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Improvising musicians' looking behaviours: Duration constants in the attention patterns of duo performers

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ABSTRACT

The study focuses on the communication processes in improvised music performance by duos, exploring the relationship of musical communication to movement in spontaneous, everyday human social interaction. The study presented here examined improvising instrumentalist musicians' looking behaviours (their ostensive direction of attention as presented by the face). Original video recordings of North Indian classical instrumental duo performances, and video material of oral music traditions harvested from a video streaming website were analysed. The material included traditional, jazz, and folk music duos. Excerpts were analysed to identify the onset and duration of the looking behaviours, which were identified by the way in which the musicians' faces were presented (towards the audience; towards their duo partner; or towards their own hands/lap). The results show that these looking behaviours occur with fairly consistent durations in the region of one to four seconds. The duration of these behaviours does not appear to co-vary with aspects of musical structure including tempo, or with the social context of performance (such as the familiarity of the musicians, or whether the context of the musical interaction is a rehearsal or public performance). The results suggest evidence of underlying timing mechanisms that may support social interaction processes, facilitating interpersonal communication..

1. INTRODUCTION

The communicative behaviour of improvising musician duos is a rich but relatively under-explored domain of study. Much research on musician communication focuses on performances by musicians who are score-reading or who are performing scored music from memory. The domain of Western classical music has dominated most scientific studies of music.

In this general view, music is aesthetically valuable on two counts: for its affective powers; and for its potential to communicate codified, propositional meaning. The value of both of these aspects is enhanced by a concomitant notion of music as a commodity for passive reception. But evidence from cross-cultural studies on the function of music in social context (Blacking, 1973), and from therapeutic practices using music (Pavlicevic, 1997) would suggest that the distinctiveness of human musical behaviour lies in its capacity for embodied communicative practice. Emphasis on score-based music may be one factor that has led researchers away from a pragmatic and embodied interpretation of music's role in human society, divert attention from the practical process of engagement between musicians and with listeners.

Cross (2008) has suggested that music may have been evolutionarily valuable for the way it engenders non-propositional meaning through events of social interaction.

This notion, of meaning-through-social-interaction, is one that is difficult to tackle in empirical research. But beyond the field of music research, social interaction researchers take spontaneous, everyday interaction as the material for their 'context analysis' (Kendon, 1981). Such work from the 1970s onwards, including the subsequent microanalyses of social interaction by researchers such as Bavelas (2007), have amply demonstrated that processes of nonverbal, pragmatic meaning construction underpin language skills and language use (Clark, 1996). It is clear that the study of spontaneous everyday interaction in all its modalities – including body posture, movement, gesture, prosody, and non-linguistic utterance – is deeply revealing of human interaction.

On similar lines, it may be a good idea to look at music from oral traditions (for example, by including the study of extemporised music that is performed independently of score-reading or score-learning) in order to help to separate out the 'dramatic' performance of learned, fixed repertoire from the communicative aspect of musical performance that deals with inter-personal interaction.

The empirical approach taken in this paper is designed to examine *processes* of communication during musical interaction. The paper focuses on one particular aspect of nonverbal communication by examining the ostensive looking behaviours - or *attentional stance* - of musicians in performance. The results suggest that improvising musicians' interactional behaviour could be based on more general mechanisms of human interaction, demonstrating patterns of communicative behaviour common to both everyday interaction and musical performance.

2. METHOD

The studies described here took place in three distinct stages: i. an original study of North Indian duos; ii. a replication study of North Indian duos with new video data; and iii. a study of other (non-Indian) duos. The first stage was conducted as one element in a larger study of nonverbal communication in musical performance by North Indian classical music duos.

2.1 Data Collection.

i. Seven original video recordings were collected, all of performances by professional North Indian classical music instrumental duos consisting of sitar (long-necked, fretted lute) or

sarod (fretless lute) with tabla accompaniment (pair of tuned hand-drums).

ii. Eight further North Indian classical music duo video excerpts were collected from YouTube (www.youtube.com, retrieved 19 August 2009).

iii. Seven excerpts of improvised duo instrumental music were collected from the website, YouTube (www.youtube.com, retrieved 5 September 2009). Suitable excerpts included those with a static camera perspective showing both musicians in duo performance, where music was performed without score, and with apparent freedom in interpretation (memorised classical performances were excluded). Instrumentalists with similar physical and postural constraints to the North Indian duos were chosen. These included instruments held near the lap or centre of the body, and played with hand and arm movements, such as accordions, various guitars, and lutes.

See Table 1 for the musical performance content of video material.

Excerpts	i - Original video recordings, North Indian duos
1-2	Rag Bairagi Todi, sarod and tabla; rehearsal, Kolkata
3-5	Rag Bairagi Todi, sarod and tabla; performance, Kolkata
6-8	Rag Jhinjhoti, sitar and tabla; concert, Kolkata
9-11	Rag Yaman, sitar and tabla; rehearsal, Cambridge
12-14	Rag Yaman, sitar and tabla; performance, Cambridge
15	Rag Yaman, sitar and tabla; rehearsal, Chembur
16-18	Rag Yaman, sitar and tabla; performance, Chembur
ii - Video retrieved online, North Indian duos	
1	Rag Yaman, sitar and tabla
2	Rag Bihag Razakhani, sitar and tabla
3-4	Rag Nat Bhairav, sitar and tabla
5-6	Rag Bhairavi, sitar and tabla
7	Rag Khamaj/Darbari, sitar and tabla
8	Rag Nat Bhairav, sarangi and tabla
iii - Video retrieved online, Various duos	
1	Jazz, accordion duet
2	Baltic region/folk, accordion duet
3	Central European/folk, accordion duet
4	Hebrew/traditional, accordion duet
5	Eastern European/folk, guitar and slide guitar
6	Jazz, guitar and electric bass
7	Swedish/traditional, nyckelharpa duet
8	Irish/traditional, nyckelharpa and harp guitar

Table 1. Details of video material used in the study. (All video recordings for the original study (i) made to MiniDV by Nikki Moran, Martin Clayton and Laura Leante, in India and the UK between April and December, 2004. For details of source and date of collection for ii and iii, see References.)

Independent variables. On the basis of ethnographic research suggesting that the circumstances that accommodate musicians' relationships during performance may affect the behaviour of performing musicians (Moran, 2007), video material was collected and compiled to provide comparisons across the following musical and social dimensions:

- **Familiarity.** The musician duos were either *familiar* with one another, with experience of playing together; or *previously unknown* to one another before the point of recording.
- **Role.** Each duo included a *solo* instrumentalist and a tabla *accompanist*.
- **Tempo.** In the original study, tempo was described in categorical terms as used by the musicians – either Slow (*vilambit*), Medium (*madhya*) or Fast (*dрут*). In ii and iii, the perceptually salient pulse (tactus) was recorded.
- **Set.** North Indian classical music performances vary considerably in duration and their structure is quite flexible. To compare the various cases of music performance, one-minute excerpts were taken from each recording session, creating a stratified sample. The criteria for selecting these excerpts was based on three categories of large-scale performance structure, including the point at which the tabla player starts to accompany the soloist (who has completed a free-time, solo introduction); a point where the musicians make a significant compositional or tempo transition in the musical structure; and a section where both musicians are playing together and no transition occurs.

In ii and iii, video data were harvested from the website, YouTube (www.youtube.com) and, following the findings from i, a limited array of parameters were measured.

2.2 Coding Procedure.

Nonverbal behaviours were categorised and logged using specialist video analysis software (Observer Video-Pro). The basic observational design used throughout this study codes nonverbal behaviour related to musicians' attention by recording the direction in which the participants appear to be looking. A musician who presents his/her face to the other is making him/herself visible and available in communication. The design is thus based on observation of the direction of an individual's face, not the exact direction of the gaze.

Dependent variables These dependent variables of *attentional stance* may be defined as one of four mutually exclusive conditions: the presentation of a musician's face to either their own hands and lap (a); their improvising partner's hands or face (b/c); or away from their partner and towards their audience (d).

Video data were studied of the two individuals in each excerpt. The occurrences of *attentional stance* were coded from the video without sound. The mean duration of each occurrence was then calculated across each excerpt for each of the musicians in the duo.

i. *Attentional stances* were coded in 18 one-minute excerpts of North Indian duo performance, with independent variables of Familiarity, Role, Set and Tempo.

ii and iii. Approximately 15 minutes (stage 2) and 20 minutes (stage 3) of further video data were coded. Musicians were classified as taking either a soloist or an accompanist Role for each excerpt. The independent variable of Tempo was also recorded, derived from the average inter-tactus interval for each excerpt. Due to the quality and variation in camera perspectives that were present in the array of YouTube excerpts, the observations by musicians of one another's face (b) and hands (c) were concatenated into one group.

2.3 Exploratory analysis.

The complete data collected in the first study (i) were initially summarised by Principal Components Analysis (PCA). PCA is a method of transforming a set of variables into a smaller set, reducing the complexity of managing multivariate data (Dunteman, 1994, p.157). Where results suggested patterns of association, these were investigated with non-parametric tests. In ii and iii, the analysis was refined to explore specific findings.

3. RESULTS

The results of the original study revealed many significant associations between musician behaviour and the social and music-

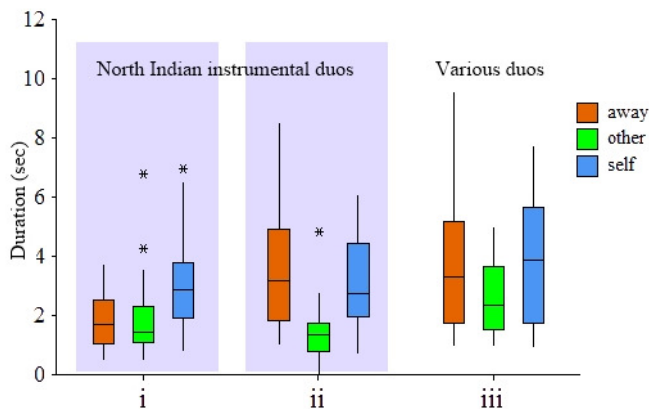


Figure 1. Typical duration of attentional stances showing median (bar) and interquartile range (box). See Table 2 for median values.

organisational dimensions described above. Among other findings, the frequency with which the various attentional states occurred appears to have an association with factors such as the familiarity of the musicians, the part of the rag performance underway, and the context as either rehearsal or performance. For full results, see Moran (2007).

The data describing the *typical duration of the various attentional stances*, however, present a different story. The observations across all three stages of the study show a robust tendency to cluster at particular durations, specifically within the range of one to four seconds (see Figure 1 and Table 2).

	North Indian duos (i & ii)		Various duos (iii)
	Median duration (seconds)		
Looking at self (a)	2.8	2.7	3.9
Looking at other (b/c)	1.4	1.3	2.3
Looking away (d)	1.7	3.1	3.3

Table 2. Median durations of *attentional stances*.

The results of the first part of the study (i) showed that neither musicians' familiarity, nor the large-scale structural features of performance event, nor – surprisingly – did the tempo of the music appear to exert any influence on variation in the duration of the musicians' looking behaviours. Some effect of Role was observed, and this is described below. In ii and iii, the effects of Role and Tempo were examined further.

Effect of Role. Results from part i showed that the performer's role as either soloist or accompanist had a significant association with some variation in the data. Soloists tended to look down at themselves for longer durations than did accompanists (Mann Whitney U-test: $n = 50$, $w = 836.5$, $p = 0.0001$). Meanwhile, accompanists looked for longer at the soloists than did the soloists at the accompanists ($n = 50$, $w = 402$, $p < 0.001$). No significant association was found between Role and duration for musicians looking down at themselves (ii. $n = 16$, $w = 52$, n.s.; iii. $n = 12$, $w = 36$, n.s.), nor for musicians looking at one another (ii. $n = 16$, $w = 45$, n.s.; iii. $n = 15$, $w = 59.5$, n.s.).

Effect of Tempo. The mean duration of each individual musician's attentional stance from each excerpt was plotted against tempo, as described by the mean inter-tactus interval for each excerpt (Figure 2.) The results of neither ii (North Indian duos) nor iii (various instrumental duos) suggested a correlation between tempo and duration.

4. DISCUSSION

The results suggest that the duration of each *attentional stance* has a typical duration of one to four seconds, regardless of broad features of the musical performance structure, the musical tactus or the non-musical social factor of musician familiarity. This tendency towards constant durations for attention behaviour appears in different musical styles of duo performance.

Given the lack of explanation by the socio-musical predictors given as independent variables, a different organisational mechanism may be involved. It is possible that evolutionarily-conserved mechanisms for temporal constraints of action-perception units may well operate throughout musical, as well as non-musical, interaction.

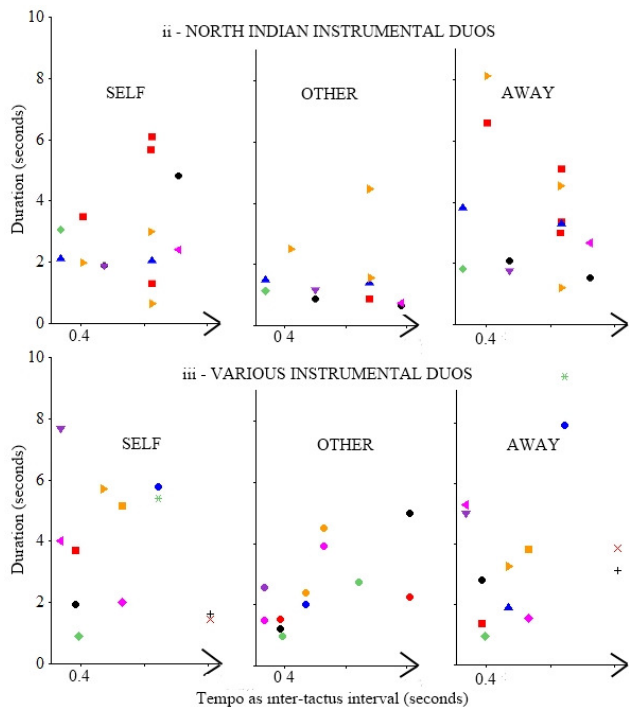


Figure 2. Mean duration of individual musicians' *attentional stance* (y-axis) in relation to the tempo of each excerpt, described by the mean inter-tactus interval (x-axis).

In a cross cultural study observing the filmed behaviour of four different groups (Europeans, Tobriand Islanders, Yanomami Indians and Kalahari Bushmen), Schleidt (1988) reported a three-second universal duration in repetitive movement patterns in everyday human behaviour. She proposed two inter-related functions of the universal time constant. Firstly, the action unit is imagined to bear some contribution to the phenomenological perceptual present. Secondly, "communication and synchronisation between people might be facilitated by a mechanism which creates a common time beyond the content of a behaviour pattern" (Schleidt, 1988, p.74). The notion that dynamic social interaction processes might be the foundation for the experience of shared time is extremely relevant to a discussion of the functions of human musical behaviour.

5. CONCLUSION

This study indicates that musicians' ostensive attention patterns have, typically, a duration of about three seconds. While the *frequency of occurrence* of this nonverbal behaviour is associated with socio-musical factors, the *typical duration* appears not to be. The duration constant could, therefore, be associated with possible universal mechanisms underlying general, communicative social behaviour. Further study involving a larger sample of musical performances is important, as the trends in the data may be a result of the limited sample size, and/or due to individual musicians' idiosyncracies. Another limitation of the current study is that the occurrence of such musical events as phrase structure are not visible in the analysis. However, the development of this empirical

approach on the lines indicated here could well lead towards a more socially-interactive understanding of musical communication.

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