. 4, October 2009, pp. 302–315.

--- "Emotional Styles and Modern Forms of Life", in KARAFYLLIS, Nicole; ULSHÖFER, Gotlind (eds): *Sexualized Brains*, Cambridge, MA, MIT Press, 2008, pp. 81–100.

RÉE, Jonathan: *I See A Voice: A Philosophical History of Language, Deafness and the Senses*, Hammersmith, Harper Collins, 1999.

REED, Edward: *From Soul to Mind: The Emergence of Psychology, from Erasmus Darwin to William James*, New Haven, CT-London, Yale University Press, 1997.

REHDING, Alexander: *Hugo Riemann and the Birth of Modern Musical Thought*, Cambridge, Cambridge University Press, 2003.

REICH, Leonard S.: *The Making of American Industrial Research: Science and Business at GE and Bell, 1876–1926*, Cambridge–New York–Melbourne, Cambridge University Press, 1985.

REID, Thomas: *Essays on the Intellectual Powers of Man (1785)*, critical edition by Derek R. Brookes, annotations by Derek R. Brookes and Knud Haakonssen, Edinburgh, Edinburgh University Press, 2002.

REIK, Theodor: *Listening with the Third Ear: The Inner Experience of a Psychoanalyst*, New York, Farrar, Strauss & Co., 1949.

REY, Roselyne: *Naissance et développement du vitalisme en France de la deuxième moitié du XVIIIe siècle à la fin du Premier Empire*, Oxford, Voltaire Foundation, 2000.

REYBROUCK, Mark: "Biological Roots of Musical Epistemology: Functional Cycles, Umwelt, and Enactive Listening", *Semiotica*, col. 134, 1/4, special issue edited by Kalevi Kull, 2001, pp. 599–633.

--- "Body, Mind and Music: Musical Semantics Between Experiential Cognition and Cognitive Economy", *Revista Transcultural de Música. Transcultural Music Review*, 9, 2005, disponible a: http://www.sibetrans.com/trans/articulo/180/body-mind-and-music-musical-semantics-between-experiential-cognition-and-cognitive-economy [last access: October 2015].

--- "A Biosemiotic and Ecological Approach to Music Cognition: Event Perception between Auditory Listening and Cognitive Economy", *Axiomathes. An International Journal in Ontology and Cognitive Systems*, vol. 15, nº 2, 2005, pp. 229–266.

RHEINBERGER, Hans-Jörg: *Toward a History of Epistemic Things*, Stanford, CA, Stanford University Press, 1997.

RICE, Tom: “Learning to Listening: Auscultation and the Transmission of Auditory Knowledge”, *Journal of the Royal Anthropological Institute*, Special Issue, 2010, pp. S41–S61.

RICHARDS, Graham: *Mental Machinery, Part 1: The Origins and Consequences of Psychological Ideas from 1600 to 1850*, London, Athlone Press, 1992.

--- *‘Race’, Racism and Psychology: Towards a Reflexive History*, London, Routledge, 1997.

--- “Loss of Innocence in the Torres Straits”, *The Psychologist*, vol. 23, part 12, December 2010, pp. 982–983.

RIEGER, Matthias: “Unterscheidung und Synthese: Rezeptionsformen akustischer Forschung in der Musikliteratur des 19.Jahrhunders”, *Berichte zur Wissenschaftgeschichte*, no. 31, 2008, pp. 181–194.

--- *Helmholtz Musicus. Der Objektivierung der Musik in 19.Jahrhundert durch Helmholtz’ Lehre von den Tonempfindungen*, Darmstadt, Wissenschaftliche Buchgesellschaft, 2006.

RIEMANN, Hugo: *Katechismus der Musik–Aesthetik (Wie hören wir Musik?),* Leipzig, Max Hesse´s Verlag, 1890.

--- “Wie hören wir Musik? Grundlinien der Musik-Ästhetik (1888)”, in BUJIC, Bojan: *Music in European Thought, 1851–1912*, Cambridge: Cambridge University Press, 1988.

RILEY, Matthew: *Musical Listening in the German Enlightenment: Attention, Wonder and Astonishment*, Aldershot, Ashgate, 2004.

RINK, John (ed.): *The Practice of Performance. Studies in Musical Interpretation*, Cambridge, Cambridge University Press, 1995.

--- *Musical Performance: A Guide to Understanding*, Cambridge, Cambridge University Press, 2003 (traducción castellana de Bárbara Zitman: La interpretación musical, Madrid: Alianza, 2006).

RISKIN, Jessica: *Science in the Age of Sensibility: the Sentimental Empiricists of the French Enlightenment*, Chicago, University of Chicago Press, 2002.

RIZZOLATTI, Giacomo; SINIGAGLIA, Corrado: *So quel che fai. Il cervello che agisce e i neuroni specchio*, Milano, Raffaello Cortina, 2006.

ROBERTS, John: “Art After Deskilling”, *Historical Materialism*, no. 18, 2010, pp. 77–96.

ROBINSON, Jenefer: *Deeper than Reason: Emotion and Its Role in Literature, Music, and Art*, New York, Oxford University Press, 2005.

RODAWAY, Paul: *Sensuous Geographies: Body, Sense and Place*, London Routledge, 1994.

ROGER, Jacques: *Les Sciences de la vie dans la pensée française du XVIIIe siècle: la génération des animaux de Descartes à l'Encyclopédie*, with a preface by Claire Salomon-Bayet, Paris, Albin Michel, 1993.

ROGER, Joseph-Louis: *Traité des effets de la musique sur le corps humain*, translated from Latin and annotated by Étienne Sainte-Marie, Paris, Brunot, 1803.

ROSALDO, Michelle Z.: *Knowledge and Passion: Ilongot Notions of Self and Social Life*, Cambridge, Cambridge University Press, 1980.

--- "Toward and Anthropology of Self and Feeling", in SHWEDER, Richard A.; LEVINE, Robert A. (eds): *Culture Theory: Essays on Mind, Self and Emotion*, Cambridge, Cambridge University Press, 1984, pp. 137–157.

ROSALDO, Renato: *Culture & Truth: The Remaking of Social Analysis*, Boston, Beacon Press, 1989.

ROSENFELD, Sophia: "On Being Heard: A Case for Paying Attention to the Historical Ear", *The American Historical Review*, vol. 116, no. 2, April 2011, pp. 316–334.

ROSENWEIN, Barbara H.: "Worrying about Emotions in History", *American Historical Review*, vol. 17, no. 3, June 2002, pp. 821–845.

--- "Problems and Methods in the History of Emotions", *Passions in Context: Journal of the History and Philosophy of the Emotions*, no. 1, 2010, http://www.passionsincontext.de/uploads/media/01_Rosenwein.pdf [last access: February 2015].

--- *Anger's Past: The Social Uses of an Emotion in the Middle Ages*, Ithaca, NY, Cornell University Press, 1998.

--- *Emotional Communities in the Early Middle Ages*, Ithaca, NY, Cornell University Press, 2006.

RÖSING, Helmut: "Musik und ihre Wirkungen auf den Rezipienten. Versuch einer Standortbestimmung", *International Review of the Aesthetics and Sociology of Music*, vol. 12, no. 1, June 1981, pp. 3–20.

--- "Listening Behaviour and Musical Preference in the Age of 'Transmitted Music'", *Popular Music*, vol. 4: "Performers and Audiences", 1984, pp. 119–149.

ROSS, Alex: "Applause: A Rest Is Noise Special Report", 18th February 2005, accessible online: http://www.therestisnoise.com/2005/02/applause_a_rest.html [last access: November 2015].

ROSSELLÓ MIR, Jaume: *Psicología de la atención: introducción al estudio del mecanismo atencional*, Madrid, Pirámide, 1998.

ROSSING, Thomas D. (ed.): *Springer Handbook of Acoustics*, New York, Springer, 2007.

ROST, Michael: *Teaching and Researching Listening*, "Applied Linguistics in Action" Series, Harlow, UK, Longman, 2002.

ROUGET, Gilbert: *La musique et la transe. Esquisse d'un théorie génerale des relations de la musique et de la possession*, Paris, Gallimard, 1990.

ROUSE, Joseph: *Engaging Science: How to Understand Its Practices Philosophically*, Ithaca, NY-London, Cornell University Press, 1996.

ROUSSEAU, George S.: *Nervous Acts: Essays on Literature, Culture and Sensibility*, Basingstoke, UK, Palgrave Macmillan, 2004.

ROUSSEAU, George S. (ed.): *The Languages of Psyche: Mind and Body in Enlightenment Thought*, Berkeley, University of California Press, 1990, accessible online: http://ark.cdlib.org/ark:/13030/ft638nb3db/ [last access: October 2015].

ROUSSEAU, Jean-Jacques: *Oeuvres complètes IV: Émile. Éducation – morale – botanique*, edited by Bernard Gagnebin and Marcel Raymond, Paris, Gallimard, 1969.

--- *Essai sur l'origine des langues*, *où il est parlé de la mélodie et de l'imitation musicale*, edited and presented by Jean Starobinski, Paris, Gallimard, 1990.

--- *Collection complète des oeuvres, vol. 9. Dictionnaire de musique*, Geneve, 1780-1789
online edition: http://www.rousseauonline.ch/Text/volume-9-dictionnaire-de-musique.php
(Beta version: 7 October 2012) [last access: October 2015].

--- *The Discourses and Other Early Political Writings*, edited by Victor Gourevitch, Cambridge, Cambridge University Press, 1997.

--- *The Collected Writings of Rousseau, vol. 13: Emile, or On Education* (includes *Emile and Sophie, or The Solitaires*), series editors: Roger Masters and Christopher Kelly, translated and edited by Christopher Kelly and Allan Bloom, Hanover, NH-London, University Press of New England, 2009.

ROWELL, Lewis: *Introducción a la filosofía de la música: antecedentes históricos y problemas estéticos*, translated by Miguel Wald, Barcelona, Gedisa, 1987.

RUBY, Christian: *L'âge du public et du spectateur. Essai sur les dispositions esthétiques et politiques du public moderne*, Bruxelles, La Lettre volée, 2008.

RUST, John: “The Birth of Psychometrics in Cambridge, 1886 – 1889”, August 2008, http://www.psychometrics.cam.ac.uk/about–us/our–history/first–psychometric–laboratory and later Oxford [last access: October 2015].

RUTHERFORD, William: “Physiological Notice: A New Theory of Hearing”, *Journal of Anatomy and Physiology*, vol. 21, 1886, pp. 166–168.

SACKS, Oliver: *Musicophilia: Tale of Music and the Brain*, revised and enlarged edition, New York, Vintage, 2008.

SADIE, Stanley (ed.), *New Grove Dictionary of Music and Musicians*, London, Macmillan, 2001 (2nd ed.)

SAKATA, Hiromi Lorraine: *Music in the Mind: The Concepts of Music and Musician in Afghanistan*, Washington, Smithsonian Institution Press, 2002.

SALINAS, Francisco: *De musica libri septem* (facsimile edition), edited by Amaya García Pérez and Bernardo García-Bernalt Alonso, Salamanca, Ediciones Universidad de Salamanca, 2013.

SALZER, Felix: *Structural Hearing: Tonal Coherence in Music*, with a foreword by Leopold Mannes, New York, Dover, 1962, 2 vols.

SAMSON, Jim (ed.): *The Cambridge History of Nineteenth-Century Music*, Cambridge, Cambridge University Press, 2002.

SAMUELS, David W.; MEINTJES, Louise; OCHOA, Ana Maria; PORCELLO, Thomas: “Soundscapes: Toward a Sounded Anthropology”, *Annual Review of Anthropology*, no. 39, 2010, pp. 329–345.

SANDEN, Paul: “Hearing Glenn Gould’s Body: Corporeal Liveness in Recorded Music”, *Current Musicology*, no. 88, Fall 2009, pp. 7–34.

SANDERS, John T.: “Merleau-Ponty, Gibson, and the Materiality of Meaning”, *Man and World*, no. 26, 1993, pp. 287–302.

SAN ROQUE, Lila; KENDRICK, Kobin H.; NORCLIFFE, Elisabeth; et al.: “Vision Verbs Dominate in Conversation across Cultures, but the Ranking of Non-Visual Verbs Varies”, *Cognitive Linguistics*, 2015, advance online publication, accessible online at: http://pubman.mpdl.mpg.de/pubman/item/escidoc:2045058:8/component/escidoc:2083297/SanRoque_etal_CogLin_2015.pdf [last access: February 2015].

SAUVEUR, Joseph: *Principes d'acoustique et de musique ou, Système général des intervalles des sons*, Geneve, Minkoff, 1973.

SAVART, Félix: “Notes sur la sensibilité de l’organ de l’ouïe”, *Annales de chimie et de physique*, vol. 44, 1830, pp. 337–352.

SAWDAY, Jonathan: *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture*, London, Routledge, 1995.

SCHAEFFER, Pierre: *Traité des objets musicaux. Essai interdisciplines*, Paris, Seuil, 1966.

SCHAFER, R. Murray: "The Music of the Environment" in *Cultures*, vol.1, n.1, UNESCO, 1973.

--- *The Soundscape. Our Sonic Environment and the Tuning of the World*, Rochester, Destiny Books, 1994, 2ª ed. (Originally published as: *The Tuning of the World*, New York, Alfred A. Knopf, 1977).

--- *Voices of Tyranny, Temples of Silence*, Indian River, Ontario, Canada, Arcana, 1993.

SCHAFFER, Simon: "Astronomers Mark Time: Discipline and the Personal Equation", *Science in Context*, vol. 2, 1988, pp. 115–145.

--- *From Physics to Anthropology and Back Again*, Cambridge, Prickly Pear Press, 1994.

SCHATZKI, Theodore R.; KNORR CETINA, Karin; VON SAVIGNY, Eike (eds): *The Practice Turn in Contemporary Theory*, London and New York, Routledge, 2001.

SCHECHNER, Richard: *Performance Theory*, revised and expanded edition, New York–London, Routledge, 1988.

SCHEER, Monique: "Are Emotions a Kind of Practice (and Is That What Makes Them Have a History)? A Bourdieuian Approach to Understanding Emotion", *History and Theory*, vol. 51, 2012, pp. 193–220.

SCHEERER, E.: "Sinne", in RITTER, Joachim; GRÜNDER, Karlfried (eds): *Historisches Wörterbuch der Philosophie*, Basel, Schwabe, 1971–2007, Band 9, col. 824–869.

SCHENKER, Heinrich: *L'écriture libre*, trans. Nicolas Meeùs, 2a ed., revised and adapted by Oswald Jonas, Liège, Mardaga, 1993 (2 vols).

SCHEPER-HUGHES, Nancy; LOCK, Margaret: "The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology", *Medical Anthropology Quarterly, New Series*, vol. 1, no. 1, 1987, pp. 6–41.

SHEPHERD, John: *Music as social text*, Cambridge, Polity Press, 1991.

SCHER, Steven P. (ed.): *Music and Text: Critical Inquiries*, Cambridge, Cambridge University Press, 1992, pp. 21–27.

SCHERER, Klaus R.; EKMAN, Paul (eds): *Approaches to Emotion*, Hillsdale, NJ, Lawrence Erlbaum, 1984.

SCHERMER, Henry; JARY, David: *Form and Dialectic in Georg Simmel's Sociology: A New Interpretation*, Basingstoke, UK, Palgrave Macmillan, 2013.

SCHIEFFELIN, Edward L.: *The Sorrow of the Lonely and the Burning of Dancers,* New York, Saint Martin's Press, 1976.

SCHMIDGEN, Henning: "Time and Noise: the Stable Surroundings of Reaction Experiments, 1860–1890", S*tudies in History and Philosophy of Science. Part C: Biological and Biomedical Sciences*, vol. 34, no. 2, June 2003, pp. 237–275.

--- "The Donders Machine: Matter, Signs, and Time in a Physiological Experiment, ca. 1865", *Configurations*, 2005, 13, pp. 211–256.

--- "Camera Silenta: Time Experiments, Media Networks, and the Experience of Organlessness", *Osiris,* special issue on "Music, Sound, and the Laboratory from 1750 to 1980", vol. 28, 2013, pp. 162–188.

SCHMIDT, Leigh Eric: *Hearing Things: Religion, Illusion, and the American Enlightenment*, Cambridge, MA, Harvard University Press, 2000.

SCHNEIDER, Manfred: "Kollekten des Geistes. Die Zerstreuung im Visier der Kulturkritik", *Neue Rundschau*, 1999, 110/2, pp. 44–55.

SCHOEN, Max: *The Understanding of Music*, New York-London, Harper & Brothers, 1945.

SCHOEN, Max (ed.): *The Effects of Music*, London-New York, Kegan Paul, Trench, Trubner & Co.-Harcourt, Brace & Company, 1927.

SCHOLES, Percy A.: *Music Appreciation: Its History and Technics*, edited for American readers by Will Earhart, New York, M. Witmark & Sons, 1939 (reissued in a facsimile edition by Kessinger Legacy Reprints, Whitefish, MT, 2005).

SCHOLL, Brian J.: *"*Objects and Attention: The State of the Art", *Cognition*, n. 80, 2001, pp. 1–46.

SCHÖNBERG, Arnold: *Style and Idea: Selected Writings of Arnold Schönberg*, edited by Leonard Stein with translations by Leo Black, London, Faber, 1984.

SCHOON, Andi; VOLMAR, Axel (eds): *Das geschulte Ohr: Eine Kulturgeschichte der Sonifikation*, Bielefeld, Transcript Verlag, 2012.

SCHÖTTLER, Peter: "Mentalities, Ideologies, Discourses. On the 'Third Level' as a Theme in Social–Historical Research", in LÜDTKE, Alf (ed.): *The History of Everyday Life: Reconstructing Historical Experiences and Ways of Life*, translated by William Templer, Princeton, Princeton University Press, 1995, pp. 72–115.

SCHULLIAN, Dorothy M.; SCHOEN, Max (eds): *Music and Medicine*, New York, Henry Schuman, 1948.

SCHUTZ, Alfred: “Making Music Together. A Study In Social Relationship”, in *Collected Papers II: Studies in Social Theory*, edited and introduced by Arvid Brodersen, The Hague, Martinus Nijhoff, 1964, pp. 159–178.

SCHWARTZ, Elliott; CHILDS, Barney (eds): *Contemporary Composers on Contemporary Music,* expanded edition with the collaboration of Jim Fox, New York, Da Capo, 1998.

SCHWARTZ, Hillel: *Making Noise: From Babel to the Big Bang and Beyond*, Cambridge, MA, MIT Press, 2011.

SCOTT, Derek B.: “Music and Social Class in Victorian London”, *Urban History*, vol. 29, part 1, May 2002, pp. 60–73.

SCOTT, Derek B. (ed.): *Music, Culture, and Society: A Reader*, Oxford, Oxford University Press, 2000.

--- *The Ashgate Research Companion to Popular Musicology*, Farnham, UK, Burlington, VT, Ashgate, 2009.

SCRIBNER, Sylvia; COLE, Michael: *The Psychology of Literacy,* Cambridge, MA, Harvard University Press, 1981.

SCRUTON, Roger: *The Aesthetics of Music*, Oxford, Oxford University Press, 1997.

SEASHORE, Carl. E.: *Psychology of Music*, New York, Dover, 1967. (1st ed. New York, McGraw-Hill, 1938).

SEEGER, Anthony: “The Meaning of Body Ornaments”, *Ethnolog*y, vol. 14, no. 3, 1975, pp. 211–224.

--- *Nature and Society in Central Brazil: The Suya Indians of Mato Grosso*, Cambridge, MA, Harvard University Press, 1981.

--- “Oratory is Spoken, Myth is Told, and Song is Sung, but They Are All Music to My Ears”, in SHERZER, Joel; URBAN, Greg (eds): *Native South American Discourse*, Amsterdam, Mouton de Gruyter, 1986, pp. 59–82.

--- *Why Suyá Sing: A Musical Anthropology of an Amazonian People*, Urbana–Chicago, University of Illinois Press, 2004.

SELFRIDGE–FIELD, Eleanor: “Experiments with Melody and Meter, or the Effects of Music: The Edison–Bingham Music Research”, *The Musical Quarterly*, 81/2, Summer 1997, pp. 291–310.

SEMI, Maria: *Music as a Science of Mankind in Eighteenth-Century Britain*, translated by Timothy Keates, Farnham, Ashgate, 2012.

SENFT, Gunter: “Talking about Color and Taste on the Trobriand Islands. A Diachronic Study”, *Senses & Society*, vol. 6, no. 1, 2011, pp. 48–56.

SENFT, Gunter, ÖSTMAN, Jan-Ola, VERSCHUEREN, Jef (eds): *Culture and Language Use*, Amsterdam, John Benjamins Publishing Co., 2009.

SENNETT, Richard: *The Fall of Public Man*, Cambridge, Cambridge University press, 1974.

SEREMETAKIS, C. Nadia (ed.): *The Senses Still: Perception and Memory as Material Culture in Modernity*, Boulder–San Francisco–Oxford, Westview Press, 1994.

SERRAVEZZA, Antonio: *Musica e scienza nell'età del positivismo*, Bologna, Il Mulino, 1996.

--- "L'educazione estetica alla musica", in LA FACE BIANCONI, Giuseppina; FRABBONI, Franco (ed.): *Educazione musicale e formazione*, Milano, Franco Angeli, 2008.

SESSIONS, Roger: *The Musical Experience of Composer, Performer and Listener*, Princeton, Princeton University Press, 1971 (1950).

SHANNON, Claude E.: "A Mathematical Theory of Communication", reprinted with corrections from *The Bell System Technical Journal,* vol. 27, pp. 379–423, 623–656, July, October, 1948, accessible online: http://cm.bell-labs.com/cm/ms/what/shannonday/shannon1948.pdf [last access: October 2014].

SHANNON, Claude E.; WEAVER, Warren: *The Mathematical Theory of Communication*, Urbana, University of Illinois Press, 1949.

SHANNON, Jonathan H.: "Emotion, Performance, and Temporality in Arab Music. Reflections on Tarab", *Cultural Anthropology*, vol. 18, no. 1, February 2003, pp. 72–98.

SHAPIN, Steven: *The Scientific Revolution*, Chicago-London, University of Chicago Press, 1996.

--- "Descartes the Doctor: Rationalism and Its Therapies", *British Journal for the History of Science*, 33/2, 2000, pp. 131–154, accessible on line: http://dash.harvard.edu/handle/1/3219884 [last access: October 2015].

SHAPIN, Steve; SCHAFFER, Simon: *Leviathan and the Air–Pump. Hobbes, Boyle, and the Experimental Life*, Princeton, Princeton University Press, 1985.

SHOUSE, Eric: "Feeling, Emotion, Affect", *M/C Journal*, vol. 8, no. 6, 2004, accessible online: http://journal.media-culture.org.au/0512/03-shouse.php [last access: July 2015].

SIMMEL, Georg: "Die Grössstädte und das Geistesleben", in *Aufsätze und Abhandlungen 1901–1908, Band I. Gesamtausgabe Band 8*, herausgegeben von Rüdiger Kramme, Angela Rammstedt und Otthein Rammstedt, Frankfurt a.M., Suhrkamp, 1995, pp. 116–131.

--- “The Metropolis and Mental Life (1903)”, translated by H.H. Gerth with the assistance of C. Wright Mills, in SENNETT, Richard (ed.): *Classic Essays on the Culture of Cities*, Englewood Cliffs, NJ, Prentice-Hall, 1969, pp. 47–60.

--- “Soziologie der Sinne”, in *Aufsätze und Abhandlungen 1901–1908, Band II. Gesamtausgabe Band 8*, herausgegeben von Alessandro Cavalli und Volkhard Krech, Frankfurt a.M., Suhrkamp, 1993, pp. 276–292.

--- “Sociology of the Senses (1907)”, translated by Mark Ritter and David Frisby, in FRISBY, David; FEATHERSTONE, Mike (eds): *Simmel on Culture*, London, SAGE, 1997, pp. 109–120.

--- *The Conflict of Modern Culture and other Essays*, translated, with an introduction, by K. Peter Etzkorn, New York, Teachers College Press (Teachers College, Columbia University), 1968.

SLOBODA, John: *The Musical Mind: The Cognitive Psychology of Music*, Oxford, Clarendon Press, 1987

--- *Exploring the Musical Mind: Cognition, Emotion, Ability, Function*, Oxford–New York, Oxford University Press, 2005.

SLOBODA, John A., O'NEILL, Susan A., IVALDI, Antonia: “Functions of Music in Everyday Life: An Exploratory Study Using the Experience Sampling Method”, *Musicae Scientiae*, vol. V, nº 1, primavera 2001, pp. 9–32.

SLOTERDIJK, Peter: *Extrañamiento del mundo*, translation and preface by Eduardo Gil Bera, Valencia, Pre-Textos, 1998.

SMALL, Christopher: *Musicking: The Meanings of Performing and Listening*, Hanover, NH, Wesleyan University Press-University Press of New England, 1998.

--- *Música, sociedad, educación: un examen de la función de la música en las culturas occidentales, orientales y africanas, que estudia su influencia sobre la sociedad y sus usos en la educación*, Madrid, Alianza, 1989.

--- “El Musicar: Un ritual en el Espacio Social”, *Revista Transcultural de Música/ Transcultural Music Review*, n. 4, 1999, http://www.sibetrans.com/trans/articulo/252/el-musicar-un-ritual-en-el-espacio-social [last access: October 2015].

SMITH, Bruce R.: *The Acoustic World of Early Modern England. Attending to the O-Factor*, Chicago, University of Chicago Press, 1999.

SMITH, Bruce R.: “Hearing Green”, in PASTER, Gail Kern; ROWE, Katherine; FLOYD-WILSON, Mary (eds): *Reading the Early Modern Passions: Essays in the Cultural History of Emotions*, Philadelphia, University of Pennsylvania Press, 2004, pp. 147–168.

SMITH, C.U.M.; FRIXIONE, Eugenio; FINGER, Stanley; CLOWER, William: *The Animal Spirit Doctrine and the Origins of Neurophysiology*, Oxford-New York, Oxford University Press, 2012.

SMITH, David: "Colonial Encounters through the Prism of Music: A Southern African Perspective", *International Review of the Aesthetics and Sociology of Music*, vol. 33, no. 1, June 2002, pp. 31–55.

SMITH, Mark M.: *Listening to Nineteenth-Century America*, Chapel Hill, University of North Carolina Press, 2001.

--- "Making Sense of Social History", *Journal of Social History*, 37/1, 2003, pp. 165–186.

--- "Producing Sense, Consuming Sense, Making Sense: Perils and Prospects for Sensory History", *Journal of Social History*, vol. 40, no. 4, Summer 2007, pp. 841–858.

--- *Sensory History*, Oxford, Berg Publishers, 2007.

--- "The Explosion of Sensory History", *The Psychologist*, vol. 23, no. 10, October 2010, accessible online: https://thepsychologist.bps.org.uk/volume-23/edition-10/looking-back-explosion-sensory-history [last access: March 2015].

SMITH, Mark M. (ed.): *Hearing History: A Reader*, Athens, University of Georgia Press, 2004.

SNYDER, Bob: *Music and Memory. An Introduction*, Cambridge, MA, MIT Press, 2000.

SOBE, Noah W.: "Challenging the Gaze: the Subject of Attention and a 1915 Montessori Demonstration Classroom", *Educational Theory*, vol. 54, no. 3, 2004, pp. 281–297.

--- "Concentration and civilisation: Producing the Attentive Child in the Age of Enlightenment", *Paedagogica Historica*, vol. 46, no. 1–2, February–April 2010, pp. 149–160.

SOLIE, Ruth A.: "The Living Work: Organicism and Musical Analysis", *19th–Century Music*, vol. 4, nº 2, 1980, pp. 147–156.

SOLÍS, Ted (ed.): *Performing Ethnomusicology. Teaching and Representation in World Music Ensembles*, Berkeley, University of California Press, 2004.

SORCE KELLER, Marcello: *Note in libertà. Studi di musica e musicisti*, "I quaderni del Club di Rete Due", Lugano, RTSI, 2005.

--- "Some Remarks on Musical Aesthetics from the Viewpoint of Ethnomusicology", *The Music Review*, 1988, n. 2, accessible online: http://www.rodoni.ch/marcellosorcekeller/marcello88.html [last access: October 2015].

--- *Musica e sociologia*, Milano, Ricordi, 1996.

--- "Musicologists and the Radio: A Shortlist of Questions, Problems, and Issues", in MAEUSLI, Theo (ed.): *Talk About Radio: Towards a Social History of Radio*, Zurich, Chronos Verlag, 1999, pp. 115–126, accessible online: http://www.rodoni.ch/marcellosorcekeller/mr1.html [last access: October 2015].

STAFFORD, Barbara Maria: *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine*, Cambridge, MA, MIT Press, 1991.

--- *Artful Science: Enlightenment Entertainment and the Eclipse of Visual Education*, Cambridge, MA, MIT Press, 1994.

STAHL, William Harris; with E.L. BURGE: *Martianus Capella and the Seven Liberal Arts*, 2 vols, New York, Columbia University Press, 1971.

STAROBINSKI, Jean: "Brève histoire de la conscience du corps", in ELLRODT, Robert (ed.): *Genèse de la conscience moderne*, Paris, PUF, 1983.

STEARNS, Carol Z.; STEARNS, Peter N.: *Anger: The Struggle for Emotional Control in America's History*, Chicago, University of Chicago Press, 1986.

STEARNS, Peter N.: *American Cool: Constructing a Twentieth-Century Emotional Style*, New York, New York University Press, 1994.

STEARNS, Peter N.; LEWIS, Jan (eds): *An Emotional History of the United States,* New York, New York University Press, 1998.

STEARNS, Peter N.; STEARS, Carol Z.: "Emotionology: Clarifying the History of Emotions and Emotional Standards", *The American Historical Review*, vol. 90, no. 4, October 1985, pp. 813–836.

STEBLIN, Rita: *A History of Key Characteristics in the Eighteenth and Early Nineteenth Centuries*, Rochester, NY, University of Rochester Press, 2002 (2nd ed.; 1st ed. 1983).

STEEGE, Benjamin: *Helmholtz and the Modern Listener*, Cambridge, Cambridge University Press, 2012.

STEFANI, Gino: "Musica come. Progetti antropologici (e didattici)", *Nuova Rivista Musicale Italiana*, vol. X, n. 3, 1976, pp. 407–413.

--- *Capire la musica*, Milano, Bompiani, 1985.

--- *Il segno della musica: saggi di semiotica musicale*, Palermo, Sellerio, 1987.

--- "A Theory of Musical Competence", *Semiotica: Special Issue on the Semiotics of Music* (Eero Tarasti, ed.), vol. 66, 1/3, , 1987, pp. 7–22.

STEINBERG, Michael P.: *Listening to Reason: Culture, Subjectivity, and Nineteenth–Century Music*, Princeton, Princeton University Press, 2004.

STEINER, Wendy (ed.): *The Sign in Music and Literature*, Austin, University of Texas Press, 1981.

STEPHANSON, Anders: "Regarding Postmodernism: A Conversation with Fredric Jameson", in KELLNER, Douglas (ed.): *Postmodernism/Jameson/Critique*, Washington DC, Maisonneuve Press, 1989.

STEPHENS, S. D. G.: "The British Medical Profession and the First Audiometers", *The Journal of Laryngology and Otology*, vol. 95, December 1981, pp. 1223–1235.

STERNE, Jonathan: "Sounds Like the Mall of America: Programmed Music and the Architectonics of Commercial Space", in LYSLOFF, René T. A. and GAY Jr., Leslie C.: *Music and Technoculture*, Middletown, CT, Wesleyan University Press, 2003, pp. 316–345.

--- *The Audible Past: Cultural Origins of Sound Reproduction*, Durham, NC, Duke University Press, 2003.

--- "Being 'In the True' of Sound Studies", *Music, Sound and the Moving Image*, vol. 2, no. 2, Autumn 2008, pp. 163–167.

--- "The Theology of Orality", *Canadian Journal of Communication*, vol. 36, no. 2, 2012, pp. 207–225.

--- *MP3: The Meaning of a Format*, Durham, NC-London, Duke University Press, 2012.

--- "The Stereophonic Spaces of Soundscape", in THÉBERGE, Paul; DEVINE, Kyle; EVERRETT, Tom (eds): *Living Stereo: Histories and Cultures of Multichannel Sound*, New York-London, Bloomsbury Academic, 2015, pp. 65–81.

STERNE, Jonathan (ed.): *The Sound Studies Reader*, New York-London, Routledge, 2012.

STEVENS, S.S.; DAVIS, Hallowell: *Hearing: Its Psychology and Physiology*, New York, Acoustical Society of America-American Institute of Physics, 1983 (1st ed. 1938).

STEVENS, S.S.; WARSHOFSKY, Fred, and the Editors of Time-Life Books: *Sound and Hearing*, Alexandra, VA, Time-Life Books, 1980.

STEVENSON, R. Scott; GUTHRIE, Douglas: *A History of Oto–Laryngology*, Edinburgh, E. & S. Livingstone, 1949.

STILL, Arthur; COSTALL, Alan: *Against Cognitivism: Alternative Foundations for Cognitive Psychology*, London, Harvester Wheatsheaf, 1991.

STOCKFELT, Ola: “Adequate Modes of Listening” in SCHWARZ, David; KASSABIAN, Anahid; SIEGEL, Lawrence (ed.): *Keeping Score: Music, Disciplinarity, Culture*, Charlottesville, University Press of Virginia, 1997, pp. 129–146.

STOCKING, George W. Jr.: *Race, Culture, and Evolution: Essays in the History of Anthropology*, New York-London, The Free Press-Collier-Macmillan, 1968.

STOFFREGEN, Thomas A.; BARDY, Benoït G.: “On Specification and the Senses”, *Behavioral and Brain Sciences*, 2001, 24 (2), pp. 195–213, followed by open peer commentaries (pp. 213–261).

STOLLER, Paul: *The Taste of Ethnographic Things: The Senses in Anthropology*, Philadelphia, University of Pennsylvania Press, 1989.

--- *Sensuous Scholarship*, Philadelphia, University of Pennsylvania Press, 1997.

STRANG, Veronica: “Common Senses: Water, Sensory Experience and the Generation of Meaning”, *Journal of Material Culture*, vol. 10, no. 1, 2005, pp. 92–120.

STRAUSS Neil (ed.): *Radiotext(E)*, New York, Semiotext(e), 1993.

STRAVINSKI, Ígor: *Poética musical*, presentación de Iorgos Seferis, traducción de Eduardo Grau, Barcelona, El Acantilado, 2006.

--- *Poetics of Music in the Form of Six Lessons*, preface by George Seferis, translated by Arthur Knodel and Ingolf Dahl, Cambridge, MA, Harvard University Press, 1970.

STRUNK, Oliver; TREITLER, Leo (eds): *Source Readings in Music History*, revised edition, New York-London, W.W, Norton and Co., 1998.

STYLES, Elizabeth A.: *The Psychology of Attention*, Hove-New York, Psychology Press, 2006 (2nd edition).

SUBOTNIK, Rose Rosengard: *Deconstructive Variations: Music and Reason in Western Society*, Minneapolis, University of Minnesota Press, 1996

SUMMERS, David: *The Judgment of Sense: Renaissance Naturalism and the Rise of Aesthetics*, Cambridge, Cambridge University Press, 1987.

SUPPE, Frederick: “Understanding Scientific Theories: An Assessment of Developments, 1969–1998”, *Philosophy of Science*, vol. 67, Supplement. Proceedings of the 1998 Biennial Meetings of the Philosophy of Science Association. Part II: Symposia Papers, 2000, pp. S102–S115.

SUSUMU, Shôno: “The Role of Listening in GAGAKU”, *Contemporary Music Review*, vol. 2, no. 2, 1987, pp. 19–43.

SUTTON, R. Anderson: “Interpreting Electronic Sound Technology in the Contemporary Javanese Soundscape”, *Ethnomusicology*, vol. 40, no. 2, Spring-Summer 1996, pp. 249–268.

SWEETSER, Eve: *From Etymology to Pragmatics. Metaphorical and Cultural Aspects of Semantic Structure*, Cambridge-New York-Melbourne, Cambridge University Press, 1990.

SYKES, Ingrid J.: "The Art of Listening: Perceiving Pulse in Eighteenth-Century France", *Journal for Eighteenth-Century Studies*, vol. 35, no. 4, December 2012 (Special Issue on The Senses, guest edited by Jonathan Reinarz and Leonard Schwarz), pp. 473–488.

SYMES, Colin: *Setting the Record Straight: A Material History of Classical Recording*, Middletown, CT, Wesleyan University Press, 2004.

SYNNOTT, Anthony: *The Body Social: Symbolism, Self, and Society*, London-New York, Routledge, 1993.

SZENDY, Peter: *Musica practica. Arrangements et phonographies de Monteverdi à James Brown*, Paris, L'Harmattan, 1997.

---*Écoute. Une histoire de nos oreilles (précédé de "Ascoltando" par Jean–Luc Nancy)*, Paris, Les Éditions de Minuit, 2001.

--- *Listen: A History of Our Ears*, foreword by Jean-Luc Nancy, translated by Charlotte Mandell, New York, Fordham University Press, 2008.

SZENDY, Peter (ed.): *L'écoute*, Paris, L'Harmattan, Ircam-Centre Pompidou, "Les cahiers de l'Ircam", 2000.

TAGG, Philip: "Musicology and the Semiotics of Popular Music", *Semiotica*, vol. 66, 1/3, Amsterdam, Mouton de Gruyter, 1987, pp. 279–298.

--- "'Universal' music and the case of death", *Critical Quarterly* 35/2, 1993, pp. 54–98, accessible online: www.tagg.org/articles/xpdfs/deathmus.pdf [last access: November 2015].

--- "Vers une musicologie de la télévision", paper presented at the Colloque Ferdinand Gonseth, La Chaux du Fonds (Suiza), September 1991, in "Frank Martin, musique et esthétique musicale", special issue of *Revue Musicale de Suisse romande*, 1995, pp. 33–60, accessible online: http://www.tagg.org/articles/gonseth.html [last access: November 2015].

--- "Text and Context as Corequisites in the Popular Analysis of Music", paper prepared for the conference "Musical Text and Context", Cremona, April 2002. accessible online: http://www.tagg.org/articles/cremona.html [last access: November 2015].

--- "Reading Sounds or An Essay on Sounds, Music, Knowledge, Rock & Society", *Ré Records Quarterly*, 3/2, 1990, pp. 4–11, http://www.tagg.org/articles/readsound.html [last access: November 2015].

TAGG, Philip: *Music's Meanings: A Modern Musicology for Non-Musos*, New York-

Huddersfield, The Mass Media Musicologists' Press, 2013.

TAGG, Philip; CLARIDA, Bob: *Ten Little Title Tunes: Towards a Musicology of the Mass Media*, New York-Montreal, The Mass Media Musicologists' Press, 2003.

TALBOT, Michael (ed.): *The Musical Work: Reality or Invention?*, Liverpool, Liverpool University Press, 2000.

TAUSIET, María; AMELANG, James S. (eds): *Accidentes del alma: las emociones en la edad moderna*, Madrid, Abada, 2009.

TAUSSIG, Michael: "Tactility and Distraction", *Cultural Anthropology*, vol. 6, no. 2, May 1991, pp. 147–153.

--- *Mimesis and Alterity: a particular history of the senses*, New York–London, Routledge, 1993.

TAYLOR, Timothy D.: *Strange Sounds. Music, Technology & Culture*, New York, Routledge, 2001.

--- "Music and the Rise of Radio in Twenties America: Technological Imperialism, Socialization, and the Transformation of Intimacy", in GREENE, Paul D.; PORCELLO, Thomas (ed.): *Wired for Sound: Engineering and Technologies in Sonic Cultures*, Middletown, CT, Wesleyan University Press, 2005.

--- *Beyond Exoticism: Western Music and the World*, Durham, NC-London, Duke University Press, 2007.

TAYLOR, Timothy D.; KATZ, Mark; and GRAJEDA, Tony (eds): *Music, Sound, and Technology in America: A Documentary History of Early Phonograph, Cinema, and* Radio, Durham, NC, Duke University Press, 2013.

THÉALL, Donald F.: *The Virtual Marshall McLuhan*, Montreal, McGill-Queen's University, 2001.

THÉBERGE, Paul: *Any Sound You Can Imagine: Making Music/Consuming Technology*, Middletown, CT, Wesleyan University Press, 1997.

THOMAS, Downing A.: *Music and the Origins of Language: Theories from the French Enlightenment*, Cambridge, Cambridge University Press, 1995.

--- *Aesthetics of Opera in the Ancien Régime, 1647–1785*, Cambridge, Cambridge University Press, 2002.

THOMPSON, Emily: "Dead Rooms and Live Wires: Harvard, Hollywood, and the Deconstruction of Architectural Acoustics, 1900–1930", *Isis*, vol. 88, no. 4, December 1997, pp. 597–626.

--- "Listening For/To Modernity", in GALISON, Peter; THOMPSON, EMILY (eds): *The Architecture of Science*, Cambridge, MA, MIT Press, 1999.

--- *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933*, Cambridge, MA, MIT Press, 2004.

THOMPSON, William Forde: *Music, Thought and Feeling*, Oxford, Oxford University Press, 2009.

THOMSON, Virgil: *The State of Music*, New York, William Morrow and Company, 1939.

THUMS, Barbara: "Aufmerksamkeit: Zur Ästhetisierung eines anthropologischen Paradigmas im 18.Jahrhundert", in STEIRGEWALD, Jörn; WATZKE, Daniela (Hrsg.): *Reiz– Imagination – Aufmerksamkeit*, Würzburg, Königshausen & Neuma, 2003, pp. 55–74.

TURNBULL, Colin: *The Forest People*, New York, Simon and Schuster, 1962.

TILLMANN, Barbara; BHARUCHA, Jamshed J.; BIGAND, Emmanuel: "Implicit Learning of Regularities in Western Tonal Music by Self-Organization", in FRENCH, R., and SOUGNÉ, J. (eds): *Perspectives in Neural Computing series. Proceedings of the Sixth Neural Computation and Psychology Workshop: Evolution, Learning, and Development*, London, Springer, 2001, pp. 175–184.

TITCHENER, E.B.: 'Anthropometry and Experimental Psychology', *The Philosophical Review*, vol. 2, no. 2, March 1893, pp. 187–192.

--- *Lectures on the Elementary Psychology of Feeling and Attention*, reprint of the original edition (New York, Macmillan, 1908), New York, Ayer Publishing, 1973.

--- "On Ethnological Tests of Sensation and Perception with Special Reference to Tests of Color Vision and Tactile Discrimination Described in the Reports of the Cambridge Anthropological Expedition to Torres Straits", *Proceedings of the American Philosophical Society*, vol. 55, no. 3, 1916, pp. 204–236.

TOMATIS, Alfred: *L'oreille et la voix*, avec dessins de Patrick Guillaume et Valérie Simon, Paris, Éd. Robert Lafont, 1987.

--- *L'oreille et la vie*, Paris, Robert Laffont, 1990.

TOMKINS, Silvan S.: *Exploring Affect: The Selected Writings of Silvan S. Tomkins*, edited by E. Virginia Demos, Cambridge-Paris, Cambridge University Press-Éditions de la Maison des sciences de l'homme, 1995.

TOMLINSON, Gary: *Monteverdi and the End of the Renaissance*, Berkeley-Los Angeles, University of California, 1987.

--- *Music in Renaissance Magic: Toward a Historiography of Others*, Chicago, University of Chicago Press, 1993.

--- “Vico’s Songs: Detours at the Origins of (Ethno)musicology, *The Musical Quarterly*, vol. 83, no. 3, 1999, pp. 344–377.

--- *The Singing of the New World: Indigenous Voice in the Era of European Contact*, Cambridge, Cambridge University Press, 2007.

TREITLER, Leo: *With Voice and Pen. Coming to Know Medieval Song and How it was Made*, Cambridge, Cambridge University Press, 2003.

TREZISE, Simon (ed.): *The Cambridge Companion to French Music*, Cambridge, Cambridge University Press, 2015.

TRUAX, Barry: *Acoustic Communication*, Wesport, Ablex Publishing, 1984.

--- “Soundscape Composition as Global Music: Electroacoustic Music as Soundscape”, Organised Sound, 13(2), pp. 103–109, 2008, accessible online: http://www.sfu.ca/~truax/OS7.html [last access:July 2015].

TRUESDELL, Clifford: The Rational Mechanics of Flexible and Elastic Bodies, 1638–1788. Introduction to Leonhardi Euleri Opera Omnia, vol. X et XI seriei secundae, Zurich, Orell Füssli, 1960.

TUNSTALL, Kate E.: Blindness and Enlightenment: An Insight, with a new translation of Diderot’s Letter on the Blind and La Mothe Le Vayer’s “Of a Man Born Blind”, New York, Continuum, 2011.

TURINO, Thomas: Music as Social Life. The Politics of Participation, Chicago-London, Chicago University Press, 2008.

TURNER, Bryan S.: *The Body and Society: Explorations in Social Theory*, London-Thousand Oaks, CA-New Delhi, SAGE, 1996 (2nd ed.) (1st ed. 1984; 3rd ed. 2008)

TURNER, Victor: From Ritual to Theater: The Human Seriousness of Play, New York, PAJ Publications, 1982.

--- The Anthropology of Performance, preface by Richard Schechner, New York, PAJ Publications, 1987.

ULLMANN, Dieter: "Chladni und die Entwicklung der experimentellen Akustik um 1800", Archive for History of Exact Sciences, vol. 31, issue 1, 1984, pp. 35–52.

VAN BRAKEL, Jaap: "The Plasticity of Categories: The Case of Colour", British Journal for the Philosophy of Science, vol. 44, no. 1, 1993, pp. 103–135.

VANCOUR, Shawn: "Popularizing the Classics: Radio's Role in the American Music Appreciation Movement, 1922–34", Media, Culture & Society, vol. 31(2), 2009, pp. 289–307.

VAN DIJCK, José: "Record and Hold: Popular Music between Personal and Collective Memory", Critical Studies in Media Communication, vol. 23, no. 5, December 2006, pp. 357–374.

VAN KRIEKEN, Robert: "The Organisation of the Soul: Elias and Foucault on Discipline and the Self", Archives Européennes de Sociologie, vol. 31, no. 2, 1990, pp 353–371.

--- "Norbert Elias and Emotions in History", in LEMMINGS, David; BROOKS, Ann (eds): Emotions and Social Change: Historical and Sociological Perspectives, London, Routledge, 2014, pp. 19–42.

VAN LEEUWEN, Theo: Speech, Music, Sound, Basingstoke-London, Macmillan, 1999.

VANNINI, Phillip; WASKUL, Dennis; GOTTSCHALK, Simon: The Senses in Self, Society and Culture: A Sociology of the Senses, New York-London, Routledge, 2012.

VAN WYMEERSCH, Brigitte: "L'esthétique musicale de Descartes et le cartésianisme", Revue Philosophique de Louvain. Quatrième série, vol. 94, no. 2, 1996, pp. 271–293.

--- *Descartes et l'évolution de l'esthétique musicale*, Paris, Mardaga, 1999.

VARELA, Francisco J.; THOMPSON, Evan; ROSCH, Eleanor: The Embodied Mind: Cognitive Science and Human Experience, Cambridge, MA, MIT Press, 1991.

VERMEIR, Koen; DECKARD, Michael Funk (eds): The Science of Sensibility. Reading Burke's Philosophical Enquiry, Dordrecht-Heidelberg-London-New York, Springer, 2012.

VIBERG, Ake: "The Verbs of Perception: A Typological Study" in BUTTERWORTH, BRIAN; COMRIE, Bernard; DAHL, Östen (eds): Explanations for Language Universals, Berlin, Mouton, 1984, pp. 123–162.

VICENTINO, Nicola: Ancient Music Adapted to Modern Practice, edited by Claude V. Palisca, translated with introduction and notes by Maria Rika Maniates, New Haven, CT, Yale University Press, 1996.

VICKERS, Brian: "Figures of Rhetoric Figures of Rhetoric/Figures of Music?", Rhetorica, Spring 1984, vol. 2, no. 1, pp. 1–44.

--- In Defence of Rhetoric, Oxford, Clarendon Press, 1988.

VIGARELLO, Georges: Le corps redressé: histoire d'un pouvoir pédagogique, Paris, Jean-Pierre Delarge, 1978.

VIDAL, Fernando: The Sciences of the Soul: the Early Modern Origins of Psychology, translated by Saskia Brown, Chicago, University of Chicago Press, 2011.

VIEUSSENS, Raymond: Traité nouveau de la structure de l'oreille, Toulouse, Jean Guillemette, 1714, accessible online: http://www2.biusante.parisdescartes.fr/livanc/?cote=05399x02&p=1&do=page [last access: September 2015].

VILA, Anne C.: Enlightenment and Pathology: Sensibility in the Literature and Medicine of Eighteenth-Century France, Baltimore, MD, Johns Hopkins University Press, 1998.

VINCENT-BRUFFAULT, Anne: Histoire des larmes: XVIIIe–XIXe siècles, Paris, Rivages, 1986.

VIQUEIRA, Carmen: Percepción y cultura: un enfoque ecológico, preface by Witold Jacorzynski, México DF, Centro de Investigaciones y Estudios Superiores en Antropología Social, 2008.

VOGEL, Donald A., McCARTHY, Patricia A.; BRATT, Gene W.; BREWER, Carmen: "The Clinical Audiogram. Its History and Current Use", Communicative Disorders Review, vol. 1, no. 2, 2007, pp. 81–94.

VOGT, Katharina; DE CAMPO, Alberto; ECKEL, Gerhard: "An Introduction to Sonification and its Applications in Theoretical Physics", in Proceedings of the AAA – Alps Adria Acoustics, Graz, 2007, accessible online: http://alpsadriaacoustics.org/aaaa-archives/ [last access: August 2015].

VOLMAR, Axel: "Listening to the Body Electric. Electrophysiology and the Telephone in the Late 19th Century", The Virtual Laboratory (ISSN 1866–4784), 2010, http://vlp.mpiwg-berlin.mpg.de/essays/data/art76 [last access: October 2015].

VOLTAIRE: *Oeuvres complètes, vol. 15: Élements de la philosophie de Newton*, critical edition by Robert L. Walter and W.H. Barber, Oxford, Voltaire Foundation-Taylor Institution, 1992.

VOVELLE, Michel; BOSSÉNO, Christian-Marc: "Des mentalités aux représentations", *Sociétés & Représentations*, 2001/2 n° 12, p. 15–28, http://www.cairn.info/revue-societes-et-representations-2001-2-page-15.htm [last access: September 2014].

WACHSMANN, Klaus: "Universal Perspectives in Music", Ethnomusicology, vol. 15, no. 3 (September, 1971), pp. 381–384.

--- "The Changeability of Musical Experience", Ethnomusicology, vol. 26, no. 2, May 1982, pp. 197–215.

WALLON, Henri: La vie mentale, edited by Émile Jalley, Paris, Éditions sociales, 1982. (Published originally as volume 8 of Encyclopédie française, Paris, La Société de gestion de l'Encyclopédie française, 1938).

WALKER, D.P.: Studies in Musical Science in the Late Renaissance, London, The Warburg Institute–University of London / Leiden, E.J. Brill, 1978.

WEBER, Max: *The Protestant Ethic and the Spirit of Capitalism*, translated by Talcott Parsons, with a foreword by R.H. Tawney, London, Unwin University Books, 1930.

--- Sociologie de la musique. Les fondements rationnels et sociaux de la musique, introduction, traduction et notes de Jean Molino et Emmanuel Pedler, Paris, Éditions Métailié, 1998.

WEBER, William: "Did People Listen in the 18th Century?", Early Music, vol. 25, n. 4, 25th Anniversary Issue: "Listening Practice", November 1997, pp. 678–691.

--- “The Rise of the Classical Repertoire in Nineteenth-Century Orchestral Concerts”, in PEYSER, Joan (ed.): *The Orchestra: Origins and Transformations*, New York, Billboard Books, 2000, pp. 361–385.

--- “Canon and the Traditions of Musical Culture”, in GORAK, Jan (ed.): *Canon vs. Culture: reflections of the current debate*, New York-London, Garland, 2001, pp. 135–150.

--- *Music and the Middle Class: The Social Structure of Concert Life in London, Paris and Vienna between 1830 and 1848*, Aldershot, Ashgate, 2004 (2nd edition). (1st published in 1975).

--- *The Great Transformation of Musical Taste: Concert Programming from Haydn to Brahms*, New York, Cambridge University Press, 2008.

--- “Le savant et le général. Les goûts musicaux en France au XVIIIe siècle”, *Actes de la recherche en sciences sociales*, no. 181–182, 2010/1, pp. 18–33.

WEBSTER, James G.: “Structuring a Marketplace of Attention”, in TUROW, Joseph, and TSUI, Lokman (ed.): *The Hyperlinked Society: Questioning Connections in the Digital Age*, Ann Arbor, University of Michigan Press, 2008, pp. 23–38.

WEBSTER, James G.; PHALEN, Patricia F.: *The Mass Audience. Rediscovering the Dominant Model*, Mahwah (NJ), Lawrence Erlbaum Associates Pub., 1997.

Webster’s Encyclopedic Unabridged Dictionary of the English Language, New York–Avenel, Gramercy Books, 1996.

WEGMAN, Rob C.: “Sense and Sensibility in Late-Medieval Music: Thoughts on Aesthetics and ‘Authenticity’”, *Early Music*, vol. 23, no. 2, May 1995, pp. 298–304+306–308+310–312.

--- “‘Das musikalische Hören’ in the Middle Ages and Renaissance: Perspectives from Pre-war Germany”, *Musical Quarterly*, vol. 82, no. 3/4, special issue: “Music as Heard”, 1998, pp. 434–454.

--- “‘Musical Understanding’ in the 15th Century”, *Early Music*, vol. 30, no. 1, February 2002, pp. 46–60 and 63–66.

--- *The Crisis of Music in Early Modern Europe, 1470-1530*, New York, Routledge, 2005.

WEIDMAN, Amanda J.: “Guru and Gramophone: Fantasies of Fidelity and Modern Technologies of the Real”, *Public Culture*, vol. 15, no. 3, Fall 2003, pp. 453–476.

WEINGARTEN, Gene: “Pearls Before Breakfast. Can one of the nation’s great musicians cut through the fog of a D.C. rush hour? Let’s find out”, *Washington Post*, 8th April 2007, http://www.washingtonpost.com/lifestyle/magazine/pearls-before-breakfast-can-one-of-the-nations-great-musicians-cut-through-the-fog-of-a-dc-rush-

hour-lets-find-out/2014/09/23/8a6d46da-4331-11e4-b47c-f5889e061e5f_story.html [last access: October 2015].

--- *The Fiddler in the Subway*, New York, Simon & Schuster, 2010.

WEISZ, George: *Divide and Conquer: A Comparative History of Medical Specialization*, Oxford, Oxford University Press, 2006.

WEVER, Ernest Glen; BRAY, Charles W.: "Action Currents in the Auditory Nerve in Response to Acoustical Stimulation", *Proceedings of the National Academy of Science*, no. 16, 1930, pp. 344–350.

WEVER, Ernest Glen: *Theory of Hearing*, New York, Dover, 1949.

WHITE, Avron Levine (ed.): *Lost in Music. Culture, Style and the Musical Event*, London, Routledge and Kegan Paul, 1987.

WICKBERG, Daniel: "What Is the History of Sensibilities? On Cultural Histories, Old and New", The American Historical Review, vol. 112, no. 3, June 2007, pp. 661–684.

WICKE, Peter: "Sound-Technologien und Körper-Metamorphosen. Das Populäre in der Musik des 20.Jahrhunderts", in WICKE, Peter (ed.): *Handbuch der Musik im 20.Jahrhundert, Band 8: Rock-und Popmusik*, Laaber, Laaber-Verlag, 2001, pp. 11–60.

WICKE, Peter; SHEPHERD, John: Music and Cultural Theory, Cambridge, Polity Press, 1997.

WIENER, Norbert: *Cybernetics: or Control and Communication in the Animal and the Machine*, Cambridge, MA, MIT Press, 1948.

WIERZBICKA, Anna: *Emotions Across Languages and Cultures: Diversity and Universals*, Cambridge-Paris, Cambridge University Press-Éditions de la Maison des Sciences de l'Homme, 1999.

WILD, Jonathan: "Genus, Species and Mode in Vicentino's 31-tone Compositional Theory", *MTO: A Journal of the Society for Music Theory*, vol. 20, no. 2, 2014, accessible online at: http://www.mtosmt.org/issues/mto.14.20.2/mto.14.20.2.wild.php [last access: October 2015].

WILLIAMS, Alastair: *Constructing Musicology*, Aldershot, Ashgate, 2001.

WILLIAMS, Elizabeth A.: *The Physical and the Moral: Anthropology, Physiology, and Philosophical Medicine in France 1750–1850*, Cambridge, Cambridge University Press, 1994.

--- *A Cultural History of Medical Vitalism in Enlightenment Montpellier*, Aldershot, Ashgate, 2003).

WILLIS, Thomas: *Cerebri anatome,* London, 1664, accessible online:

https://archive.org/details/cerebrianatomecu00will [last access: October 2015].

--- *Two Discourses Concerning the Soul of Brutes*, translated by Samuel Pordage, London, 1683, reprinted facsimile edition by Scholars' Facsimiles and Rreprints, Gainsville, FL, 1971.

WILLIS, Paul E.: *Symbolism and Practice: A Theory for the Social Meaning of Pop Music*, Birmingham, Centre for Contemporary Cultural Studies–University of Birmingham, Stencilled Occasional Paper, "Sub and Popular Culture Series: SP 13", 1974.

WILSON, Robert A.; FOGLIA, Lucia: "Embodied Cognition", *The Stanford Encyclopedia of Philosophy* (Fall 2011 edition), edited by Edward N. Zalta, accessible online: http://plato.stanford.edu/archives/fall2011/entries/embodied-cognition/ [last access: February 2015].

WILSON, Timothy D.: *Strangers to Ourselves: Discovering the Adaptative Unconscious*, Cambridge, MA, Harvard University Press, 2002.

WINDSOR, W. Luke: "Through and around the acousmatic: the interpretation of electroacoustic sounds", in EMMERSON, Simon (ed.): *Music, Electronic Media and Culture*, Aldershot, Ashgate, 2002, pp. 7–35.

--- "An Ecological Approach to Semiotics", *Journal for the Theory of Social Behaviour*, vol. 34, nº 2, 2004, pp. 179–198.

WINSTON, Brian: *Media Technology and Society: A History from the Telegraph to the Internet*, London, Routledge, 1998.

WINTHROP, Robert H.: *Dictionary of Concepts in Cultural Anthropology*, Westport, CT, Greenwood Press, 1991.

WISEMAN, Boris: *Lévi-Strauss, Anthropology and Aesthetics*, Cambridge, Cambridge University Press, 2007.

WISEMAN, Boris (ed.): *The Cambridge Companion to Lévi-Strauss*, Cambridge, Cambridge University Press, 2009.

WITKIN, Robert: *Adorno on Music*, London, Routledge, 1998.

WITTGENSTEIN, Ludwig: *Lectures and Conversations on Aesthetics, Psychology and Religious Belief*, compiled from notes taken by Yorick Smythies, Rush Rhees and James Taylor, and edited by Ciryl Barrett, Oxford, Blackwell, 1983.

WITTJE, Roland: "The Electrical Imagination: Sound Analogies, Equivalent Circuits, and the Rise of Electroacoustics, 1863–1939", in *Osiris,* special issue on "Music, Sound, and the Laboratory from 1750 to 1980", vol. 28, 2013, pp. 40–63.

WOBER, Mallory: "Sensotypes", *The Journal of Social Psychology*, 1966, vol. 70, no. 2, pp. 181–189.

WOLFE, Charles T.; GAL, Ofer (eds): *The Body as Object and Instrument of Knowledge: Embodied Empiricism in Early Modern Science*, Dordrecht-Heidelberg-London-New York, Springer, 2010.

WONTORRA, Maximilian: "Early apparatus–based experimental psychology, primarily at Wilhelm Wundt's Leipzig institute", in C. Pléh, L. Gurova and L. Rapolyi (eds.), *New Perspectives on the History of Cognitive Science,* Budapest: Akademiai Kiado, forthcoming

WOOLF, D.R.: "Speech, Text, and Time: The Sense of Hearing and the Sense of the Past in Renaissance England", *Albion: A Quarterly Journal Concerned with British Studies*, vol. 18, no. 2, Summer 1986, pp. 159–193.

WOOLGAR, C.M.: *The Senses in Late Medieval England*, New Haven, CT, Yale University Press, 2006.

The World of Music, special issue on "Hearing and Listening in Cultural Contexts", edited by Max Peter Baumann and Linda Fujie, vol. 41, no. 1, 1999.

WOUTERS, Cas: *Informalization: Manners & Emotions since 1890*, Los Angeles-London-New Dehli-Singapore, SAGE, 2007.

WRIGHT, John P.: "The Embodied Soul in Seventeenth-Century French Medicine", *Canadian Bulletin of Medical History / Bulletin canadien d'histoire de la médecine*, 1991, Vol 8, pp. 21–42.

WUNDT, Wilhelm: *Essays*, Leipzig, Engelmann, 1906, 2nd. ed., accessible online: http://archive.org/details/essayswund00wunduoft [last access: October 2015].

--- *Outlines of Psychology*, translated with the cooperation of the author by Charles Hubbard Judd, Leipzig–London–New York, Wilhelm Engelmann–Williams & Norgate–Gustav E. Stechert, 1897, accessible online: http://archive.org/details/cu31924014474534 [last access: October 2015].

--- *Principles of Physiological Psychology* (1902), translated by Edward Bradford Titchener, London–New York, Swan Sonnenschein & co.–Macmillan, 1904, accessible online: http://psychclassics.yorku.ca/Wundt/Physio/ and http://archive.org/details/principlesofphys01wund [last access: October 2015].

YATES, Frances A.: *The French Academies of the Sixteenth Century*, London, The Warburg Institute-University of London, 1947 (Nendeln, Liechtenstein, Kraus Reprint, 1973).

YOUNG, Robert M.: *Mind, Brain and Adaptation in the Nineteenth Century: Cerebral Localization and Its Biological Context from Gall to Ferrier*, New York–Oxford, Oxford University Press, 1990 (1st ed. 1970).

ZARAGOZA BERNAL, Juan Manuel: "Historia de las emociones: una corriente historiográfica en expansión", *ASCLEPIO. Revista de Historia de la Medicina y de la*

Ciencia, no. 65(1), January-June 2013, accessible online: http://asclepio.revistas.csic.es/index.php/asclepio/article/viewArticle/547/571 [last access: February 2015].

ZARLINO, Gioseffo: *Le istitutioni harmoniche*, with introductory essays by Iain Fenlon and Paolo Da Col, and critical edition and index by Paolo Da Col, Bologna, Arnaldo Forni, 1999.

ZBIKOWSKI, Lawrence M.: *Conceptualizing Music: Cognitive Structure, Theory and Analysis*, Oxford, Oxford University Press, 2002.

ZELDIN, Theodore: *A History of French Passions, 1848–1945*, Oxford, Clarendon Press, 1993, 2 vols: *vol. 1: Ambition, Love, and Politics*, *vol. 2: Intellect, Taste, and Anxiety*. (Originally published by Oxford University Press, 1973–1977).

--- "Personal History and the History of the Emotions", *Journal of Social History*, vol. 15, no. 3, Spring 1982, pp. 339–348.

ZEMP, Hugo: *Musique Dan. La musique dans la pensée et la vie sociale* d'une *société africaine*, Paris, Mouton, 1971.

ZENATTI, Arlette (ed.): *Psychologie de la musique*, Paris, PUF, 1994.

ZIEMER, Hansjakob: *Die Moderne hören: Das Konzert als urbanes Forum 1890-1940*, Frankfurt-New York, Campus Verlag, 2008.