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Exploring co-performer communication

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• ABSTRACT

This paper examines the development and implementation of general social and specific non-verbal communication between two expert pianists who prepared and gave a recital of piano duo and duet music. All ensemble rehearsals and the final performance were video-taped. Following the performance, the musicians were interviewed in order to document their thoughts on the learning and performance processes. From the video-taped rehearsals and performance, data concerning musical coordination, social interaction, non-verbal gestures and looking behaviour were coded and counted. The results show that these excellent sight-readers used rehearsals to consolidate the timing, phrasing and sense of musical style. Moreover, an emergent set of coordinated, non-verbal gestures and eye-contact developed, with these actions increasing significantly over the rehearsal process at locations in the music identified by the pianists as "important for coordinating performance and communicating musical ideas". Thus, the two performers acquired a deepening expressive and communicative assurance along with a familiarisation with the musical material. The findings are discussed in relation to their implications for musical performance by highlighting the elements of co-performer interaction that were negotiated and coordinated throughout the rehearsal process.

Recent interest in performance skill acquisition, social interaction and expressive body movement has opened up new areas of research in music performance — namely, that of the methods by which skilled musicians communicate in ensembles. In such situations, verbal, musical and visual cues are often established and shared between co-performers to enable and drive successful rehearsals and performances (see Goodman, 2000).

Verbal feedback is, of course, a fundamental mode of communication for rehearsal situations. Murnighan and Conlon (1991) studied group function among string quartet players and found that musical ideas were often discussed explicitly for points of clarification and unity. Davidson and Good (1997) carried out an analysis of a string quartet rehearsal and performance and discovered many levels of spoken

interaction, including talk about coordination of musical content, friendship conversations and even a sexual dynamic *(i.e.* the speech of two of the players).

It is important to note, however, that previous research into music ensembles has concluded that much of the exchange between musicians is unspoken. Co-performers can, although playing from a fixed musical score, share elaborate musical exchanges that have the quality of spontaneous, spoken conversation and include interrogation and unplanned fluctuations in factors such as tempo, dynamics and pitch (Murnighan and Conlon, 1991). A substantive literature has aimed to reveal how skilled performers communicate their musical ideas through non-verbal means by systematically investigating these factors (*e.g.* Deutsch and Clarkson, 1957; Shaffer, 1980, 1981, 1984; Clarke, 1982, 1985; Kamenetsky, Hill and Trehub, 1997). In fact, musicians rehearse and consolidate their ideas to such a highly consistent degree that Shaffer (1984) discovered similar expressive timing profiles across successive performances that were months apart.

Visual cues

Besides exchanging information verbally and musically, co-performers often rely on visual information — such as direct eye-contact, facial expressions, specific physical gestures and continuous swaying movements — for communication amongst themselves. Clayton (1985) discovered that without visual feedback co-performers found it difficult to co-ordinate musical timing. With regard to direct eye-contact and facial expressions, Yarbrough (1975) demonstrated that high levels of eye-contact and use of facial and bodily expressions are integral for effective co-performer interaction.

As for specific physical gestures, Davidson (2001) has classified those used by musicians into two broad types: illustrators and emblems. *Illustrators* are those that trace ideas. They are often self-explanatory gestures of emphasis (*e.g.* the downward nod of the cellist in a quartet to signify that the phrase begins "now"). *Emblems* are non-verbal symbols with direct musical or speech translators (*e.g.* a "thumb's up" would symbolise a positive or good response). They are used in a more varied manner than illustrators, with some being frequently embedded in everyday body movement and others being far more abstracted. Therefore, while working with co-performers, an individual may need to introduce some emblems over a period of time for their meaning to become apparent.

Research by Davidson (1993, 1994, 1995) has shown that specific gestures reveal much about performers' expressive interpretation of musical structure. For example, in a performance of one of Beethoven's *Bagatelles* for piano, a pianist used highly distinctive head shaking movements consistently when playing a cadence and a wiggle movement of the upper torso when executing ornaments. For this performer, these movements were integral to the production of the music. Moreover, when pianists in a specifically controlled situation (*i.e.* learning a piece of a two octave range that did not require shifts in body position) were constrained from moving

their torsos during sight-reading, learning and performance, the final performances were judged by audiences to be far less musically expressive than those where the performers had been allowed to use their torsos freely (Davidson and Dawson, 1995).

In addition to identifiable gestures, Davidson (1994, 2001) found that musicians' continuous swaying movements can provide audiences with constant expressive information about performance intention. The research of Cutting and Kozlowski (1977) was used to explain the overall expression found in swaying. Cutting and Kozlowski's work, which investigated walking performance and perception, showed that any part of the movement cycle in locomotion can offer expressive information (in their work, the "expression" was the walker's identity). In further studies, Kozlowski and Cutting (1977, 1978) discovered, by viewing the walkers in point-light display, that even a single body joint can provide enough information to allow observers to determine the walkers' gender. Cutting, Proffitt and Kozlowski (1978) explained these gender results by demonstrating that there is a point (referred to as the centre of movement) within a walker's body that acts as a reference around which movements in all parts in the body have regular geometric relations. The point is located in the torso and is different for men and women, with its location being determined by the relative widths of the hips and the shoulders. In other words, the body contains a physical centre for expressive information.

The swaying action commonly found in pianists would support this hypothesis, for an equal distribution of expressive information in piano playing seems unlikely since the body is not engaged to equal degrees in producing music. The legs and feet, for instance, are required only to make pedalling movements. Also, the body is fixed to the piano stool; therefore, it is likely that a centre of movement would be related to sitting position and would not involve the lower limbs. Davidson (in press) found this to be the case with a single pianist, but it is important to know whether this finding would generalise to others.

Runeson and Frykholm's (1983) *Kinematic Specification of Dynamics* (KSD) — allied to the work of Cutting and Proffitt — asserts that "movements reveal their causes". So, the quality of a movement may well indicate an explicit or implicit personal intention. It is useful to bear KSD in mind when considering the interface of continuous swaying movements of performers and specifically identifiable gestures within those movements. Clearly, both may provide a vocabulary through which performers articulate their ideas.

Nevertheless, some features of the musical score can be more or less emphasised in moment-by-moment and quite spontaneous modifications during performance (Sloboda, 1985). Rehearsals, therefore, appear to be occasions for co-performers to learn the score, coordinate general expressive features of the music and establish a network for social support (*i.e.* emotional, appraisal, informational and instrumental; see Reis, 1984; Cohen and Wills, 1985). In a live performance situation, variations that occur spontaneously can be critically dependent on the

extent to which these objectives have been met, thereby freeing performers to detect and act immediately upon the ideas of others (Davidson and Good, 1997).

The present study

In research terms, the social communication aspects of rehearsal and performance have been largely ignored (Davidson, 1997). This paper aims to provide insight into these salient aspects of musical skill and development by examining and detailing video data, collected from two pianists while rehearsing and performing piano duos and duets. This study focuses on the exchanges between the players during rehearsals and a subsequent performance of an entire recital programme, exploring how they worked together and how they may have adapted to one another's ideas and movement styles.

Of course, both spontaneous and planned behaviours of all kinds — be they verbal, musical or visual — are embedded within a socio-cultural framework. Thus, when considering coordination between co-performers, researchers must be aware of overriding socio-cultural factors that shape the interaction processes (*e.g.* social etiquette and a learned cultural aesthetic). For this study, a piano duo and duet was chosen specifically because both performers contribute similar musical elements to the performance and both use comparable instrumental techniques. The limited scope of this paper, with its focus on one tradition (Western art music) and one type of musical ensemble, is intended to provide only an initial framework on which further empirical and theoretical explorations may be based.

Method

• **Participants.** Two male pianists (Anthony and Jonathan) with a mean age of 23 years were recruited for the study. Both had a wide range of solo and accompanying experience, with Jonathan having recently won an international piano accompanying prize. Both had played the piano since the age of seven, and so, had about sixteen years of learning and performing experience. They were always in demand as performers, accompanying at least two concerts a week and playing solo repertoire. Neither had recent piano duo or duet experience, although both had played duets when they were children and had played through duets with colleagues for fun. Although they had met informally on two previous occasions, they did not know one another prior to working on the current project.

• **Materials.** A VHS camcorder was used to record the pianists' ensemble rehearsals and performance, including all spoken and musical interactions. One camera was used so that the pianists' gestures, swaying movements and eye-contact could by assessed and transcribed by the researchers from one source, without the need to synchronise video displays. For each rehearsal and performance, the camera was positioned so that both pianists were equidistant from the camera and captured

within the frame. The camera was always placed between 4-10 metres from the pianists. Two portable cassette recorders were used to record all independent, individual practice.

• **Procedure.** The researchers approached the pianists, offering them the opportunity to perform a 30-minute lunchtime recital of piano duos and duets at the University of Sheffield. Both agreed and were set a performance date for ten weeks later. They were asked to select their own repertoire, arrange their own rehearsals and prepare as normally as possible, but with the additional request of recording all joint rehearsals and the performance on video and all individual practice sessions on cassette tape. No restrictions or special instructions were given with regard to the content of practice sessions (either in terms of the spoken interaction or the music that was rehearsed). The pieces they selected to perform were (1) *Variations on a Theme by Beethoven* by C. Saint-Saëns for two pianos, (2) the second movement of J. S. Bach's *Concerto in C* for two keyboards and (3) *Sonate* for four hands by F. Poulenc. Table 1 lists general characteristics of the selected pieces in the order in which they were performed, the specific parts played by each performer and the total time spent practising each piece.

Table 1
General characteristics of the selected pieces in the order in which they were performed, the specific parts played by each performer and the total time spent practising each piece

Composer	Composition	Ensemble	Parts Played	Length	Practice Time (hours:min:sec)
J. S. Bach	*Concerto in C* (Second Movement)	2 Keyboards	Piano 1: Anthony Piano 2: Jonathan	63 bars	0:28:04
F. Poulenc	*Sonate* (Prelude, Rustique and Final)	4 Hands	Upper: Anthony Lower: Jonathan	165 bars	0:41:65
C. Saint-Saëns	*Variations on a Theme by Beethoven*	2 Pianos	Piano 1: Jonathan Piano 2: Anthony	702 bars (without repeats)	1:12:30

Based on observations of the taped material, the researchers designed a semi-structured interview schedule to procure further information on the rehearsal and performance processes. The interviews were carried out immediately following the performance and were recorded on cassette tape. One set of interview questions required that the pianists indicate whether there were locations in the selected compositions that were particularly important for coordinating performance and

communicating musical ideas, and if so, why they were important. A sample of interview questions is provided in Appendix 1.

• **Explorations of the data.** General observations of the pianists' practice and performance were made across all of the prepared compositions. Once the data were collected, the analyses took the following forms: (1) a preliminary exploration of the data; (2) qualitative assessments of spoken communication, non-verbal gestures, eye-contact and the interview data; and (3) systematic observations leading to frequency counts of non-verbal gestures and eye-contact by both authors (for these, the video tapes were viewed in slow-motion). An analysis of the agreement between the authors on their transcriptions of the frequency and location in the score of (1) non-verbal gestures and (2) eye-contact revealed scores of 0.79 and 0.82, respectively, for Cohen's kappa (κ), both of which are within the region identified as "excellent" by Fleiss (1981) and Bakeman and Gottman (1986).

Results

General observations

Prior to the project, the pianists had never played the selected compositions. In a brief telephone conversation arranging the first rehearsal, both mentioned that they had previously heard the works by Poulenc and Saint-Saëns and that these might be interesting pieces to explore. Since Anthony lived near a music library, he offered to bring a selection of duo and duet music to the first rehearsal.

Throughout the rehearsal period, the Saint-Saëns and Poulenc were practised most — that is, on four occasions prior to the performance. These were at fortnightly intervals leading up to the date of the recital. Alongside these pieces, they also rehearsed the first movement of J. S. Bach's *Concerto in C*. At the end of the second rehearsal, however, they decided to rehearse the second movement of this concerto at the next practice session to evaluate whether it would add to the diversity of the recital programme — both the Saint-Saëns and the Bach first movement contained fast fugue sections. The second movement of the Bach, therefore, was only rehearsed twice prior to performance, with both rehearsals taking place three and two days, respectively, beforehand.

Surprisingly, the pianists never practised the pieces individually, only ever practising during the video-taped, ensemble sessions. Both musicians attributed this lack of individual practice to their fluent sight-reading abilities. Also, they asserted that the peculiar physical and musical constraints of playing piano duos and duets were best addressed in the "ensemble environment". Jonathan, for example, remarked that:

> The pieces were quite easy to sight read, simply because of many repeated rhythms — not many notes to worry about. As for the question of practising alone, it's useful to a point

> — just to find the notes — but the real work is done when you meet together and find out the problems of manoeuvring yourself.

The most striking feature of the ensemble practice was the lack of verbal communication. Over 90% of the rehearsal time was spent playing. Indeed, playing provided the medium for exchanging, creating and consolidating ideas about the pieces. Jonathan commented:

> Mainly, we responded to each other's playing. We had quite a bit of fun. Tried pulling things around. Tried doing it fast and very slow. After trying in different ways, we agreed on a certain way and kept it like that. Things certainly developed... It warmed itself up to a better tempo and then we kept it. Yes, mainly we responded to one another's playing. It's quite nice to work like this — no talk.

Clearly, there was a sense of an increasing understanding of one another — "warming" — without using speech. It seems that the two pianists largely depended on an explicit use of musical communication. Here, Anthony provides useful insight:

> As accompanists, we both found that we were accompanying each other, nobody actually took a solo role. I think it developed quite nicely. I think we listened with accompanists' ears. We seemed to spin off each other. If one started something, the other would carry on.

Jonathan corroborates when he adds:

> We responded to each other. It was a two-way focus. Because we do a lot of accompanying and if you have someone nervous or not very competent, they'll go one way, and you'll have to follow them and stay there for the whole time. Here we were call and response — matching one another.

By the performance, the musical interpretation and expression of the piece had been "set" during these rehearsals, and there was an effort to "re-activate" the planned interpretation in performance, especially at the key structural moments of each composition where "the musical communication seemed more intense". It is important to note that this communication was not solely dependent on acoustical information exchange. Rather, visual communication, in the form of physical gestures and explicit attempts to make eye-contact, served as another vehicle for sharing ideas. Jonathan observed as he watched the video of the first rehearsal:

> I'm quite surprised by how much I moved. When I look at it, I can see that as I was sight-reading, I was trying to get out of my body the music that I could see on the page. As I made a big gesture, I suppose I was trying to demonstrate to Anthony my ideas.

The analyses of obtained quantitative data presented below allow for an examination of how visual communication served to strengthen the ensemble's musical coordination. Specifically, patterns emerging in the frequency of non-verbal gestures, body movement and eye-contact were transcribed from the video tapes and analysed with respect to their location in the score.

Gestures and body movement

Non-verbal movement information was expressed through two principal means: hand lifts and swaying of the upper torso. Preliminary inspections of the data revealed that such body movement was continuous throughout all rehearsals and the performance. However, certain movements were overtly explicit and exaggerated. To examine the extent to which such overt gestures coincided with attempts to communicate musical ideas, the frequency of hand lifts and swaying were counted by both authors from two rehearsals prior to the performance and the performance itself. Each occurrence was subsequently classified as "important" or "less important", depending on whether it occurred at locations in the music identified by each pianist in the interview as "important for coordinating performance and communicating musical ideas" (see "Explorations of the data" above for details of the agreement between the authors' transcriptions). For example, both pianists reported that various parts of each composition were "important" if they coincided with (1) the music's structure (*e.g.* thematic material and phrases, such as the entrance of a fugue statement in the Bach), (2) rehearsal letters, as indicated in each score and (3) new entrances of one or both performers after an extended rest (of at least one bar). Only locations identified by both pianists as "important" were classified as such for these analyses (*e.g.* bars 1, 4, 7, 13, 19, 22, 25, 29, 30, 31, 33, 36, 41, 42, 48, 49, 55, 56, 59 and 63 for the second movement of the Bach; see Augener's edition, 1953).

The proportion of overt gestures to occur at "important" locations in the score was calculated (*i.e.* the number of overt gestures at important locations divided by the total number of overt gestures) and averaged across both performers for each piece at three stages throughout the study. Stages 1 and 2 encompassed values obtained for the two rehearsals just prior to performance, respectively, and Stage 3 encompassed those obtained during the performance itself. Only three stages were included in these analyses because of the limited number of rehearsals on the Bach (*i.e.* two). Figure 1 lists the proportion of overt gestures at "important" locations in the score at Stages 1, 2 and 3, averaged across both performers and all three compositions. These proportions were compared using a repeated measures analysis of variance (ANOVA) with stage as the within-subjects factor. The analyses revealed that the proportion of overt gestures to occur at "important" locations increased significantly across the practice process [$F(2,4) = 8.61$, $p < 0.05$].

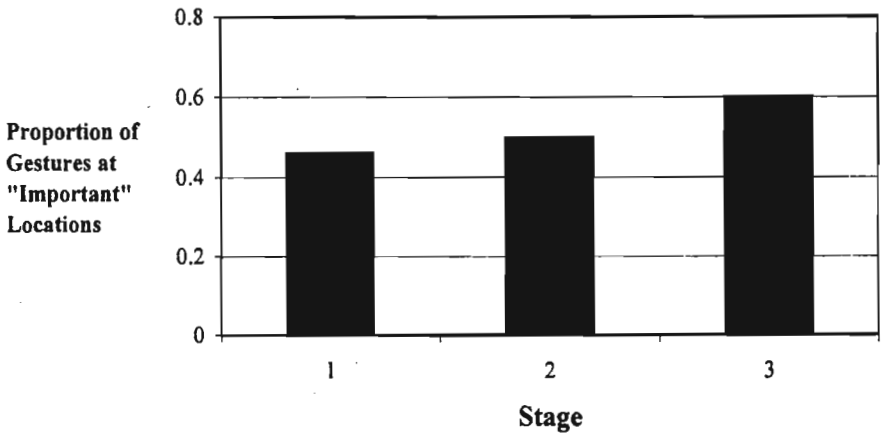

Figure 1
The proportion of gestures at "important" locations in the score at Stages 1, 2 and 3, averaged across both performers and all three compositions.

Qualitative inspections of the data revealed that hand lifts occurred at phrase boundaries or during pedalled and held notes. As the rehearsals developed, so did the synchronisation of these lifts between the two players. By the performance of the Poulenc, for instance, both pianists made similarly paced high and fast moving hand lifts. The second type of noticeable movement, swaying of the upper torso, was initially more prevalent in Jonathan's playing. As the rehearsals progressed, Anthony began moving in this manner as well, although it was mainly constrained to his head and shoulder region, whereas Jonathan moved his entire upper body. In the Bach, it was certainly evident that both were moving synchronously, in the same direction of sway. This swaying was evidently allied to the overall tempo of the piece but was also used in a variable manner, apparently either to react to or even to generate rubato in the score. For instance, a huge forward body surge by Jonathan occurred in anticipation of — and perhaps assisting in generating — an accelerando.

Eye-contact

The extent to which the pianists used direct, simultaneous eye-contact to coordinate performance and communicate musical ideas was evaluated by comparing the proportion of eye-contact that occurred at "important" locations in the music at Stages 1, 2 and 3 (*i.e.* the number of eye-contact at important locations divided by the total number of eye-contact). This proportion was calculated for both pianists for the Bach and the Saint-Saëns. Values were not obtained for the Poulenc because the pianists played on the same piano and, thus,

did not establish much direct eye-contact. Figure 2 lists the proportion of eye-contact at "important" locations in the score at Stages 1, 2 and 3, averaged across both performers and both compositions.

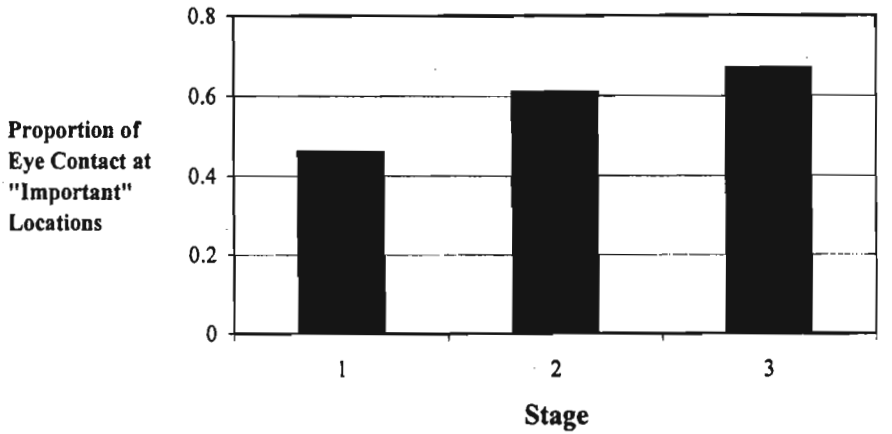

Figure 2
The proportion of direct eye-contact at "important" locations in the score at Stages 1, 2 and 3, averaged across both performers and the two compositions.

These proportions were compared using a repeated measures ANOVA with stage as the within-subjects factor. The analyses showed that the proportion of direct eye-contact to occur at "important" locations increased significantly from Stage 1 to Stage 3 [$F(2,2) = 25.64$, $p < 0.05$]. These findings can, in part, be accounted for by the fact that the pianists became increasingly familiar with the music and, therefore, felt freer to allow their eyes to leave the score. However, since both were fluent sight-readers and only played through the Bach for a total rehearsal time of 28 minutes before the performance, this simultaneous looking behaviour seems to be connected with the coordination of musical entrances and exits and an increasing awareness of one another's spontaneous ideas. Indeed, the looking was not simply a result of observing one another's hands, facial expression and so on, but rather a process for sharing ideas. In the performance, simultaneous eye-contact was even greater than in the rehearsals, organised heavily around "important" locations such as phrase boundaries. This seems to be strongly connected with the communication of intense musical moments in performance, but also, it seems to reflect a relaxed familiarity between the players, with occasional smiles occurring.

Discussion

Regardless of the piece being played, these pianists were able to converse "musically", with information being given and received, modified and consolidated. The kinds of verbal interactions that occurred in the rehearsal process are similar to those reported by Murnighan and Conlon (1991), where they found that successful professional string quartets spent most of the rehearsal time playing — not talking. Rather, eye-contact and gestural cues became gradually more synchronous over the rehearsal period, with the performance itself reflecting the refinements that the rehearsal process had brought. Both pianists observed the need for an awareness of the other's movements and musical ideas to present a unified, well-balanced ensemble performance.

In line with previous research (*i.e.* Davidson, 1993, 1994, 1995), the pianists worked to communicate their ideas at "important" locations in the music. They also spoke of the significance of a shared emotional state and conception of each piece's narrative. Although the exact location of these important bars were idiosyncratic to this particular ensemble (depending on where *they* felt communication was needed most), the finding that these bars became an increasingly integral part of the rehearsal and performance process is consistent with existing research examining the practice and performance of soloists. Specifically, it concurs with results of Williamon and Valentine (in press), who demonstrated that solo performers (especially those at higher levels of skill) used individual-specific identifications of musical structure to guide their practice increasingly across the learning period. The emergence and use of idiosyncratic structure, both in the current study and that of Williamon and Valentine, supports one prediction of the *Long-Term Working Memory Theory* (Ericsson and Kintsch, 1995; see Williamon and Valentine, in press; and Gobet, 1998, for a review): that individual differences in the implementation of retrieval schemes are likely to emerge in the skilled performance of a given task and be more apparent at higher levels. Therefore, the identification and continued use of meaningful structure in practice — regardless of what that structure may be — seems to be an ability that develops with musical competence and one that can be shared between performers.

Visual cues

The current study supports Clayton's (1985) finding that eye-contact between co-performers is critical in the coordination of musical content. The performers purposefully synchronised their glances at important points in the compositions. Moreover, the movement gestures displayed can be categorised in terms of illustrators and emblems as suggested by Davidson (1997). In the fast fugal section of the Saint-Saëns, for instance, the synchronised high hand lifts of the two pianists illustrated the mutual energy and force both were bringing to the performance and

were simultaneously emblematic of nineteenth century extravagant pianistic style. By contrast, the gestures used in the Bach, with its much "calmer" tempo, were far more constrained.

As for the swaying movement, irrespective of the composition being played, swaying was present throughout the course of the rehearsals and was most obvious during performance. It was allied to phrase structure and overall tempo of each specific piece but, most significantly, was highly illustrative of the emotional intention of the performers. This observation seems to reflect the theoretical proposals of Runeson and Frykholm (1983) who argue that there is an attunement of kinematics to dynamics in human actions. That is, internal states and intentions become manifest in movement. "Movements specify the causal factors of events" (Runeson and Frykholm, 1983, p. 585).

In line with work by Cutting and Proffitt (1981), the observed swaying could represent the global level in a hierarchy of expressive gestural information, with the hands providing a local indicator. From our observations, this would seem to be the case. As mentioned above, however, we are aware of socio-cultural influences which affect this movement production (*e.g.* adopting nineteenth century emblematic gestural piano style). Our data did not provide any clearly observable attempts by the pianists to communicate directly either specific gestures or musical ideas to the audience, but that is not to say that these communicative intentions were not present. Wilson (1997) notes that the presence of an audience affects the way in which performers behave, and Davidson (2001), who studied pop performers, has shown that some performers use special movements for audience entertainment (labelled as "showing off" gestures). These can engage the audience to participate or can be provocative in order to get the audience to react in a particular manner. The participants of this study played within the socio-cultural expectations of classical performers, so any audience-directed communication may have been much more subtle than that observed in previous work.

Practical implications

There are some immediately striking applications of this study which could be useful in both teaching and learning contexts. It is perhaps important for students and teachers to examine how much time is spent in both lessons and rehearsals talking. Is musical demonstration a useful tool to be adopted? Or is a mutual exploration through "give and take" and "trial and error" of playing a more effective way of achieving a musical solution?

In terms of eye-contact, it is important for this kind of looking behaviour to be encouraged and trained. As for the gestures themselves, individuals clearly learn certain movement styles from their social environment. Thus, it is not surprising for students to use or imitate their teacher's movement patterns. Still, it seems imperative that these movements be embedded within those which naturally results from each player's expressive intentions. In the duo and duet performances from this

study, the co-performers' sways seemed to synchronize expressive intention and tempo. Certainly, teachers may be eager to train students to achieve optimal levels of expressivity that may often include a *minimal* amount of extraneous movement, but this paper illustrates just how critical movement is in both the learning of a piece and the coordination of musical intention.

SUGGESTIONS FOR FUTURE RESEARCH

As an exploratory study, this paper was intended to provide a framework on which further explorations can be based. Several additional points should be considered and incorporated into these explorations. Firstly, this paper documents the communication between only one set of co-performers in only one type of ensemble. Further understanding of the generalisability of these results could be obtained by investigating interactions between more than one set of co-performers (differing in terms of overall level of skill and in the amount of time the ensemble has played together) and other types of ensembles (differing in size and instrumentation). For this study, a piano duo and duet provided an ensemble that required both performers to attend to similar musical demands and use comparable instrumental techniques. While the findings presented here may arguably generalise to other piano duos and duets or even to other ensembles with two performers, there is large scope for extending this work to additional multi-performer groups. Secondly, only two types of movements (in addition to direct eye-contact) were transcribed in the present study: hand lifts and swaying of the upper torso. Moreover, the case study approach taken required that even these be combined for the purposes of the analyses. Clearly, there are many additional types of body movement that must be considered if a full evaluation of co-performer communication is to be achieved. One useful approach could be to adopt the 12 analytical categories employed by Delalande (1988) for an analysis of Glenn Gould's movements. Thirdly, an understanding of co-performer communication could be furthered considerably through investigations of interactions amongst musicians who do not perform within the western art music tradition. An analysis of communication between members of pop, rock and jazz groups, for instance, may provide insight into how some performers are able to achieve greater mass appeal than others and how that appeal — including such characteristics as charisma or idolisation — is developed and manifested. Finally, attention should be given to the role of audience-directed communication in music performance, especially within the western art music tradition where such communication may be extremely refined and subtle.

Observing the results of this paper as a piece of research, some insight has been gained into how two individuals articulate their ideas in both the interpretation and execution of a programme of ensemble music. Further research is necessary to validate and ground these findings. By incorporating the above recommendations and — perhaps more importantly — by consolidating the findings of ensemble

research with those from research on solo performance, a well-rounded view of how performers prepare for and carry out highly effective musical performances can be gained[1].

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Appendix

Sample of the questions asked in the post-performance interview.

A. BACKGROUND INFORMATION

1. How long have you been playing the piano?
2. How often do you perform in public?
3. Prior to this study, have you ever practised / performed piano duets?

B. THE SELECTED COMPOSITIONS

1. Had you ever seen, heard or played these pieces before participating in this study?
2. To what extent do you find these pieces challenging?
3. To what extent do you find these pieces musically satisfying?
4. Please indicate whether, while learning these pieces, there were locations in the score that were particularly important for coordinating performance and communicating musical ideas. If so, why were they important?

C. ENSEMBLE PRACTICE

1. Had you ever rehearsed a composition with this person prior to this study?
2. How did you begin learning the pieces selected for this study (*e.g.* individually or as an ensemble)?
3. Please describe your first ensemble rehearsal with your duet partner (*e.g.* how did you decide which part to play, did you sight read through the pieces first, did you discuss certain strategies for learning the music?).
4. Please describe how the two of you decided upon the course and content of the practice sessions.
5. Please describe how the two of you decided upon the interpretations of the compositions, including the appropriate tempi, dynamic levels and articulations (*e.g.* did you do this verbally, by responding to each other's playing or in some other way?).
6. Do you feel as if you had an equal say in interpreting the compositions? If not, why?
7. Did this (*i.e.* your say in interpreting the compositions) change when you were playing the first or the second part?
8. Did this (*i.e.* your say in interpreting the compositions) change for pieces when the two of you were on separate pianos or the same piano?
9. How did your ensemble practice influence your individual practice? How did your individual practice influence your ensemble practice?
10. Did any conflicts arise between you and your duet partner during practice? If so, how were they resolved?
11. To what extent did your personal relationship have an impact on your working relationship?
12. Would you be willing to learn other duets with this person? If so, would you do anything differently?

D. THE PERFORMANCE

1. Did the performance meet, surpass or fall short of your expectations?
2. How well did you and your duet partner stick to the decisions made during rehearsals in the performance?

• Explorando la comunicación entre co-intérpretes

Este trabajo examina el desarrollo y puesta en práctica de comunicación social y específicamente no verbal entre dos expertos pianistas que prepararon y ofrecieron un recital pianístico a dúo. Todos los ensayos y el concierto final fueron grabados en video. Siguiendo la interpretación, los músicos fueron interviniendo para documentar sus pensamientos sobre los procesos de aprendizaje e interpretación. Gracias a la grabación en video de los ensayos y el concierto, se codificaron y contaron todos los datos relativos a cordinación musical, interacción social, gestos no verbales y comportamientos de la mirada. Los resultados revelaron que estos excelentes comunicadores emplearon los ensayos para consolidar el tempo, fraseo y sentido del estilo musical. Además, se desarrolló un emergente conjunto de cordinaciones, gestos no verbales y contactos visuales, incrementando significativamente los procesos de ensayo en lugares identificados por los músicos como importantes para coordinar la interpretación y comunicar ideas musicales. Los dos intérpretes adquirieron, además, una mayor profundidad expresiva y seguridad comunicativa a medida que se familiarizaban con el material musical. Las conclusiones se discutieron en relación a sus implicaciones para la interpretación musical con el fin de esclarecer los elementos de la interacción entre los co-intérpretes, pactados y coordinados a través de los ensayos.

• Esplorare la comunicazione fra i co-interpreti

Il presente studio prende in esame lo sviluppo e l'attuazione della comunicazione, sociale in generale e non verbale in particolare, fra due esperti pianisti nella preparazione e nell'esecuzione di un concerto per duo pianistico. Tutte le prove d'insieme e l'esecuzione finale sono state videoregistrate. Dopo il concerto, i musicisti sono stati intervistati per documentare le loro considerazioni sui processi di studio e di esecuzione. I dati emersi dalle videoregistrazioni delle prove e del concerto, riguardanti coordinazione musicale, interazione sociale, gestualità non verbale e comportamento visivo sono stati codificati e valutati. I risultati mostrano che questi eccellenti lettori a prima vista hanno utilizzato le prove per consolidare la sincronizzazione, il fraseggio ed il senso dello stile musicale. Si è sviluppata inoltre un'imprevista serie di gesti coordinati non verbali e di contatti visivi, azioni che nel corso delle prove sono significativamente aumentate in quei passi musicali identificati dai pianisti come "importanti per coordinare l'esecuzione e per comunicare idee musicali". I due interpreti hanno acquisito quindi una sempre crescente sicurezza espressiva e comunicativa mentre familiarizzavano con il materiale musicale. I risultati vengono discussi in relazione alle loro implicazioni per l'esecuzione musicale, mettendo in evidenza gli elementi di interazione fra i co-interpreti negoziati e coordinati durante il processo delle prove.

• Exploration de la communication entre les interprètes

On étudie ici le développement et la mise en œuvre de la communication, d'une part sociale et générale, de l'autre, non verbale et spécifique, entre deux pianistes experts lors des répétitions et d'un récital en duo. L'ensemble des répétitions et la prestation ont été enregistrées sur magnétoscope. A l'issue de l'exécution, les musiciens ont été interviewés afin de documenter leurs pensées sur les processus d'apprentissage et d'exécution. La bande vidéo des répétitions et de l'exécution atteste que les données relatives à la coordination musicale, à l'interaction sociale, à l'expression gestuelle et aux regards sont codées et comptées. Il en ressort que ces excellents lecteurs à vue se servent des répétitions pour consolider le rythme, le phrasé ainsi que le sens musical et stylistique. En outre, le nombre des gestes coordonnés, non verbaux et des contacts oculaires développés en parallèle à ces actions s'est considérablement accru au cours du processus de répétition à des endroits de la musique que les pianistes qualifient d'"importants pour la coordination de l'exécution et la communication des idées musicales". Ainsi l'acquisition d'une plus grande assurance expressive et communicative est-elle allée de pair avec une familiarisation avec le matériau musical. Ces résultats sont mis en parallèle avec leurs implications au niveau de l'exécution musicale, et l'accent est mis sur les éléments de l'interaction négociés et coordonnés par les interprètes durant le processus de répétition.

• Eine Untersuchung der Kommunikation beim Zusammenspiel

Dieser Beitrag untersucht die Entwicklung und Umsetzung allgemeiner und spezifischer nicht verbaler Kommunikation zwischen zwei renommierten Pianisten bei der Vorbereitung und Durchführung eines Konzert zu zwei Klavieren. Alle gemeinsamen Proben und die Aufführung selbst wurden mittels Video aufgenommen, und im Anschluß an das Konzert wurden die Musiker zu den Lern- und Aufführungsprozessen befragt. Aus den Videoaufnahmen wurden Daten, welche sich auf die musikalische Koordination, die gemeinsame Interaktion, auf die nichtverbale Gestik und das Blickverhalten beziehen, kodiert und ausgewertet. Die Resultate zeigen, daß die Proben dieser ausgezeichneten Blattspieler der Konsolidierung von Timing, Phrasierung und Auffassung des Musikstils dienten. Zudem bildete sich an jenen Stellen, welche den Pianisten für die Ausführungskoordination und die Vermittlung musikalischer Ideen besonders wichtig erschienen, ein mit der Dauer des Probenprozesses signifikant anwachsender emergenter Satz nicht verbaler Gesten und Blickkontakte heraus. Auf diese Weise erreichten beide Künstler zusammen mit einer zunehmenden Vertrautheit mit dem musikalischen Material eine vertiefende expressive und kommunikative Sicherheit. Die Ergebnisse werden durch Betonung der Elemente der gegenseitigen Interaktion, welche im Rahmen des Probeprozesses erarbeitet und koordiniert wurden, hinsichtlich ihrer Implikationen für die musikalische Performance diskutiert.