The social implications of embodied music cognition research

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What are the social implications of embodied music cognition research?

In this paper, I ask: What are the social implications of embodied music cognition research?

Well, one answer is that these implications provide a meaningful opportunity to compare music with snogging. But more of that later. Let’s start with some very basics.

[Slide 2.] What do we (I) mean by ‘embodied music cognition research’? Primarily, it’s an acknowledgement of the dynamic interaction between minds, bodies and their environment. Embodied accounts of cognitive process focus, for example, on the integrity of action-perception systems – this is in contrast to cognitivist accounts where we see enquiries and explanations in the realm of pure informational representations of the world.

In music specifically, embodied cognition might mean Mark Leman’s systematic approach, spelt out in his 2008 book, *Embodied Music Cognition and Mediation Technology*, theorising the human body as the mediator between the external environment- including acoustic signals - and internal musical representation and experience. We’ve also got a more general sense of embodiment in music research: an analytical acknowledgement of the musician’s (and the listener’s) body.

To avoid confusion, I’ll say now that I’ll be referring to embodiment in this second, more open sense – as a useful way of capturing an otherwise disparate body of empirical and theoretical work.

[Slide 3.] We might ask, what does embodied music cognition research offer that we can’t get elsewhere? Several things:

- A programme of work in interactive music systems
- In a sense, it’s provided a ‘home’ for music and gesture research
- A new direction for music and emotion research
- A focal point for otherwise disparate empirical studies in music performance and musical communication

And finally, most excitingly for me, I think that it potentially offers analytical access to the study of music IN and AS social interaction.

Embodiment goes hand in hand with a social interpretation of music, focusing on the real-world basis of performance. We’ve known for a long time that music is a social phenomenon. Alfred Schütz said it in the 50s, and it’s something that’s really become established since John Blacking drew attention to it in 1973 with *How Musical is Man?* Musicians, composers, ethnomusicologists, music psychologists, music neuroscientists, sociologists, many musicologists might ask: why do we need the notion of ‘embodiment’ to acknowledge this? Music is a social phenomenon. We know it. Everyone says it.

Still, descriptions of the distinctiveness of an embodied approach to music research tend to relate movement and physicality to the social context of musical performance, development and cognition.

[Slide 4] For example: from 2001, we have Jane Davidson talking about “...the matter of how both musical and extra-musical concerns are coordinated between performer, co-performers and audience using body movements.”
Vijay Iyer described how “…physical embodiment and sociocultural situatedness [have a role to play] in music perception and cognition” back in 2002.

And Ian Cross\(^1\) pointed out, in 2003, that “Music’s embodied characteristics may provide the basis for music’s capacities to coordinate and entrain action in time […] Music is embedded in social action, deriving meaning from that action and in turn endowing it with significance – intentionalizing it – for its participants.”

There’s a very obvious sense in which these two aspects – of movement and of social context – relate to one another: when we evoke ideas of physical presence, of movement, of outward-tending behaviour, we immediately step into the realm of communication: of communality, of expressivity, of sharing. Indeed, the topics of music performance research and of musical communication are deeply knitted together, and they both inform the ‘embodied’ turn in musicology that has grown over the past twenty years or so.

But I have sometimes wondered whether attention to the performing body has really told us much about music as a social phenomenon – or whether it actually masks a pervasive ‘individualism’ that just won’t let go? I wonder, does embodied music research – and here I’m using the term to describe collectively all music scholarship that deals with the relationship of corporeality and movement to musical understanding – does it fully acknowledge the socialness of music? And if not, why not?

I’ll nail my colours to the mast right now: My interest is in the performed musical event. Personally, I want to use the possibilities of a non-abstract attitude to human musical behaviour to look right at the EVENT of performance, as it takes place between two or more people. This is not to say that I’m in denial of the individual effects of and responses to musical stimuli, or that I don’t acknowledge that there are indeed important occasions of solo performance, and of solo, private listening. But joint performance events interest me more.

I made reference to an ‘embodied’ turn in musicology, which I’ll expand on through a potted history. We’ve already considered how, as a broad concept, embodied cognition challenges traditional cognitivism, which ultimately seeks to explain mental process at an abstract, computational level. Such cognitive research in music has typically focused on the perception and analysis of acoustic signals and their communication of particular structures, often starting with those compositional features that are the historical subjects of classical western music analysis, such as key, metre and harmonic progression. (Shepherd, Krumhansl, Thompson and Cuddy, Parncutt, and many others besides.)

In this way, cognitive music psychology inherited its subject matter from music theory. It’s important to recognise that its point of departure is a particular understanding of a particular type of musical encounter: the one between a listener and an idealised ‘work’.

The central categories that music theoretic scholarship uses to explore this encounter include specific ways of conceiving of structures of pitch, metre and harmony – the compositional elements which appear in rather neat form in music theory pedagogy.

\(^1\) Cross 2003 describes in close detail the dangers of the essentialisation of music by scientific communities, which this paper revisits with particular regard to the ‘embodiment’ trend in musicology.
But let’s point out straight away that these categories don’t necessarily make for the best
description - or the most revealing analyses – of non-notated or oral musical traditions. In fact, as
Nicholas Cook (1994) pointed out – flagged up by Cross in 2003 – they don’t even provide
comprehensive tools for the perceptual analysis of classical western music repertory. And while the
idealised ‘work’ is a central epistemological component of one type of music theory, it does not
appear to be a universal or defining category of musical encounters in every society.

The term that I’ve just used here, of ‘encounters’, is one that I find helpful in identifying just exactly
what we’re talking about when we examine The Music (capital T, capital M). In what ways do people
encounter music? Here are some suggestions:


I’m playing with the idea that all aspects of musical experience – any of which may serve as a focus
of analysis – involve some sort of ‘encounter’, and that the experiential ‘realms’ in which these
encounters take place are varied.

[Slide 6: Figure 1 - Musical encounters and their experiential realms].

![Figure 1 - Musical encounters and their experiential realms](image)

There is not one essential musical experience, but multiple aspects which relate to very different
ways of knowing and communicating.
Any of the musical ‘encounters’ that I’ve proposed might be accessible through different ways of knowing and communicating. Some require specialist discourse: the labelling and interpretation of harmonic progression, for example. On this illustration, I’m calling this an ‘Esoteric Realm’. Some encounters are observable, they make for empirical events of musical action – like rehearsing, jamming, or playing. I’ve put this here as a ‘Pragmatic Realm’. And some aspects we can only encounter as a priori categories: concepts like Work, Canon, Repertoire... They are abstractions (‘Abstract Realm’). They can’t be ‘observed’, they can only be thought of and discussed.

[Slide 7.] I’m open to debate on my placement of most of these ‘encounters’. I’m not set on this arrangement. But it’s worth taking a look at where I’ve put work, and play, for example. While play describes a musical encounter that we can access by witnessing its ‘doing’, its event of (inter-)action, ‘work’ and repertoire, for example, are undoubtedly inaccessible through that pragmatic realm.

When we do research in music, we have to choose a musical object of enquiry, and then we proceed to examine or to analyse that object. It’s actually quite easy to be specific about our object of enquiry because, in English language anyway, we have a lot of words to point at particular musical encounters, from the pragmatic (‘jam’) to the abstract (‘work’) to the esoteric (‘harmonic progression’). We have many words to describe the doing of and engaging with music – activities which Christopher Small collectively defined as *musicking* (1998). But on the whole, we don’t actually use them. Very, very often we will say ‘music’ to stand in for ‘score’, or when we mean ‘recording’, or when we mean ‘performance’.

It’s worth noticing that the aspect of ‘music’ taken to be the object of enquiry varies depending on who’s doing the choosing. Furthermore, that this is a decision strongly influenced by the context – historical, philosophical and cultural - of the scholarly endeavour. As our limited list of musical encounters reveals, there is not, actually, one set of attributes that we can or should assume for all musical phenomena. And yet we have a documented problem in music scholarship, described by Philip Bohlmann as the essentialization of music itself (Bohlmann, 1993) – it’s a problem that’s also been tackled in the work of Lydia Goehr (1992) and Georgina Born (2010).

Within the bounds of musicology’s own annals, through the far-sighted work of Goehr, Bohlmann, Born and others, we have named and shamed:

[Slide 8]

‘the hegemony of a certain kind of musicology... [which] rests on the ontological assumption that ‘music’s’ core being has nothing to do with the ‘social’ [...] such that the appropriate focus in music scholarship is on “the ‘music itself’.” (Born, 2010:208). We’ve recognised the essentialism for what it is, and we’ve started to identify its impact on the politics of scholarship and disciplinarity (Bohlmann, 1993), and its ‘preoccupation with the bounded, internal, immanent development of the lineages of Western art music.’ (Born, 2010: 209). We’ve recognised that this essentialising tendency might have dictated to a certain extent the remit and conceptual vocabulary of wider musicological research. So it should all be ok. Right?

But I have a concern that the success currently enjoyed in the interdisciplinary alignment of music and science – in cognitive science, psychology and neuroscience, for example – is at risk of carrying over that same “ontological assumption” that Bohlmann identified 20 years ago: that a single,
essentialised concept of (Western classical) ‘music’ is frequently used to stand alone as an object of analysis.

Given that the research programme loosely identified as embodied music cognition stands for just such interdisciplinarity, I think this is something worth considering.

I’m getting round to a more detailed account of the enduring problem of ‘individualism’ that I mentioned earlier. But first let’s go back again to my potted history of musical embodiment. By the 1990s, the lack of attention to physical bodies in academia is increasingly obvious, and we see researchers such as Jane Davidson taking advantage of newly accessible and powerful technologies of video recording and multimedia data management to focus on the analysis of performers’ body movement. There’s a growing acknowledgement that musicians move in various ways that exceed the demands of sound production on their instruments (ancillary gestures (Wanderley and Vines, 2006) or expressive movements (Davidson, 1993)); and a little more recently, on listeners’ response through movement (Toiviainen, Luck, & Thompson, 2010; Leman et al.).

We can see how this emerging ‘embodied’ agenda should be equipped to tackle all sorts of different ‘musical encounters’. It’s clearly attempting to bring under analytical scrutiny the actual event of musical performance: performers with performers, performers with listeners, classical western music, ‘world music’, popular music, sacred music, music from concert halls, music from gigs, music from the streets. And we’re now seeing a more diverse array of musical situations as the focus of empirical research (mainly through the collective efforts of two particular research groups, at Ghent and Jyvaskyla).

Indeed, over the past couple of decades, it’s generated a wide range of original research programmes. There are now several significant strands – for instance: the varied functions of performer gestures; the effects of auditory and visual limits on performers’ synchronisation abilities; the extent of audio-visual interaction in perception of a performance; the effect of a performer’s expressive movements on an audience’s response to a performance, etc. Earlier this year, I used the search terms: music*, movement, perform* to retrieve 90 abstracts of original, empirical studies of musician communication. It’s fair to say that, since the early 2000s particularly, there has been something of an explosion of research into music performance.

But into performance as what? Well, the briefest review of those 90 abstracts is revealing: in terms of the type of musical material used as a component of the method, 65 studies use scored, notated examples representing ‘classical Western’ forms, compared to just 21 which deal with all and any other non-notated forms, for example jazz, North Indian, popular music. (The remaining 4 use both scored and non-notated musical forms.) Taken as a corpus – representing systematic musicology, music psychology, performance research – this body of work puts physicality centre stage in the study of human musicality. In this sense, we have embraced the embodiment agenda.

But what is it that we think musical performance does? What do we think it is for? Do these empirical studies presume performance to be the manifestation of a ‘work’, or an event of social interaction? Is performance an act of social belonging, or individual expression? Is solo performance the same object of study as ensemble performance? Across the board, those theoretical foundations are really not clear.
Research agendas are united by a concern with issues of communication. The sorts of questions pursued by these projects can be translated as topics to do with musical communication. Under what conditions of audio-visual communication can co-performers achieve synchronised actions? Which categorical descriptions of emotional state can be communicated within the context of music performance? What type of information is communicated through specific co-performers’ gestures? Uniting these distinct research questions, the notion that music communicates something is undisputed. So, really I’m asking: according to what framework – what theorised musical experience? - do we examine this event of communication?

Well, don’t forget that our inherited assumptions were nurtured within cognitivism: the study of the perception of acoustic signals and their structures according to compositional features that are the historical subjects of classical Western music analysis. ‘Music’ as the subject of scrutiny is an essentialised concept based on the listener-versus-‘work’ encounter – behind which there lies a highly individualistic notion of musical conception, musical performance, and musical listening.

When we look back twenty years, there’s actually no issue of implied ethnocentricism because no-one’s making any bones about it: The most influential is Kendall and Cartette’s (1990) paper, ‘The Communication of Musical Expression’.

The authors clearly propose a communicative process that involves:

[Slide 9] “an intended musical message, recoded from ideation to notation by the composer, then recoded from notation to acoustical signal by a performer, and finally recoded from acoustical signal to ideation by the listener.” (Kendall and Carterette, 1990, p.131). The authors are explicit about the limitations of their approach: “We deal only with traditional Western art music in which composer, performer, and listener are involved.” (ibid., footnote 1, p.131).

In their 1992 edited volume, *Cognitive Bases of Musical Communication*, Jones and Holleran (1992) expand on the concept, using the particular terms of information theory:

[Slide 10]: “Communication, virtually by definition, assumes a low level of uncertainty with respect to some shared idea of speaker and listener or, in the case of music, of performer/composer and listener”. (Jones and Holleran, 1992, p.4.)

This logical, transparent presentation defines musical communication as an event of shared meaning. The analogy between speaker and performer/composer versus listener can transpose to multiple events of musical encounter. But compare this to Palmer’s 1997 account, which picks up directly again from K and C:

[Slide 11]: “Composers code musical ideas in notation, performers recode from the notation to acoustical signal, and listeners recode from the acoustical signal to ideas. Each performer has intentions to convey; the communicative content in music performance includes the performers’ conceptual interpretation of the musical composition.” (Palmer, 1997, pp.118-9).

Palmer (1997) goes beyond Kendall and Cartette’s (1990) more simplistic information-transmission model to include the act of performance itself, pointing out that the individual contribution of the performer does not feature in theoretic music analyses and that this is an area to which empirical research can significantly contribute. She expands on this, that “there is no single ideal
interpretation for a given musical piece” (ibid. p.119). By acknowledging that multiple ‘interpretations’ exist, we take for granted that – while modulated to some degree by the nuance of individual performance – musical communication can be reduced to the listener’s encounter with the true ‘work’. And we are left once again with a conception of music which requires the analytical separation of acts of composition, interpretation, and performance, and which assumes a distinct audience of non-participatory listeners. Palmer’s model is subtle, but it is essentially conceived as a linear ‘intention–notation–interpretation–reception’ chain.

Considered at any length, the linear transmission of musical meaning – from composer via (conductor via) performer to audience – is problematic.

1. It is clearly an incomplete account of a complex social phenomenon. (See Miell, MacDonald & Hargreaves, 2005).
2. It deals with ‘music’ as an (essentialised) time-neutral phenomenon – a sort of art-history perspective. But music, in performance at least, is surely ALWAYS ‘process’? It certainly has duration.
3. It cannot access those aspects of musical meaning that are not served by language, and which arise through interaction. (Astute members of the audience may now be thinking about snogging.)
But this linear transmission analogy happens to fit hazardously neatly with the prevailing listener-versus-‘work’ idea of what a musical encounter entails. At the heart of the linear transmission account lies the notion of an idealised and external musical ‘work’, which is all bundled up with the theory and practice of notation, with the culture of a particular art form that values *individual* acts of composition, and within a technological and economic practice which separates the concepts of composition, interpretation (often by an individual conductor) and performance (often by individual professional performers).

**This is not the only musical encounter that we should be trying to explain**, but since it’s the most common currency there is a risk that it receives a disproportionate amount of attention. And we can see this trend in action, if we know what we’re looking for, in some significant scientific publications:

[Slide 9] “...many listeners at a concert may grasp the expressiveness of the performance mainly from the artist’s gestures rather than from the musical content...” (D&F, 2007)

“...the majority of studies have focused on how listeners perceive emotions expressed in the music...” (J&V, 2008)

“...the present study investigated simultaneous processing of language and music... [using]
“musically syntactic regular and irregular chord functions...” (K,G,W,S, 2005)

“We begin this paper with two fundamental questions about musical representations in humans: first, to what extent are listeners sensitive to the expressive intent of composers...?” (C&L, 2008)

“We sought to preserve ecological validity by using a piece of music in the standard repertoire by a major composer, and recordings of live performances as stimuli.” (V, K,W,D,L, 2011)

Back to those three, mid-90s accounts of musical communication. I prefer Jones and Holleran’s transparent information theory model [slide 10], because it does not actually specify one-way transmission. The idea of communication evoked here includes an act of ‘sharing’ (which is etymologically correct, from Latin communicare—to share). It doesn’t DIRECTLY implicate an abstract musical WORK. That analogy to speakers and listeners nods – for me – at the ‘everydayness’ of much human musical behaviour, providing some space to consider the EVENT of musicking: the emergent performance.

However, it also demands some specific propositional agreement – a “low level of uncertainty with respect to some shared idea”. There’s an implication of semantic content, which is characteristic of cognitivist music psychology. And when we consider the development of cognitive science alongside computational linguistics, this analogy of music and language is almost irresistible. It has been particularly irresistible for those interdisciplinary researchers who address music via a particular theoretic framework that is itself highly developed according a system of musical literacy: in relation to this particular ecology of music-making that centres on the notion of a prescriptive score, it seems natural to search out some propositional aspect equivalent to that found in words and language.

There’s no doubt that there is overlap in our cognitive experience of musical and linguistic forms. I’m not disputing that, nor do I wish to undermine the considerable scientific effort that has progressed our understanding of brain and behaviour by pursuing the topic. I’m rather pointing out that some dominant research agendas have themselves been influenced by the hegemonic status of one
particular (anthropologically anomalous) type of musical encounter, which also happens to be bound up with scored, notated forms of dissemination. And then we really do have a problem when we turn our attention to musical ecologies that don’t have the same relationship with notation (musical interaction between carers and infants; child-led playground music; work songs; festival music; popular music; traditional music; classical Asian art musics): the essentialised musical ‘work’ encounter on which we built up our analytical and theoretical approach fades away, and our scientific or interpretive work is left with nothing to explain but itself.

Music scholarship is manifestly not a natural science. ‘Music’ is as dynamic and complex a phenomenon as the ‘society’ that enacts it, and it’s suited to the same detailed, philosophic scholarship. But as a universal human practice, it also deserves and requires serious evidence-based, systematic scientific investigation – so we need many approaches, many methods. And there can be no quantitative or experimental enquiry without some intentional (and significant) act of reduction on the part of the investigator. So I don’t believe that there is one single solution, and I don’t think it’s going to be effective to look for one unified account of human musicking.

But I do believe that it would be useful to have a more inclusive account of musical performance as the basic premise of interdisciplinary research. So what would this alternative model look like? I’ve suggested that a linear transmission model is implicit in a great deal of research, and that this particular model’s object of enquiry has to deal with music as an individualistic and abstract encounter.

What I’m looking for in an embodied music cognition research programme, then, is more direct attention to the social dimensions of musical behaviour and performance. I’m referring not to class or demographic, for example, but to the ‘rich’ context of any act of human interaction, primarily the nonverbal elements such as timing, gesture and utterance. Once we leave behind the information-transaction view, we immediately highlight the co-operative, emergent aspects that are involved in joint activities like music making.

Born (2010) articulates the reductive dangers of suggesting that music mediates solely via the social context of performance. And yet it seems to me that for interdisciplinary music research directed to a science-based rather than a humanities-based audience, the greater danger is to assume that this social context is included in the research topic, when in fact it is not. It seems very unlikely that empirical approaches which are implicitly biased towards an individual conception of music-making will be able to explain well the sort of direct, non-linguistic, co-constructed meaning which – I have argued – is emergent from the interactional behaviour of musicking people.

So, if it’s emergent, interaction-based musical meaning that we want to look at, as a starting point I’d suggest that we need a communication model that looks more like this:

[Slide 14 – Figure 3 - Emergent version of musical communication model].
Figure 3 - Emergent model of musical communication

In this version, the performance is at the centre. While performers, ideas and audiences are required to make the musical performance happen, if the musical performance DOESN’T happen then we don’t have an object of analysis.

This is a good moment to compare music with kissing. Think about a snog. One person cannot snog. One person can’t even do half a snog, because a kiss only exists in performance. Its subtleties of movement and response require joint behaviour. It’s the ultimate act of face-to-face communication, and words– by definition and by design – have nothing to do with it.

Consider also how your imagined kiss is not instantaneous. A good snog takes time.

Now, I’m not making a direct analogy between music and kissing. At the most obvious level, you CAN play music alone. End of story (almost. See post-script slide from email exchanges with colleagues).

But I’m pointing out two things:

1. That there are ways of behaving communicatively which are simply not meaningfully reducible to the separate actions of two individuals.
2. While kissing (and the rest) is perhaps the ultimate act of face-to-face interaction, ALL social interaction seems really to take this pattern. And music, as we know, often takes the form of social interaction.
Kissing is play. It can be serious, but it takes the shape of playfulness in its non-goal-orientedness, its emergence, its lack of implication for those essential chores of everyday life – hunting, gathering, childbirth, etc., etc.(!)

Looking back again to my musical encounters... [Slide 7]... it seems to me that an empirical focus on music as ‘play’ might offer something that music as ‘work’ or ‘piece’ cannot. In the second part of this paper, I’ll share with you some of my own recent empirical work and explain the route that I’ve tried to take with the Improvising Duos project. You’ll see that the main emphasis in this work is on finding ways to make the musical INTERACTION the object of analysis.

This is a growing theoretical support for such an enactivist approach - for example, in Hanne De Jaegher and Ezequiel Di Paolo’s (2007) work on Participatory Sense-Making: “We argue that the interaction process can take on a form of autonomy. This allows us to reframe the problem of social cognition as that of how meaning is generated and transformed in the interplay between the unfolding interaction process and the individuals engaged in it.”

Related to this theoretical direction, there is also some very interesting empirical work going on that’s finding ways of looking DIRECTLY at social interaction, by examining the physical manifestation of ‘unity’ by individuals involved in a joint activity. I’d like to mention three particular examples.

Firstly, the ‘double video’ paradigm, originally devised by Murray and Trevarthen (1985) for research on infant-carer responsiveness. This paradigm has inspired many variations. Murray and Trevarthen used a closed television circuit to control conditions of face-to-face interaction between four infant-carer dyads. The study and subsequent variations (Nadel et al., 1999; Stormark and Braarud, 2004) have demonstrated the socially contingent and interactive nature of the facial expressions and vocalisations used by both parties in the dyad.

My second example comes from work motivated by human-computer interaction for gaming research, on developing life-like crowd simulation. McDonnell et al. (2009) used animations of motion-captured actors in conversation with one another. They presented observers with ten-second excerpts of real (synchronised) conversations versus synthesised (desynchronised) versions made by pairing mismatched conversation excerpts of the same actors. The study demonstrated that observers can correctly identify true conversational ‘units’ based on body movement cues alone.

A third, key example is in Auvray, Lenay and Stewart’s (2009) ingenious ‘perceptual crossing’ design. This experiment examined the extent to which the mechanisms underlying the perception of mutual participation in a shared activity are contingent upon features of the shared activity itself. Using a stripped-back virtual environment, participants in the perceptual crossing study were able to discriminate between sensory (haptic) feedback which they received when their minimal avatar encountered (‘crossed’) the avatar of another person, versus feedback from their interaction with either a static or a mobile inanimate ‘lure’. Auvray et al. (2009) demonstrate that it is the interdependence of their perceptual activities which underlies participants’ strategies for correct identification of another agent. In other words, the distinguishing property of mutual perception (rather than other-object-perception) is emergent from the joint activities of the two participants, contingent upon their real time interaction.
So here are three studies that have sought out the EVENT of interaction. The Improvising Duo project that I will describe shortly is a collaborative project with Peter Keller, previously at the Max Planck institute in Leipzig and now at the MARCS institute at the University of Western Sydney. Improvising Duos was originally devised following exploratory work on improvising North Indian classical musician’s nonverbal communication. This was my PhD research, and I was interested in getting at the event of interaction as it takes place in improvised performance. Rather than through any particular embodied or enactive cognition programme, my approach came jointly from ethnography and social interaction research, supervised by ethnomusicologist, Martin Clayton, music psychologist, Ian Cross and sociologist, Dorothy Miell. I’ll tell you a bit more about the exploratory work that I did before the Improvising Duos project.

[Slide 15]. To introduce that PhD work generally, it’s helpful to watch this very short video clip, and then to watch it a second time with no audio. The richness and apparent choreography of the musicians’ (almost exclusively) non-verbal interaction as they perform music together speaks for itself.

I’ll summarise the PhD as a project of two halves.

[Slide 16] The first part was ethnographic, based on qualitative data drawn acquired from participant-observation, interviews and fieldwork, discovering crucial elements of musical communication as self-reported by the musicians. Three key mechanisms for successful co-performance included: negotiated tempo, commonly-known performance structure constraints, and the aspect of anticipation of one another’s intentions.

[Slide 17]. The second part was a video observation analysis – a quantitative, ethological ‘Watch and count’ approach. I measured the frequency of occurrence, and the duration, of particular nonverbal behaviours – looking at the musicians’ ostensive ‘looking’ patterns (by noting the direction in which they presented their face), and the occurrence of expressive gesture phrases of their torsos. It was exploratory work, using multivariate summary statistics to see how various socio-musical factors were associated with communicative behaviours. Some of the basic results of the study are summarised on the following slides: [Slides 18-22]

Overall, this exploratory project strongly emphasised how performers give close attention to one another when they play together: for example, accompanists give ‘feedback’ to the soloist through nonverbal gestures. In the north indian duos that I looked at, accompanists did this even in the sections that were entirely solo – when they weren’t playing at all. (In the first section of the performance, alap, the melodic instrumentalist systematically improvises according to the modal and aesthetic character of the particular raga.)

One aspect that I then followed up from the main exploratory work was to look at how the musicians seemed to use expressive gestures in a confirmatory way, to co-ordinate their joint performance. Being motivated to examine ‘the interaction’ rather than separate actions of the individuals, I wondered, “Is it enough that such listener-gestures are made regularly for the performer, or must such gestures be ‘tied’ in time to the performer’s utterance?”

[Slide 23] This (admittedly naïve and simplistic) cross-correlation supports the idea that musician duo partners utter vocal and bodily responses that contribute to the musical performance event, even
when they are not at that time playing. The behaviours seem to be comparable to the work of ‘back channelling’ in everyday conversation. The notion of backchannel refers (broadly) to responsive, nonverbal cues given by a listener (Duncan and Niederehe, 1974). It’s a concept that provides one way to recognise listeners’ nonverbal responses as an essential component of face-to-face interaction (Bavelas, 2007; Goodwin, 1981).

[Slide 24] That’s the backstory to the Improvising Duos project. On the basis that the behaviour of improvising duos shows parallels with conversational communication, and that joint music performance is ‘irreducible’ to the actions of the individuals – we asked: “Can observers recognise ‘real’ versus ‘fake’ improvising duos?”

[Slide 25.] Here’s the basic experimental set-up.

Some quick methodological questions:

- Are we measuring the right thing? How can we be sure that authentic duos are identified through backchannel cues rather than groove-based movement? We move in predictable, hierarchical ways to music that has a pulse (Toiviainen and Thompson, 2010), and improvised music with a regular tempo might well give clues about a duo’s unity. But not all improvised music has an obvious pulse.

[Slide 26].

LET’S COMPARE ‘standard’ jazz to free improvisation. Two examples picked from a scale of constrained → open improvisation

- How will we get around the problem of obvious complementary or contradictory musical accompaniment?

LET’S PRESENT the observer with excerpts from recordings where only one of the duo is actually (at that moment) making a noise on their instrument.

- And backchannel cues could include so many different modes…?

[Slide 27]. For visual presentation, we’ll just use stick-men animations of 3D motion-capture data. No facial expression, no fine motor movement (i.e. fingers). (And no instruments.)

[Slide 28.] 60 participants sat the experiment – 15 conservatoire students, 15 jazz improvisers, 15 free improvisers, 15 people with no formal musical training.

[Slide 29]. We had some hypotheses: We thought that musicians would outperform those without musical training and performance experience. We thought that improvisers would have an advantage in their own specialist genre. We thought that individual differences in empathy would make a difference.

We measured ‘performance’ at the task according to signal detection theory indices of sensitivity and bias: can they discriminate accurately between real and fake? Do they reliably make an actual, correct judgement or are they guessing? Do they have a bias towards a particular judgement?
[Slide 30] Here are some results. All participant groups can only reliably judge real vs fake in the Free Improvisation condition – and it’s the participants with the most consistent formal training who can do it. The bias is interesting: a universal tendency to call all duos ‘REAL’ in the standard jazz condition - and in fact, the only group who have a bias towards FAKE in the Free condition is the non-musician group.

[Slide 31] Here’s how our hypotheses pan out. So, we have a result that says, basically, that in these reduced experimental conditions, some people can do it and some can’t. Looking into the results more individually, I focused on the 10 top-performing participants.

[Slide 32] These are the super-raters: they can definitely do it. How are they characterised according to our background measures?

[Slide 33] They’re younger and they’ve got better rhythm(!) This plot is a way of scoping out patterns visually: I standardized the background measures and compared the super-raters with their counterparts, the Normals and the Not-so-goods (who performed reliably badly).

[Slide 34] So where has this got us? Well, it’s a successful paradigm. There are signals of ‘unity’ in joint, improvised performance, which some people are able to identify from very restricted audio-visual cues. The next obvious step is to use the motion data to compare the ‘most unified’ duos with the ‘least unified’ duos. (i.e. the ones that were scored as ‘real’ and as ‘fake’ most consistently.)

[Slide 35] We’ve also got a lovely batch of high quality duo improvisation, involved 24 musicians in 12 duos, recorded in audio-visual and mocap form. Suggestions welcome.

OK. So let’s finally come back to the title of my paper. I asked, What are the social implications of an embodied approach to music cognition?

I’ve proposed that the dominant understanding of musical communication, which underpins a broad range of research into perception and performance, rests on an individualistic account of a socially-oriented human behaviour. I’m not questioning the importance, the quality or the authority of any such research – I recognise the need for every act of scientific enquiry to limit its scope – but I am suggesting that it’s just not inclusive enough as it stands. I’m also suggesting that that there are some implicit restrictions within what I’ve called the linear transmission model of musical communication – based on the musical ecology of score-based, notated art music – which may be capping the influence of embodied accounts of music cognition.

I consider research like the Improvising Duo project to sit firmly within a general trend of embodied music cognition research, and to push forward an ‘interaction’ strand within it. It’s from this enactivist perspective that I see the most potential for really digging into the understanding of the social phenomenon of pragmatic music making.

So, my answer is that I see the social implications of embodied music research to be extensive and important, sitting behind those issues of PROCESS and EMERGENCE that are central to all lived, experienced musical encounters. Having acknowledged the role of bodies and human movement to cognition, we can’t assume that the concomitant ideas of social context and relationship are taken
care of. This lip-service is not enough, and it also serves a continuing political division between ‘valid’ music scholarship (addressing analysis of ‘the music’, meaning art music), versus ‘soft’ music scholarship (addressing ‘peripheral’ social context, encompassing the study of all and any form of musicking not ontologically predicated on literacy).

I think there are even bigger social implications, too. We need to face the fundamental importance of our interdependence on other people in the world – a view which seems counter to all but the most contemporary scientific accounts of the mind. But for now, let’s just start here: for the study of music performance, let’s focus on something that even the youngest children know – that music is a social phenomenon, that we can and do enact meaningful musical encounters with other people, and that we can do it through playful interaction.
BIBLIOGRAPHY


Jones and Holleran (1992)


