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The Functions of Music in Interactive Media

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Abstract. The combination of music with interactive media enables new forms of expression, can expand the bandwidth of information flow by disencumbering and complementing the visual channel, and support the user/player in controlling and managing complex structures (e.g., in strategy games). Its associative power can be used to influence playing behaviour and decision processes. This, amongst others, educationally interesting potential lies idle!
In this media theoretical and critical elaboration we intend to close the gap between music in static linear and non-linear interactive media. We will give a brief overview on media music perception, detail its historical development with regard to interactive media, elaborate and exemplify its narrative functions in order to widen the scope of the field where music meets interactivity.

Key words: Interactive Media Music, Perception, History, Narration

1 Introduction

Amongst all the arts, being interweaved by their cooperative coexistence in multimedia, music is one of the oldest and most frequently underestimated. In combination with image and sound it leads a nebulous shadowy existence, seemingly aimless or at least difficult to explain by terms like *background music*. Its tremendous importance only becomes apparent when taking it away, i.e., muting the music, and experiencing the disillusioning lack of this unconscious something [1].

What are the reasons for this difficulty of describing its value and even necessity in modern media? In Section 2 we will briefly introduce this special case of human perception of music that is performed in combination with other media. This so-called *media music* looks back on centuries of evolution and development, a history that inevitably led to the art of film scoring, the cultural-historical predecessor of interactive media music, especially games music. Section 3 will outline this historical background that furthermore enables us to recognize parallels between the development of film music and games music. Thereby, it allows us to take a look into the future of interactive media music in Section 4.

This future does not primarily lie in some change of musical language or style, but in advanced functionalities. Actually, the conception of interactive

media music hangs behind that of its ancestors, i.e., opera and film music. Although the combination of music with interactivity offers a wide range of new forms of expression, today's practice does not even make use of the traditional cinematic conventions. The majority of current computer and video games use music for banal entertainment purpose instead of a powerful tool for narration and expression. In Section 5 we encourage and show ways to evolve the possibilities of expression in interactive media by music. We elaborate the established narrative functions of music and extend this catalog by new functions, which are directly related to user interaction. Section 6 will conclude this elaboration.

2 Music Perception

What do we need background music for? Considering the fact that it is not perceived consciously, that it usually stays behind dialog, sound effects, and even images, this question stands to reason. And it is not easy to answer. It is the complexity of human perception, the interplay between the different perception channels for visual and auditory sensation on the different levels of consciousness, that does not allow an easy answer.

Visuals and dialog tend to be perceived consciously, whereas, ambient noise and background music are typical examples for a peripheral perception. However, this subconscious perception does not imply a reduced importance within the dramaturgy. The more subconsciously music acts, the more it can condition the audience in a desired manner and stimulate their perceptual direction [2].

The part of the brain, that is responsible for rational perception, is the cerebrum, whereas, the affective and emotional perception can be located in the limbic system. Background music is intended to be perceived subconsciously to directly access the limbic system, by-passing the rational thinking, and affecting its immanent emotional load [3]. The suggestive power, which is thereby emerged through music, can sensitize the audience to emotional and analogous contents of the visuals [2]. Users of interactive applications can experience this even more intensive, since they do not only pay attention to visuals and dialog, but also to their own acting.

Furthermore, the combination of music with the other media spans an association space that clears away its haziness, giving it an amazing clearness of content [4] which the musicologist and linguist Norbert Jürgen Schneider calls a *semantization process* [2]. The combination of different media enables the expression of contents, coherencies, statements, and their interdependencies as complex as none of the single media could express on its own. Music becomes meaningful as a narrative medium that does not even express emotions and mood, but also becomes a means for expression of associations and comments.

These possibilities were not available from the very beginning of media music. They had to be discovered and developed over centuries and to be established in the general listening habit. The following section will outline this historical evolution and help us to understand why media music is perceived and understood in the way it is.

3 History of Media Music

The linkage of music with other media has a tradition as old as the music itself. With text and speech song emerges. In the Greek drama it is linked to stage scenery and the dramatic plot. Within dance and ballet, music becomes a regulator for movement and gesture.

The step from the scenic stage works of the renaissance towards opera interweaves music, plot, and text closer than ever before. Thus, the linkage of music and dramatic plot took place already at the stage of theater [4]. Even the church music of this time participated in this development process with musical forms like oratorio and history. Thus, from the present view, the *Christmas History* of Heinrich Schütz (SWV 435) can be understood as the score of the nativity play.

In these forms, i.e., opera, oratorio etc., music is the dominating art. It is not just restricted to the illustration of textual content, but contemplates it. The composer becomes an annotator, a preacher, who construes and interprets the words by musical means. Many examples can be found in the vocal works of Felix Mendelssohn Bartholdy.

Compared with this, music in drama and stage play has a less organic and intrinsic role. But it still has its artistic tasks. It prepares the audience for the emotional mood of the scene or summarizes it. It accompanies monolog and dialog and performs punctuation tasks [4].

Film is related to theater. However, the first occurrences of music in films—more precisely silent movies—were evidence of a retrogression of established theatrical traditions and conventions that had to be rediscovered. The primary task of musicians in movie theaters was to drown out the noise of the cinematograph. They were free to play any music that fits reasonably to the mood of the scene. Special scores for the particular film were rare. The selection of music depended on personal favors, mood, musical repertoire and skills of the individual musicians. Classical works were performed next to banal pop songs and modern dances. They appeared in smaller and larger fragments and broke off in-between phrases quite often [4].

It is quite evident that these musics were not composed and thus hardly suitable to accompany the film medium. Soon the film makers became aware that there should be neither an antagonism of character and expression between music and film, nor an indifferent relation [4].

In their analysis from 1947, Adorno and Eisler already pointed out that traditional music structures do not work within the film medium [5]. The music had to become formally more open and unsealed. The composers had to learn to follow rapid short-term scene structures without the time for an extensive exposition or thematic treatment.

A first trial were the music archives[1] that were specially conceived for the needs of film accompaniment with musics ordered by their expressive and programmatic character. But this music was still piecemeal, working with exhausted mainstream cliché, unable to give the film individuality. If music was composed

[1] The first of these archives was the *Sam Fox Moving Picture Music* founded in 1913.

especially for the film, it was attached to the footage as cue sheets or gramophone plates. The synchronization was still very problematic.

Finally, the talkie laid the technical base for the complete synchronization of picture and sound. It also introduced the layers of speech and sound to the film. The music, so far amongst other things having the task to remedy the spooky aloofness of the silent pictures [5], was now free for a more selective and dramaturgically sophisticated use. The more it was displaced out of the focus of conscious perception towards subconsciousness, the more grew its value and importance for the film as a whole.

Today, music is an inherent part of films and developed a multitude of different forms and aesthetics according to the manifold film genres (e.g. feature film, video clip, cartoon) and functions that it accomplishes (this is detailed in Section 5). Thus, the music in films has its models, ancestors, prehistory, history, and perspectives of development; it has its commonly accepted conventions, which evolve in time [4]. For music in interactive media, especially in computer and video games, a similar development process emerges, giving us the opportunity to discover prospective promising perspectives of interactive media music.

4 History and Future of Interactive Media Music

The music in interactive media has its models as well. Its direct ancestor is the film music. It has its history and perspectives of development. Its first occurrences suffered from severe technical restrictions.

At first, the unrealistic surreal sound effects of early video games, like *Pong* (by Nolan Bushnell, 1972) or *Super Mario Bros.* (Nintendo, 1985, music and sound effects by Koji Kondo), were a concession to the limited technical possibilities. But soon they established their own self-contained aesthetics for sound design that is closer related to music and cartoonish micky mousing effects than to cinematic sound design. They substitute not just real, but also non-existent sound effects, e.g., gesture illustrations like the upwards sliding tone (in musical terms: glissando) that illustrates a jump movement, and motivic cues that reward picking up a power-up[2]. Sometimes these sound effects were designed in a way to harmonically affiliate to the actual background music.

In the beginning, this background music was forced to be quite simplistic because of technical restrictions. In *Asteroids* (Atari, 1979) it consists of only two alternating tones, permanently disturbed by shot and explosion effects. Both could not sound simultaneously; the audio output of this game had to come out with only one channel.

The music of *Space Invaders* (by Toshihiro Nishikado, 1978) is an endless repetitive sequence of four stepwise descending tones, illustrating the approaching of hostile UFOs. The nearer they come, the more do game-play and musical tempo increase, causing a hectic pace. Karen Collins gives further exemplary discussions of aesthetical aspects of C64 and Atari games music [6,7].

[2] Power-ups are objects in the game world, lending the player some special abilities or an extra live by picking up.

Space Invaders is one of the first and rare examples from the first decades of games music, that demonstrates a dramaturgic use. In contrast to this, the usual musical accompaniment is just a nice-to-have background feature without any dramaturgic or narrative reason, as can be observed still today, e.g., in the *Command & Conquer* strategy games between the years 1995 and 2000 (Westwood Studios, musics by Frank Klepacki), and especially in racing games like the *TrackMania* series (Nadeo, 2003–2008). Regardless of the difficulty level of a track or the player's aptitude, regardless of the gaming situation, the music plays on unaffected.

Most games allow the player to switch off the musical accompaniment in the setup menu. The action-role-playing game *Titan Quest* (Iron Lore, 2007, music and sound design by Scott Morton) does even offer a slider to adjust how often music should be playing within the game. Of course, this optional kind of music cannot be of any importance for the playing experience. Its contribution to the whole medium is deemed to be redundant or at least insignificant. The game must be and is playable and understandable without it.

Responsible is a lack of professionalism in the conception of games music. Often the quite technically coined milieu of game development put off professional musicians, which are non-programmers in general. As well as film music did more than half a century before, interactive media music started from the outset apart of all the achievements of hundreds of years of music history.

A turning point was the improvement of sound cards/chips with more sophisticated sound synthesis abilities (e.g., the AdLib sound card, 1987) and the introduction of the MIDI standard by the *MIDI Manufacturers Association* in 1982. It constitutes a homogeneous musical interface for home computer systems as well as for professional sound studios, enabling musicians to create musical data without programming abilities via high-level interfaces (e.g., graphical sequencer and notation software).

Not just the composition of games music became more professional now, but also its performance within the games. One of the highlights of the MIDI and audio based music engines was and still is the *Interactive Music Streaming Engine* of Michael Land and Peter McConnell, called *iMuse* [8]. It offers a number of automated arrangement techniques, enabling the composer to write music that can be performed and organically adapted to the gameplay without any unmusical breaks or cuts. It was the reversion to the insight that film music made approximately fifty years before: There should be neither an antagonism of character and expression between music and film, nor an indifferent relation [4]. This applies to interactive media as well.

But with the upcoming of the CD-ROM medium in the 1990s interactive media music made a step back. The big memory capacities, now available, led game developers into temptation to use memory intensive audio formats like Wave, MP3 or CD-Audio tracks. These provide high-quality sound but are prerendered, thus, completely static. Consequently, the indifferent relation between music and interactive scene, the abrupt unmusical cuts within the musical accompaniment are still predominant today, as can be observed in lots of expensively

produced up-to-date games, like the two *The Elder Scrolls* role playing games *Morrowind* (Bethesda Softworks, 2002, music by Jeremy Soule) and *Oblivion* (Bethesda Softworks, 2006, music by Jeremy Soule).

An organic assignment of music to the interactive scene is a necessary requirement for the success of a more sophisticated musical conception that goes beyond simple entertainment and deals with weighty narrative and dramaturgic tasks. As well as film music once had to outgrow the structural limitations of traditional music, interactive media music has to find new structural approaches that are able to deal with the unpredictability in interactive media.

The philosophy behind *iMuse* lives on. Composers became aware of the necessity to compose in a latent way so that asynchronous cuts do not appear too flashy. Or the hard cut is smoothed by a short cross-fade and becomes a soft but still asynchronous cut as can be heard in *SpellForce 2* (Phenomic Game Development, 2006, music by Tilman Sillescu). Other composers write their music as a non-predefined sequence of self-contained fragments that can be rearranged in real-time according to the gameplay comparable to classical musical dice games, like those of Kirnberger [9], Mozart [10], Joplin [11], and Ratai [12]. The more complex and flexible arrangement approach of *iMuse* is still today one of the most sophisticated and successful. Newer solutions from the last few years incorporate an extensive use of multi-track arrangement and real-time mixing, as presented by Aav [13], Berndt et al. [14,15], Tobler [16], and Wingstedt [17].

In comparison to film music, interactive media music is still at the beginning of its development. By a growing musical professionalism it rediscovers the established conventions of ancestors like film music. It is going to find its own ways to coalesce with the interactive medium. This will pave the way for a more sophisticated use in terms of narration and dramaturgy. The next Section will put the spotlight on this, systematize the functions music can accomplish in interactive media, and describe examples for application scenarios.

5 Narrative Functions of Music in Interactive Media

In every artistic work its piece-parts and formal aspects are not just present for aesthetic reasons or as an intellectual exercise of the artist, but to support mediating its content. This is known as the *dialectic unity of form and content*.

Hence, music is not included in multi-medial environments just as an end in itself. It performs vital narrative functions established in autonomous music, drama, theater, opera, and film scoring. Interactive media music still lacks the rich diversity of means of expression, blunting, and diluting the medium to a primitive banal entertainment machine instead of being a sophisticated medium for ambitious artistical, philosophical, or socio-critical matters.

Section 5.1 will provide an introduction to the narrative functions of film music. It will briefly present the most important systematizations and describe their application in interactive media. This will be furthermore extended by new functional relations, which become possible by considering also the interactive moment, in Section 5.2.

5.1 The Cinematic Heritage

Depending on the level of abstraction, the narrative functions of music can be explained very detailed or in more general categories. A very basic and widely accepted high-level classification is that of Eisenstein, Pudowkin, and Alexandrow, written down in their famous manifesto [18].

They distinguish between two categories: *Parallelism* and *Counterpoint* in terms of the relation between music and images. Parallelism comprises music that follows and expresses the visual content (e.g, its mood, themes related to visible characters etc.), whereas, the audio-visual counterpoint describes music that controverts the scene. It enriches or even changes the meaning of the images and comments: a happy scene that is accompanied by sad music is perceived as very serious, hiding an invisible danger.

Since this very strict mutually excluding classification could not cover all forms of film music, it was extended by several musicologists like Pauli [19] and Thiel [20]. They introduced a third category—which Thiel calls *Affirmative Picture Interpretation and Illustration*—comprising music that adds new non-visible content but does not contradict the scene.

This very coarse scheme is hardly suited to distinguish the manifold intentions behind the use of music. That is why Zofia Lissa's very meticulous detailed categorization [4] became important. She distinguishes the following eighteen categories of functions the music could perform (or are related to music):

1. Musical illustration of movement and sounds (known as *Micky Mousing*),
2. Emphasis of movement,
3. Stylizing of real sounds,
4. Representation of locations (geographic, ethnic, social),
5. Representation of time (for historical associations),
6. Deformation of sound (for alienation effects),
7. Comment (audio-visual counterpoint),
8. Source music (diegetic music),
9. Expression of (actor's) emotions,
10. Means of immersion,
11. Symbol (e.g., national anthems),
12. Anticipation of subsequent actions,
13. Enhancement and demarcation of the film's formal structure,
14. Multi-functionality of music (the functions are not mutually excluding),
15. Sound effects (and the mixing with music),
16. Speech/Dialog (e.g., punctuation tasks of music),
17. The function of silence ('The rest belongs to the music as well.' Stefan Zweig),
18. Non-functional aspects (for inner-musical and aesthetic purpose).

Even today, about fifty years after Lissa's investigations, her functions are still up to date and only need to be supplemented by a few new and advanced functions of contemporary cinematic practice. Especially the influence of music on the perceived tempo of the elapse of time (extensively used in action movies) and the guidance/manipulation of the audience's attention have to be added.

A similar approach is presented by Wingstedt [21]. He also describes a very detailed differentiation of musical functions. In addition, he introduces a higher-level abstraction, sorting the variety of functions into more abstract classes:

Emotive Class:
– emotionalize content and acting;
Informative Class:
– communication of meaning;
– communication of values;
– establishing recognition;
Depictive Class:
– describing settings;
– describing physical activity;
Guiding Class:
– attention guidance;
– mask (out) unwanted or weak elements (e.g., projector noise, bad acting);
Temporal Class:
– provide continuity;
– define structure and form;
Rhetorical Class:
– comment, make a statement, judge.

In connection with his temporal class, Wingstedt states furthermore: 'In interactive non-linear media, such as computer games, music's ability to provide continuity is an important quality with strong potential.' [21] It helps to integrate the disrupted episode-likeness of the cut scenes to the film as a whole. It connects visually separate locations of a virtual world, establishing a bigger continuous and more believable whole.

Likewise all the musical functions can be transferred to interactive media. However, current computer and video games rarely apply at least a few of them. Thus, the pool of narrative musical means is extremely underdeveloped. Too often, music is played for banal entertainment and to end in itself. Even professional issue-related literature joins in this trot [22,23].

The only established functions in games are those providing the feeling of immersion into the scenario and a superficial dramatization of action scenes. The *The Elder Scrolls* sequels *Morrowind*, *Oblivion*, and the games of the *Gothic* series (Piranha Bytes, 2001-2006, musics by Kai Rosenkranz) are examples for such a music usage. Occasionally, some functions of Wingstedt's informative class appear, in terms of a parallelism based recognition establishing use of the leitmotif technique (e.g., in LucasArts' *Star Wars* and *Monkey Island* games). Hence, interactive media are far behind their possibilities and even behind ancestors, like opera and film. Especially the contrapuntal functions seem completely unknown to game developers. To encourage a more extensive use of the whole range of narrative musical functions, we conclude this section, by describing three more examples of their application within the interactive scenario.

– The masking of weak elements can help to lend more emotional authenticity to the virtual characters and to conceal graphical insufficiencies. This can

supersede such believability reducing interface diagrams to indicate the emotional state of non-player characters, as can be found in several role-playing games.
- The guidance of attention can support the player at handling the interface or managing complex structures (e.g., in strategy games) and discharge the visual channel by auditive feedback. Jørgensen discovered this great potential in a user study and proved that auditive feedback helps the player to comprehend non-visual processes and coherencies [1].
- By associating non-visual contents of the scene (e.g., traffic outside of the window, footsteps behind the door) it can become more present and immersive. Sound and music help to blur the picture frame—the borders of the virtual world—and suggest a world beyond.

5.2 Take a Stand on Interaction!

In addition to those functions which are already established by previous forms of media music and by common listening habit, its combination with the interactive medium—its combination with interactivity—enables further so far unknown forms of expression that are impossible in linear media.

Since the player is primarily part of the real world he perceives diegetic as well as non-diegetic information. He perceives the comment of a non-diegetic contrapuntal music. Here a major distinction to linear media emerges: film music cannot be heard by the actors on screen (unless its source is part of the scene and it becomes diegetic). Thus, it has no influence on the plot. But in interactive media—like games—the player acts in the virtual world and non-diegetic information can influence the diegesis over him. Interactive media music necessitates a different conception!

Jørgensen explains that sound and music in games is perceived and understood in the same way as in films [1]. The player may recognize a change of the background music, e.g., to a darker more dissonant theme and is automatically warned of some upcoming danger. He is conditioned by the narrative conventions of (western) film culture, will understand the music's statement, and, in the case of this example, change his playing behavior and be more careful. This uncovers the danger that music could betray to much and make the game unintentionally predictable and the playing experience less challenging, thus, uninteresting. Such a situation is only possible in interactive media.

But up to now music still refers only to the virtual scene, surrounding the player. This is still film music! It is conceived for the outside spectator, helping him to immerse in the scene and to understand it. However, he remains a passive spectator. The player/interactor, by contrast, is far from being passive. He acts in the virtual world and, thus, becomes a part of it. Why should music demote him to an external outsider as it is doing when referring to everything else in the scene, but ignoring the player. It does not dare to refer to him, to influence him or to morally judge him.

Music can communicate more than just a deeper understanding of the fictive world, the plot, or (emotional) conditions of non-player characters, but also a

deeper understanding of the player himself and his acting. By music's associative power it is possible to make it clear for him what his actions cause and mean in the context of the game's diegesis, the narrative, the state of the virtual world and its inhabitants. It can laud the player for doing something good and reprove him for bad/morally condemnable actions.

Moreover, music can be used as a regulator for the player's attention, emotional state, and playing behavior. A very slow and careful player can, e.g., be forced to hurry by music that dynamically reacts and speeds up when deliberate slow movement is detected. This can mediate a more personalized playing experience. It can be a powerful instrument for the game developer to ensure and fine-tune the type of a particular scene (action, creepy, sneaky) even if the player acts in a different unintended way. Music can be used dynamically to steer playing behavior. Some further examples will give an impression of the big potential:

- The stylization of a movement, a sound, or an action caused by the player (e.g., a shot, moving a lever), could be the base of an ongoing musical cue—a moment from when everything is in consequence of this particular action. Up to now, computer games hardly mediate consequential relations that directly although the state of the virtual world and the progress of the narration depend on interaction. Often, consequences of player decisions arise hours of gameplay later and the visual recognizability usually lacks. A semantisized thematic/motivic auditive feedback can perform this function and thereby increase the believability of the game's mechanics.
- The influence of non-diegetic music on diegetic elements over the player is only possible in interactive media. Such effects should not be left to chance. Music can affect the players behavior and, thus, influence his way of playing. During a key scene the players decisions are all-dominant and require a special accentuation compared to the overall game-play. If the player is too careless, the music can become more serious to mediate the severity of the situation and force him to act with more caution. In this way key scenes can be stressed.
- Emotive and informative musics can influence the player's decisions by accenting some associations and masking out others. After his decision it can make a moral comment. This bares strong potential for educational and therapeutic purpose.

Because of its subtleness music reaches the player on a more personal and intimate level. A moral comment is not just related to an actor on screen, but to the player himself and his particular acting. The emotive power of music can mediate real pride and regret for his actions. It is personally touching and enables more intense experiences than film can ever provide.

Till this day this potential is widely unused! Interactive media music should not be conceived as a static predefined accompaniment. The game developers should be aware of the ontological difference between linear and interactive media in all its facets and apply music as an active essential participant in the multimedial interplay and dialog with the player.

6 Conclusions

This paper presented a media-theoretical attempt towards closing the gap between linear and interactive media music. The analysis of music history—especially of film music—provided an insight into the development of (western) human listening habit and the way media music is perceived today. Furthermore, film music history features many parallels to the development of interactive media music (technical limitations in the beginning, rising professionalism, dealing with the problem of synchronization). This gives us the opportunity to look into the future:

- The synchronization and organic correlation of musical elements with visual and interactive content is one of the most challenging technical problems and has to be resolved. For the success of advanced musical conceptions an organic musical flow and coherency is essential (dialectic unity of form and content).
- Therefore, new musical structures have to be found. The future of interactive media music lies in its structural advancement to enable flexible organic music performances. Algorithmic adaption techniques (whether of an arranging or a pseudo-compositional nature) will become more important in this field.
- Interactive media music has to rediscover the rich pool of narrative functions and furthermore expand its responsibilities to be of sensible enriching use in the interactive medium.

We have demonstrated the application of the traditional narrative functions within interactive media. Moreover, we have shown that interaction must be an integral part of the music conception to open up the great potential currently unused. This enhances the player's experience and the feeling of being an active part of the virtual world. It affects his playing behavior and responds on a very personal and intimate level.

The way music is used in interactive media makes the difference between banal entertainment and profound artistic expression. Music conception is an important instrument to raise the quality of future computer and video games so that their artistic quality really deserves the certificate art.

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