1 Section 5

2 Conclusion

Chapter 33

Music as a social and cognitive process

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Music: discursive category or biological universal?

Music, in recent Western thought, is a discursive category. It is a term that can be applied to a cluster of behaviours, artefacts, experiences, and institutions within contemporary and historical Western societies, and provides the basis for an orderly taxonomy—and orderly or disorderly exegeses—of cultural products and behaviours. It expresses a normative ideal that is specific to particular cultural contexts. Music may thus only be understood largely, or even exclusively, in terms of the dynamics of historical and cultural process (Kramer, 1995). Most humanistic and musicological thinking about music adheres to this view, which implies that there is virtually no room for approaches to understanding music that attempt to treat it as comprehensible in terms that are not reducible to the effects of social or historical agency.

Nevertheless, music does appear to have scientific, and especially, biological foundations, and at least some aspects of music are understandable by the application of scientific method. Music, as sound, appears susceptible to explanation in terms of physics (Campbell & Greated, 1987); as perceived sound, it should be capable of being elucidated by means of psychoacoustics (Helmholtz, 1885); and as perceived patterns of sound and action that cannot be derived directly from the physical signal and that yield pleasure, at least some aspects of it should be understandable from the perspectives of the cognitive sciences and neuroscience (Hallam, Cross, & Thaut, 2009; Patel, Chapter 22, this volume; Peretz, Chapter 27, this volume). For music to be an appropriate subject for scientific investigation, we must be able to claim that music exhibits characteristics that are expressible in terms that are independent of historical or social agency. Music must be at least partly understandable in terms of generally applicable scientific theories. While many musicologists (see, e.g. Kramer, 2003) would strongly contest the idea that this is either desirable or possible, it certainly seems to be the case that many aspects of music are indeed amenable to scientific investigation. Over the last few decades, there has been an explosion of scientific studies of music—building on work conducted since the middle of the nineteenth century—and we now know a great deal about the principles underlying music cognition, and over recent years, about the ways in which those principles manifest themselves as processes in the brain.

However, it might be that while musicologists' objections to music as the object of scientific study are beginning to be overcome, the unacknowledged role of humanistic

conceptions of music in shaping the course of scientific investigations of music has undermined the generalizability—and hence the scientific status—of those investigations. Almost all scientific studies of music have focused on music from Western societies, and have implicitly assimilated into their concepts and procedures many of the features of music as understood in those societies. The vast majority of studies have focused on music as an aural phenomenon, something that is listened to; they have tended to treat music as embodying types of structures that are salient in Western theories of music; and they have, often implicitly, conceived of music as fulfilling only one simple function, that of affording pleasure.

It can be argued that music, as a focus of scientific enquiry, has all too often been a shadow of the discursive category that constitutes music for Western intellectual culture, particularly when the focus is on listening as 'the' mode of engagement and on structures which may, in the exemplars employed, be atypically characteristic only of music of the Western common-practice period. This argument would suggest that what has constituted the focus of the scientific study of music is, at best, a subset of the prospective phenomena that may constitute music and, at worst, a completely unrepresentative and contingent set of sounds, artefacts, and behaviours that is specific to one (albeit hegemonic) culture in one particular historical period. In this worst case, the scientific study of music would be telling us almost nothing; the culture-specificity of its object of study would undermine its generality to the extent that it could scarcely be called 'science'. In the best case, science has explored only a small fraction of what there is to be known about music, and requires radically to re-evaluate its fundamental premises in order to develop adequately comprehensive scientific accounts of music.

While this argument presents a vastly over-simplified account of the scientific study of music, there is more than a grain of truth in it. Ethnomusicologists have long focused on the exploration of structures, institutions, behaviours, and sounds in non-Western societies that appear, from the viewpoint of Western culture, to constitute 'something like music' (e.g. Wallaschek, 1893). While this 'something like music' is largely recognized on the basis of foregrounding of patterns in pitch and rhythm, there is certainly more to 'something like music' than would be evident from its manifestations and descriptions in Western culture. It sounds different, appears to exploit different types of structures, fulfils a startlingly wide range of functions, and more often than not is something that involves the active and interactive participation of all members of a culture (Blacking, 1976). A science which explores music as patterned sound that has hedonic value is evidently exploring only a subset of prospective musical behaviours. But if this is the case, what would be the superset?

It could be that 'music' is simply an epiphenomenal and pleasurable outcome of human biology, a contingent and ephemeral exploitation of capacities that have arisen for other purposes (such as language, auditory scene analysis, emotional expression, motor control, etc.—for such a view see Pinker, 1997). If this were the case then we could expect that 'something like music' might be accessible to all humans, irrespective of their cultural background, but that 'something like music' should have no particular function in any society other than simple enjoyment. We might also expect that societies should exist in which something like 'music' has never arisen. The superset of all music would then be extremely variable and would be largely determined by the ways

in which different societies license the exercise of the heterogeneous human capacities upon which the pleasure-value of 'something like music' is parasitic.

Alternatively, we could suppose that 'something like music' is universal and accessible to all humans, and shares at least some characteristics in addition to its pleasure-value across cultures, 'music', in the sense in which it is used in Western societies, representing a subset of the possible range of manifestations of music (Nettl, 2000). This latter position can be defended on the basis of what is known from the ethnomusicological record, on the basis of which it should be possible to develop at least an operational definition of 'music' that has some universal applicability and hence is susceptible to scientific exploration.

Ethnographies of 'something like music'

In order to give a sense of the scope of prospective musical behaviours across cultures, a range of non-Western examples of behaviours that are recognizably 'music' will be considered. These examples are taken from geographically and historically separated societies that have, and have had until very recently, no common point of contact, within which 'something like music' can be thought of as an indigenous activity that is, in different ways, accessible to all members of each society.

Starting with an historical example from the USA, Bruno Nettl (one of the most eminent living ethnomusicologists) suggests that music, for the Blackfoot group, seems to fulfil and to have fulfilled several different functions. In 1966 it was still used in games between men's societies, preceding and following the contests, but its historical roles (particularly pre-1900) were more widespread. As Nettl (1967, p. 152) notes, 'musical performance [was] associated with all kinds of activity . . . [having to be] performed with practically every activity, religious or secular, in order for that activity to be regarded as properly carried out'. Any important act could not be carried out without its proper songs, which, for Nettl (1967, p. 152), acted as 'an authenticating device': 'without it no important act was a truly Blackfoot act'. Notably, however, the contexts in which it appears to have been used—such as the transfer between persons of a medicine bundle (a wrapped package used in shamanistic ritual), or in the approach to an encampment of another tribe—are contexts where acts are taking place that either do not have outcomes that are determinable in advance or that signal significant potential changes in social status. Nevertheless, music appears here to be interwoven into other aspects of everyday life; it is—or was—not something distinct from normal social intercourse, but an intrinsic part of that intercourse.

A very different form of music is encountered in Podstavsky's (2004) account of the role of music in traditional Hausa society in Nigeria. Here, musicians are of very low status—indeed, Podstavsky notes that the word for musician, or more properly, for singer, *maroki*, derives from the Hausa term for begging, *roko*. The *maroka* are and were dependent on patrons for largesse, but they 'flout social conventions in an ostentatious display of license, and the liberties they take with patronage, even of the highest rank, are not less expected of them than are praise, flattery and self-abasement [. . .]' (Podstavsky, 2004, p. 348) Nevertheless, as Podstavsky suggests, 'if *maroka* are permitted so many liberties, it is not despite their lowly condition, but because of it. . .'

(Podstavsky, 2004, p. 348). In effect, in traditional Hausa society, singers—*maroka*—are bound to powerful patrons (who are generally male but may be female, and may be corporations rather than individuals). *Maroka* are themselves of low status, being almost extrasocial, and are licensed not only to praise but also to comment and critique (in a sense, as the lowest of the low they have nothing to lose!). But they and their music again appear to have a significant role in ambiguous or doubtful situations, such as when social structures require to be re-affirmed (for instance, when a chief's power needs re-affirming—either for his own ego or for the reinforcement of his followers' confidence in the chief), or when collective actions require to be motivated.

On yet another continent, Simon's (1978) account of the musical practices of the Eipo pygmies of Irian Jaya (the Indonesian-held territory of Papua), show that music in this more-or-less neolithic, exogamous, patrilineal, and patrilocal clan-based society again permeates critical phases of social action. Music—again, more properly, song—in this culture falls into four categories according to the occasion in which it is manifested; it can be used for self-entertainment during various daily activities, in ritual dancing, and in the activities surrounding either death or illness. Self-entertainment music is termed *dit*, while that involved in ritual dancing is termed *mot*; as Simon (1978, p. 442) notes, 'The third category (laments) and the fourth (singing at the curing ceremony) are not considered music or singing, and therefore these musical activities have no special term'. Yet again, in this culture music appears to be critically involved at moments of social—or even individual—uncertainty. While the solitary *dit* songs may occur sporadically, and can be thought of as fulfilling psychical or magical functions for an individual (in effect, self-regulatory), the social *mot* songs, performed at feasts or dances, have a primary function of social stabilization; 'they maintain the social forces of the . . . men . . . they strengthen the friendship between allied villages . . . [and] . . . also serve as a kind of marriage market' (Simon, 1978, p. 443). The curing songs and laments appear to have both self-regulatory and social functions in helping manage change or transition in the states of individuals and in their roles and significances within the society.

The Kamayurá is a very small Amazonian group with around 300 members, living in the headwaters of the Xingu River, a tributary of the Amazon in Central Brazil; their culture is presently under severe ecological stress, and indeed under threat of extinction. Hill (1979) provides an account of their musical practices which focuses on three distinct sets of activities: *jaqui* dances, *taquara* dances, and *kwarìp* ceremonies. *Jaqui* dances are performed only by the men, take place at the beginning of the dry season (in April) and invite forest and river spirits to enter the Kamayurá village to 'bring the fish'. *Taquara* dances are held when the Kamayurá wish to rid the village or household of evil spirits that may result from contact with outsiders. *Kwarìp* ceremonies occur at the beginning of the rainy season in late August, are held only when a man of high prestige has died, and consist of two parts, a funerary rite and a celebratory festival. As Hill (1979, p. 428) notes, 'the two categories of social relations represented individually in the structurally opposed *jaqui* and *taquara* dance are simultaneously expressed in the first part of the *kwarìp* ceremony'; in effect, three forms of musical practice are employed in the management of relationships between the environment and the community (*jaqui*), between the community and outsiders (*taquara*), and within the

community and between the community and the outside world as the community changes over time (*kwarìp*). Again, in this tiny and marginal Amazonian society, music is an integral component of collective action in situations where potential outcomes—in terms of future relationships between the group and its environment, and within the group and between the group and other groups—are uncertain.

A final example from yet another continent illustrates the ways in which music can appear recognisable but can yet bear a weight of meaning that is quite alien to the expectations of members of contemporary Western cultures (see example). This example comes from the Northern Territory of Australia, and is reported by Allan Marett in his 2005 volume *Songs, Dreamings, and Ghosts: the Wangga of North Australia*. Marrett states that around the small coastal settlement of Wadeye in the 1940s and 1950s, the establishment of a mission station led local groups to come to the mission regularly for food assistance. This frequently led to actual violence, as several of the groups had long been in conflict with each other, although these groups inhabited very much the same areas of the country. Elders from the three main language groups collectively created a system of tripartite ceremonial reciprocity, in which the each group would, in turn, sing songs using their own song-forms but all referring to local places and to commonly-held cosmological principles. So the wangga-owning group would sing wangga for the dhanba- and lirrga-owning groups, the dhanba-owning group would sing dhanba for the wangga- and lirrga-owning groups, and so on. As Marrett notes (2005, p. 23), in Wadeye, 'The tripartite ceremonial system . . . continues to function to the present day and is pointed to as a source of ongoing stability within the community'. Marrett (2005, p. 35) also notes that '. . . song texts often contain elements of ambiguity that permit a variety of different exegeses', and it appears likely that it is this ambiguity that allows the tripartite ceremony to maintain a degree of social harmony across the three groups. Here, we have a state of affairs where music has consciously been employed by the participants to manage a situation—the co-presence of groups, each of whom claim that their locale is part of *their* own ancestral heritage—that has the potential for violent conflict; again, music is central to a situation where the dynamics of inter-group relations are dangerously uncertain.

Each of the societies from which these examples are drawn display different types of social organization, inhabit different physical and ecological environments, and provide seemingly quite different manifestations of music. While all share modulation of pitch and the use of periodically-based rhythmic structures, manifested in song—and, more often than not, dance—otherwise all take quite distinct forms and fulfil quite different functions in these different cultural contexts, few if any of which are simply reducible to 'entertainment'. Nevertheless, there are at least two general tendencies that are evident in all these examples. Music is generally interwoven into other aspects of everyday life, and music tends to be employed to manage situations involving change or transition in the states of individuals and in their roles and significances within a society (Cross & Woodruff, 2009). One can draw a very general hypothesis from examples such as these (and, indeed, many more): that 'music', as a communicative medium accessible to all members of a society, has a central role in the management of situations of social uncertainty, situations where outcomes are unclear, on the edge.

It is obvious that language also has a hugely significant role in managing situations of social uncertainty, as a medium for instruction, negotiation, collective agreement, or the imposition of individual or collective will. However, unlike enactive language, music as an interactive behaviour leaves no apparent traces or residues in the form of goal-directed behaviours or consensual agreement as to current or future behaviour—other than the agreement that the music has been enacted, though precisely *what* has been enacted may remain unclear. Music seems a much less purposeful and consequential form of interaction than does language. If it is functioning so as to help manage situations of social uncertainty, the relationships between music and the generic processes of social cognition require to be explored in order for music's putative social functionality to be understood.

Recent approaches conceive of the processes involved in social cognition as automatic, orienting responses that rely on the behaviours of others—particularly facial expression of emotion, or eye gaze direction—to be informative about the environment, whether physical or social (Adolphs, 2003; Frith, 2008), and to guide behaviour. When interaction is communicative, there is a generic tendency towards mirroring of action, which can be thought of as underpinning shared intentionality (Tomasello, Carpenter, Call, Behne, & Moll, 2005). In communicative interaction, there is also evidence for the use of continual (pragmatic, attitude-, and intention-signalling) acts of 'communicative scaffolding', such as eye gaze signals in controlling turn-taking, or eye contact in signalling communicative intention to manifest new and relevant knowledge (Hari & Kujala, 2009); these signals are not limited to the eyes as indicators of attentional focus, but may also involve more complex ostensive orofacial, brachiomanual, or postural gesture (Kendon, 2004) which may be deliberate but are frequently subconscious. In real-time social interaction, then, there is thus a complex cycle in which we abstract information from the acts of others which guides our own behaviours, which will in turn form part of the social environment from which the others abstract information that guides their own behaviour.

Much of the research that has explored these types of interactive situation has focused on circumstances in which interactions are goal-directed and hence volitional or involving conscious awareness. However, there is considerable evidence—particularly from the explorations of 'mirroring' in communicative contexts—that non-conscious and, particularly, affective, processes play a crucial role in sustaining, and perhaps enabling, efficacious social interaction (Singer & Lamm, 2009). Affective mirroring, whether in the form of mimicry of affective expression (facial, vocal, gestural, or postural), or emotional contagion, appears largely automatic or reflexive. It has been proposed that either of these processes is likely to precede empathy, an affective state elicited by observing the affective state of another person, and which we are aware is brought about by the other's state or situation; empathy may precede sympathy which may, in turn, precede prosocial behaviour.

A framework for exploring the functional efficacy of music

How, then, do the types of process that enable music to be functional as a medium for managing situations of social uncertainty relate to these more general processes

involved in social interaction? To start with, we shall sketch some of the features that appear likely to endow music with the capacity to deal with social uncertainty. One attribute that characterizes music in almost all accounts is the way in which it simultaneously appears ambiguous—its meaning is not consensually determinable—yet it seems also to present raw, basic and unmediated meaning (Tolbert, 2001). Music seems to mean like it sounds, yet participants are unlikely to agree on its precise meaning. A further consistent feature is that music enables participants to orient their attention and behaviours around a common temporal framework, usually by foregrounding a periodic pulse (Clayton, Sager, & Will, 2005). It can be suggested that music's sense that a meaning is being presented, yet maintenance of indeterminacy in the meanings that can be derived from it—which elsewhere I have termed *floating intentionality* (Cross, 1999)—together with its capacity to induce a sense of connection between participants by establishing a commonly experienced temporal framework, makes music an excellent medium for non-conflictual interaction. Music's floating intentionality allows different participants to derive different significances from the ongoing musical event while each feeling that the meanings that they are experiencing are somehow intrinsic to the music; as these different significances are not made manifest between the participants, potentially divergent interpretations are never in conflict. Moreover, music's provision of a periodic temporal framework acts as a foundation for the coordination or entrainment of participants' actions and perceptions, leading to a sense of mutual affiliation. Exploitation of these two features endows music, as a communicative medium, with a particular efficacy in managing situations of social uncertainty.

This still leaves unresolved the questions of how music can simultaneously evince fixity and multiplicity of meaning, and of how it relates to the types of process involved in social interaction described above. Elsewhere (Cross, 2008), I have proposed that we can analyse the sources of meaning in music in terms of at least three dimensions reflecting aspects of biologically-grounded communicative systems that have different levels of generality, the first shared with other species of animals, the second common to all humans and the third specific to each culture.

We can account for the feeling that music means like it sounds in terms of the first of these dimensions which can be termed the *motivational-structural*. The rationale for hypothesizing this dimension of meaning in music derives from some recent theories of animal communication (Owings & Morton, 1998; Rendall, Owren, & Ryan, 2009) which postulate that, through processes of evolution, animals have come to be sensitive to the acoustical structure of biologically-significant signals, which act to modulate their emotional or *motivational* states. A form of relationship between the acoustical structure of signals and the motivational states of perceivers appears general across a wide range of species (though modulated by species-specific constraints), and it is no surprise that there is evidence that human listeners are similarly sensitive; in experiments on the ways in which listeners respond emotionally to music, perhaps the only consistent finding tends to be that certain 'primitive' global features of music—such as tempo, register, or intensity—are reliably associable with changes in arousal (see, e.g. Schubert, 2004; Gomez & Danuser, 2007). These relationships between acoustical structure and motivational state allow music to be experienced as though it were

'honestly' conveying quite specific information; indeed, from these considerations, music appears to be acting like an 'honest signal', a signal that reveals, to the receiver, qualities of the signaller that are relevant to the communicative situation (after Szamado & Szathmáry, 2006). Nevertheless, music's 'honesty' is more apparent than real; at most, the motivational-structural dimension of music's significance may constrain the range of possible interpretations rather than determining any single interpretation.

A second dimension of meaning in music can be termed the *socio-intentional*. The workings of this dimension are rooted in parameters that are universally evident in the pragmatics of human communicative interaction (see, e.g. Kendon, 2004; Gussenhoven, 2005) and are shared with language, being concerned with the sense of communicative intent that can be inferred from what could be termed prosodic and gestural cues (Ogden, 2006). These types of meaning are communicated by and inferred from features such as the overall pitch contour of a musical phrase (rising or falling) and its overall range (broad or narrow), and afford inferences about attitudes and emotions of the producer of the musical signal (see Huron, Kinney, & Precoda, 2006). The operation of this dimension of musical meaning is unproblematically evident in contexts in which music involves interactive participation. Here, music can be thought of as exhibiting features that are common to linguistic dialogue, being exemplified in specific contoural and accentual structures, call and response patterns, or antecedent-consequent phrase structures. This dimension is likely to underlie the inter-cultural accessibility of music, the fact that we are able to make at least some sense of the music of a culture with which we are completely unfamiliar.

A third dimension of musical meaning stems from the ways in which musical activities and their traces come to have particular significances in specific cultural contexts. These significances are the result of active participation in, and engagement with, the dynamics and specificities of particular cultural contexts and processes, as well as of individual life histories. They are shaped by the conceptions and uses of music that exist within a specific cultural framework, by the contingencies of cultural formation and change, by enculturative, formal and personal learning processes, and by associations of music with episodes in and aspects of an individual's life history. Examples might include the ways in which a particular song may have a range of significances for different groups at particular periods in time (such as *Nkosi Sikelele Africa*, composed as a hymn in 1897, but gaining particular significance during the years of apartheid in South Africa), or the ways in which particular genres of music may have particular—though often transient—significance for adolescents in constructing their own identities.

These three dimensions of musical meaning are probably always simultaneously present in any musical interaction or experience. As an example, we can consider a famous instance of the use of music in film: the passage of violin 'stabs' during the shower scene in Hitchcock's *Psycho*. These can be considered at one and the same time to be eliciting emotion in the audience by virtue of embodying the acoustical characteristics of the signal produced by an animal in an extreme situation, by articulating (in overall downward contour across multiple phrases) a sense of diminution of effort, and at the same time a particular cultural code—post-tonal musical structure—that is

likely to signify unfamiliarity and strangeness (the music was written by Bernard Hermann, whose own musical interests were profoundly modernist). All the significances are simultaneously accessible, and while one may be foregrounded for a particular listener on a particular viewing the others persist in the background, colouring the overall experience. At the same time, this example points up one other aspect of music that must be considered, which is that it rarely, if ever, constitutes an unattached or independent domain of experience. It is almost always embedded in a broader social context—here, the unveiling of a cinematic narrative—which will shape the ways in which its meanings are interpreted, while at the same time being re-shaped by the meanings accessible within the musical domain. As the ethnomusicologist Philip Bohlman (2000, p. 293) has put it, 'Music accumulates its identities . . . from the ways in which it participates in other activities'.

Music not only manifests this network of dimensions of musical meaning embedded in social context, it presents, across cultures, a temporal framework within which participants can experience their actions and perceptions as commonly organized in time. Across cultures, music is characterized by patterns of temporally regular events, allowing participants to align their experiences in time with the musical signal and with each other—in other words, to *entrain* their perceptions and actions (Clayton, Sager, & Will, 2005). Entrainment, in this sense, is a feature of music that appears more-or-less universal (even when a regular pattern of pulses is not present in the phenomenal musical surface, as, for instance, in the *alap* section of a North Indian musical performance). It is also a feature of the ways in which humans engage attentionally with temporal sequences of events; the experience of sequences of events that are regularly spaced in time is likely to involve a periodic modulation of attention that aligns with the temporal structure of the stimulus (see, e.g. Large & Jones, 1999). Moreover, humans appear to be particularly attuned to each other's capacity to act and produce sound at regular time intervals; studies by Tommi Himberg have shown that individuals interacting musically will continually adjust the timing of the signals that they produce in ways that adapt what each participant is doing to what each other is doing, a continual process of mutual temporal co-adjustment (Himberg, 2006).

It is possible that this capacity is unique to humans, despite the attention that has recently been paid to relationships between the capacity of a species for vocal learning and entrainment (Patel, Iversen, Bregman, & Schultz, 2009) and the thesis concerning the origins of human entrainment capacities in great ape drumming behaviours that Fitch puts forward in this volume (see Chapter 9). Humans exhibit entraining behaviours spontaneously and consistently and appear motivated to do so, whereas entrainment in non-human species has only been observed in a very few instances and may well be based on processes that are not the same as those that underlie human inter-individual entrainment. Indeed, a recent paper comparing the performance of humans with that of rhesus macaque monkeys when tapping along with a metronome (Zarco, Merchant, Prado, & Mendez, 2009) found that humans tended to anticipate—tapped in advance of—the beat while the macaques reacted to the beat, tapping almost in response. Moreover, humans required minimal training—if any—to undertake the task, while of the three macaques used in the experiment, one took 25 months to master the task. It is likely that entrainment underpins not only musical interaction but also

shapes aspects of linguistic interaction (see, e.g. Krahmer & Swerts, 2007). This feature of human communicative interaction, entrainment, affords interacting individuals the sense that they and all other participants are experiencing their interactions within a common temporal framework, endowing a collective musical behaviour with a profoundly affiliative sense of shared purpose or meaning.

Hence music integrates multiple sources of potential meaning within a framework for interaction that is likely to align participants' expectations, attentional and affective states (see also Bharucha, Curtis, & Paroo, Chapter 16, this volume); types of possible meaning attributed to the ongoing flow of musical activity are likely to be similarly constrained for all participants, but definite meanings are not made publicly attributable. Music, in communicative interaction, provides cues as to our affective attitudes to, and levels of engagement with, our co-participants. These cues are typically embodied in the acoustic signal but are also present in the actions and expressive behaviours that occur while making music together, helping to co-construct the collective musical activity as it unfolds in time. The specific significances of these cues are rarely, if ever, resolved; in effect, music in interaction embodies the preconditions for propositional meaning without itself embodying propositions, allowing us to abstract our own narratives from the progress of our musical interactions.

In this respect, music exemplifies a condition of ambiguity (see Cross, 2005), a feature that can be claimed to be the ground state of communication—and of the cognitive processes involved in social interaction. We have to detect and decode the meanings of our interactions with others, and in the real world we might fail, with prospectively negative consequences for ourselves and others. But in musical interactions, we are provided with a framework that is, at root, affiliative; our interactions are hypothetical, bounded, suspended in pretence. Engagement with each other in music absolves us of the need to resolve the ambiguity of our involvement with each other—and with ourselves. Yet at the same time we have a sense that we *know* what the music means; it means like it sounds. Our musical actions and intentions appear to have no ends beyond the moment, or beyond the conventions that frame our musical interactions. Yet it can be suggested that they do have consequences, in that the envelope of our musical attachment may provide us with a means of carrying beyond the immediacy of our interactions a sense of involvement with, and understanding of, others. Indeed, recent research by Tal-Chen Rabinowitch (see Cross, Laurence, & Rabinowitch, in press) has provided some preliminary evidence that the regular participation of young children in forms of musical group interaction that require them to attend and respond to what each other is doing can lead to an enhanced disposition towards empathy.

Implications and conclusions

One key implication of this view of music as an efficacious communicative medium is a need to re-assess our understandings of how music relates to other communicative media, in particular, how music relates to language. While we could adopt the position that language and music are distinct domains—or even modules—of mind, brain and behaviour (see Peretz, Chapter 27, this volume), it would seem more parsimonious to hypothesize that both might draw on common resources (see Patel, Chapter 22,

this volume). Music appears distinct from language in foregrounding pitch and (entrainable) rhythm, facilitating affective expression and a sense of connectedness but not expressing secure or consensual meaning. But music, in most of its cross-cultural manifestations, is essentially song, articulating words, albeit endowing them with a fluidity of meaning by foregrounding the expressive and affiliative dimensions of pitch and rhythm. Furthermore, music is typically an integral component of larger contexts for social interaction that may shape and constrain participants' interpretations of music's possible meanings.

Conversely, pitch and rhythm are generally interpreted as constituting background aspects of language that may be drawn on in the service of embodying and articulating semantically decomposable propositions, generally taken to be the primary role of language. However, language may also foreground pitch and rhythm to facilitate affective communication and engender a sense of mutual affiliation between interlocutors; speech in socially interactive contexts (as opposed to language abstracted as symbolic notation) almost always involves elements that could be construed as 'musical' in terms of its intermittent foregrounding of entrainment and semantic non-specificity (as in phatic communion—see Coupland, Coupland, & Robinson, 1992). It also appears to share features with music in the extent to which it embodies, in speech signals, cues as to degrees of communicative engagement, by exploiting features that we might think of as characteristic of music such as pitch contour and rhythmicity. Indeed, in at least some cultures it is very difficult to draw a hard and fast line between music and language. As Jerome Lewis (2009, p. 383) notes in respect of the communicative culture of the Mbendjele pygmies of Central Africa, while in the forest women accompany each other's speech with sung sounds, both ideophones and expletives, which contribute to increasing the volume and distinctive melodiousness of their conversations, a form of communicative interaction that appears to be neither speech nor music but somewhere in between. Similarly, in his study of music and communication amongst the Amazonian Suyá, Anthony Seeger identifies a range of types of communicative interaction that, in his words (Seeger, 1987, p. 51), '. . . demonstrate how the separation of speech and music distorts both of them'.

So there is some good evidence for considering music and language as overlapping in many of their features: as drawing on the same pool of communicative resources. At the same time, they do appear to be distinguishable in at least three ways, the first two of which have conventionally taken as of most significance though it can be suggested that the third is likely to be the most definitive.

Language and music can be distinguished semantically in terms of their capacity to embody articulate propositions. Language can express semantically decomposable propositions—complex, well-formed utterances that can be decomposed into constituent and dependent, and implicative and entailing, simple propositions. Music simply cannot do this; its capacity to mean is not understandable in the same way as is that of language (see, e.g. Scruton, 1987; Davies, 1994; Cross & Tolbert, 2009).

Language and music can be distinguished structurally in terms of the extent to which affective/rhythmic or syntactical/semantic features are foregrounded (see responses to Bharucha et al., Patel, Peretz, and Fabb & Halle, this volume). While theories of syntax have been applied with some success to a subset of possible musics—principally, to

Western tonal music of the common-practice period (see Lerdahl & Jackendoff, 1983; Bharucha et al., Chapter 16, this volume; Wiggins, Chapter 18, this volume)—it remains to be seen whether or not some type of structure analogous to linguistic syntax is truly characteristic of a wider range of musics.

Finally, language and music can be distinguished in terms of the communicative contexts within which they tend to be efficaciously deployed. Language—more properly, speech—tends to have primacy in situations where goal-directed behaviour requires to be co-ordinated; in other words, language is efficacious in getting people to do things. Music, on the other hand, figures largely in situations where the goal is getting people to experience other people *as* people with whom one might get together and do things; in other words, music is efficacious in facilitating social interaction as a context for possible social action. In effect, language can be thought of as mobilizing shared intentionality for goal-directed behaviour, while music can be interpreted as mobilizing shared intentionality per se. Music and language can thus be interpreted as context-specific manifestations of a common substrate for human communicative capacities.

This approach to understanding music also has implications for the cognitive sciences and neuroscience of music. It suggests that we need to extend our explorations well beyond the bounds of listening; we need to explore music as interaction and in social context. While there is some indicative evidence that language and music do indeed draw on common resources, we need to move beyond the constraints of current methodologies and conceptions of what could and should constitute music and language in order fully to investigate their commonalities, as well as the features that differentiate them, in both behaviour and in brain. There is an urgent need to develop more ecologically valid and culturally sensitive means of investigating relationships between music, language, cognition, and brain.

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