

Music, learning and emotion

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Abstract

Conventional views of the relationships between music and emotion would suggest that music can be thought of as the language of the emotions; musical meaning is expressive and emotional. Similarly, in the conventional view "learning music" is associated with long and effortful training; musical expertise and the ability to acquire it is thought to be exclusive to those with talent and/or motivation, while learning to experience music—if conceptualised at all—is thought of as individual and rather contingent. Hence music education tends to split into learning to master the processes of performance, and, for those destined for the role of music consumer, learning to appreciate cultural symbols and signals: a decoupling of perception and production.

There are problems with these views. There is an increasing amount of evidence from studies of infants and children that suggests that music learning is best thought of as the cultural particularisation of an inherent capacity to engage with musical behaviour and to behave musically. The apparent effortfulness that we associate with learning to produce music is difficult to square with infant and early childhood capacities actively to engage in music. Similarly, while there is increasing evidence of music as emotionally potent, there is evidence that it is meaningful in ways that are embedded in social contexts—in film, as propaganda, as an apparent tool for manipulating attitudes and behaviours—that suggest that music's meanings are not located solely in the domain of affect. If music is the language of the emotions, it is many other things as well.

I shall suggest that we can begin to resolve these problems by identifying what we mean by music in contemporary western societies and how we have come to conceive of it in the terms that we do; only then can we fruitfully address ideas of emotion and learning in relation to music. For many musicologists music exists as "pure" or "absolute", music free of text and of textual meaning; music is its own autonomous domain unconnected to everyday worldly concerns. This perspective, which colours and has helped shape more popular conceptualisation of music, have their origins in nineteenth century ideas of music, themselves reactions to earlier ideas of music as expressive of sentiment or feelings. But everywhere we look and listen, in every society that we know of, we find "something-like-music". We recognise it as "music" because it seems to bear a resemblance to what we think of as music, but it often seems to be employed to do things that music does not do in our own cultural world, and it seems to have emic significances that vastly exceeds that to which we typically allow to music. However, even in Western societies music is scarcely "pure"; it is central to and embedded in religious ritual, it manifests itself as spontaneous collective behaviour in mass contexts that are recreational yet full of group significance (e.g., football matches), and musical expertise is acquired and exercised outside of formal social institutional contexts in informal and subculturally-significant ways (garage bands, rap). Music, in other words, is not an autonomous domain that is used for display, aesthetic enjoyment or entertainment; it is a potent mediator of complex social interactions.

We can make sense of this in terms of a taxonomy proposed by the ethnomusicologist Thomas Turino, who distinguishes between what he terms "presentational" musics—a typical example would be the western symphonic concert—and participatory musics, involving interaction between participants who have acquired their expertise through acculturative processes and who may not think of themselves as "musical specialists" in any sense. I shall suggest that if we think of music as a participatory and communicative medium for interaction we can resolve many of the problems that arise from conceiving of music as an autonomous domain of art. I shall further suggest that conceiving of music as fundamentally participatory allows us to ascribe it a generic function across cultures and times, that of managing situations of social uncertainty; I shall outline some of the processes and attributes that inhere in interactive music that may fit it for such a function.

As an interactive process, music is bound up with affect; social interaction is fundamentally affective. We can think of emotion as elicited in presentational (or Turino's other categories of high-fidelity and studio audio art) as responses to traces of social behaviours, and to characteristics of biologically-significant sound. As an interactive process, music appears to be acquired very much like language: informally, through exposure and active engagement. We are statistical processors, and increasing evidence shows that we can acquire the ability to make sense of even abstract patterns in pitch and

time implicitly, without apparent effort. Hence if we interpret music as a socially-significative, interactive, communicative process, the ways in which we can "learn" it and use it are likely to parallel the ways in which we learn and use speech. Indeed, we are presently exploring whether or not common processes are implicated in music and speech as interactive spontaneous communicative media, and some evidence is emerging which indicates that there are indeed common processes and mechanisms at work in both domains.

This perspective suggests that the functions of music in educational contexts, and the ways in which we can expect musicality to be exercised and developed, should be viewed pluralistically. Rather than thinking of music as a specialist domain of production, we can think of music as an interactive process as well, accessible to all members of our societies. Indeed, some of our recent research has provided evidence for positive effects of musical interaction on children's capacities to experience each other's experiences in affective terms. But much remains to be known; we can reconceptualise music, but we have barely begun to explore the implications of that reconceptualization.

Music in western societies

We live in a multicultural world, yet like hermit-crabs—*einsiedlerkrabs*—we experience that world while cocooned in our own cultural shell. When we use the term "music", our understanding of the term is necessarily shaped by our own cultural histories in ways of which we are often unaware. So "music", for most members of most Western societies, exists as complexly patterned sounds in the form of songs, pieces, or works that we listen to because they give us pleasure, or perhaps because they offer us an experience that appears aesthetically transcendental. Music has institutionalised value as a commodity with economic significance; it is hedged around with laws defining ownership and rights of exchange and distribution. And music has aesthetic value, with significance that can only be accounted for in terms that are proper to the discussion of music and that are the preserve of connoisseurs. Only those with genius, or those who have subjected themselves to long and arduous training, are capable of producing—composing and performing—music.

Many aspects of this view of music are relatively recent in the history of Western societies. The idea of music, in the form of pieces or works, as having economic value independent of the activity of its producer in composing or performing it arises around the turn of the nineteenth century (though in fact prefigured in the early days of music printing in the sixteenth century), when ideas of artistic authenticity—and hence, value—meet the pragmatic and reproducible reality of the printed score and the new market provided by a growing bourgeoisie. The idea of music as sound, and of listening as the primary mode of engaging with music, has a much longer lineage (at least back to Plato), but becomes reinforced and naturalised with the development of technologies for sound reproduction from the later nineteenth century. The idea of music as an artistic, autonomous, aesthetic domain is consolidated in the nineteenth century, particularly in the writings of Hoffmann and Hanslick. For Hanslick (1891/1986: 6), the aesthetic value of a work—"the unique efficacy of the impressions we receive" from musical phenomena—should be accounted for in terms of "the principles of their own structure"; hence music can only be composed and performed by those who have native talent, or who are certified by appropriate educational institutions.

It is obvious that these ideas of music do not adequately describe the variety of phenomena in our everyday world that we are happy to accept as "music", or as "musical". Music is something that people do, and not just the talented or the conservatoire-trained. There are circumstances where music is not "for pleasure" and where it is unlikely that we will have an aesthetic experience (think of the typical kindergarten orchestra); where music is being done for the sake of those who are making it rather than for a listening audience (think of a typical amateur choir rehearsal); where music is being done because it is part of another activity, and not for its own sake (a church service, or a football match); where the socially-appropriate mode of engaging with music is not listening, but moving (as in a dance club). Music, when we allow all these varieties of phenomena to fall under that description, is not an autonomous artistic domain, with specialist producers and consumers who engage with it through listening; it is active and interactive, and is embedded in social values, norms and processes. Indeed, it becomes difficult to determine just which activities we should count as "musical", as the identity of musical activities is difficult to distinguish from those in which they are embedded.

Music beyond the west

The problem is compounded when we look beyond the bounds of our own societies—as we must, if we wish to develop a scientific understanding of music. We cannot claim to be developing a scientific understanding of any human activity if we do not start by evaluating its scope and its generality: (i) what precisely does this activity consist of; and (ii) are all humans capable of it? If we wish to explore music from scientific perspectives we must be able to delineate what we mean by music in ways that allow us to ask the second question, and we can only do this by exploring music and conceptions of music in societies beyond our own.

To start with, we need some operational definition of what aspects of other cultures we can identify as music or musical; the ethnomusicologist Klaus Wachsmann (1971: 384) suggests that we tend to identify as music "those phenomena outside [our] own immediate culture... which seem ... to *resemble* the phenomena which [we are] in the habit of calling music in [our] home ground". Were we to start from the premise that music is aesthetic, autonomous, for listening, then we find a very limited range of musical phenomena outside the west such as North Indian raag, Persian maqam, or Japanese gagaku. All are court musics or art-musics, rendered similar to the standard western conception of music more by their social context—they are complex musics for performance or presentation—than by any other features. If we adopt the broader approach to identifying music that is required to account for the diversity of western manifestations, then we find an extraordinary diversity, ranging from the complex art-musics of India or Japan to the socially-embedded and inclusive musics of the central African rainforest or the central Andes.

A useful way to bring some order to this diversity is provided by the ethnomusicologist Thomas Turino (2008), who distinguishes between presentational and participatory musics. Presentational musics—such as Western concert music—tend to be complex; they involve closed, scripted forms with organized beginnings and endings, extensive variation, individual virtuosity, contrasts in design, and varied textures. They are intended for display, are produced by trained specialists, and tend to occur in quite specific contexts where they are the focus of attention. In contrast, participatory musics are characterised by redundantly repeated forms with "feathered" beginnings and endings, dense textures, little individual virtuosity, few dramatic contrasts and a constancy of rhythm, metre, or groove. They are intended for collective enactment rather than display, are socially inclusive in that all members of a given culture may be expected to be able to play some role; they typically involve all participants in joint and synchronous (or at least temporally coordinated) action, and appear to be associated with a sense of social solidarity. Participatory musics are typical of many traditional societies, and may well constitute the most prevalent manifestation of music across cultures.

Thus it may be useful to reverse our Western preconceptions about music and take the participatory mode as "the" model for music. From this perspective, music appears much more like a medium for social—perhaps communicative—interaction between members of a culture than an abstract medium for aesthetic display. But adopting this approach gives rise to new problems; it may not be possible to determine just what should count as "music", as opposed to some other type of participatory activity, in some cultures. We can find an example of this in the

Anthony Seeger's superb account of song amongst the Suyá people of Amazonia. Seeger (1987) notes that Suyá communicative activities are best conceived of as falling into overlapping categories that span a continuum between two extreme situations: at one pole, the responsibility for an utterance should be accorded to an individual "communicator", while at the other that responsibility is held not to lie with the ostensible communicator but rather with a remote—even non-human—source. In the first of these overlapping categories, *kapérni* (speech), text has priority over melody, with text and melody determined by speaker; *kapérni* may become increasingly formalized in public performance, when utterances are addressed to a large group or even the whole community rather than to an individual or small group. In the second and third categories, *sangére* (invocations, which come from a teacher in the past) and *sarén* (narrative and oratory), there is a relative priority of relatively fixed texts over relatively fixed melodies, and both are held to derive from earlier, ancestral times. In the fourth, *ngére* (song), melody has priority over text, with the time, text and melody of the utterance(s) fixed by some non-human source. Hence speech shades into invoking and orating which elide with song; a distinction between what, from a Western perspective, would constitute "language" and "music" does not exist.

Even in contemporary Western societies, what should be classed as "music", as opposed to some other participatory, communicative form of interaction such as speech, is not wholly clear. Work in conversation analysis has shown that features that we might think of as "musical", such as pitch pattern, are used by speakers to indicate their stance in respect of what they are communicating or their attitude to the person with whom they are communicating, or to signal changes of topic or closure of a parenthetical excursion; and some recent work in the CMS (Knight, 2013) is suggesting that "musical" features such as temporal regularity may be found in individual speakers' utterances depending on the extent to which a speaker wishes to capture someone's attention (as in a lecture) or engender in them a sense of affiliation (as in a party political speech). In other words, the pragmatic dimension of language—the use of language to achieve social ends—employs features such as rhythmic regularity and pitch pattern that we tend to think of as primarily musical, blurring the boundaries between language and music.

[A generic social function for music?](#)

The use of particular features does not suffice to identify something-like-music across cultures, but I will propose an alternative approach that focuses on function which allows us to draw some useful distinctions. I shall suggest that participatory music has functions and uses that are distinct from the functions and uses of speech.

Participatory music involves, as Turino notes, synchronous or coordinated activity between each person contributing; each organises their behaviours around a regular temporal structure that all participants experience as shared, and that allows them to anticipate, predict and align their behaviours (whether sound-producing or not) to, those of others. In other words, in participatory musics, people entrain their attention, actions and sounds with those of other participants. This is not a unidirectional process, with participants entraining to a particular individual who is the time-keeper; it is likely to involve a process of continuous mutual adaptation of the periods and phases of the sounds and actions produced (Himberg, 2006;

Konvalinka et al, 2010), with each participant continually switching between leading and following each other. An increasing amount of evidence indicates that when people entrain their behaviours with one another, they experience effects on their memory for and their attitudes towards each other (Miles, Nind & Macrae, 2009; Miles et al, 2010); their memory for incidental attributes of each other is likely to be heightened, and they are likely to experience an enhanced sense of mutual affiliation with each other. In other words, keeping together in time, as many have noted (McNeill, 1995), really does have powerful effects on social bonding.

In addition to the social effects of entrainment, music—across cultures— also *means* in ways that appear paradoxical but that may aid social cohesion. The idea that music embodies "natural", direct or unmediated meaning is found in many societies (Feld, 1981; Leman, 1992; Turino, 1999), albeit embedded in different ontologies in different cultures. However, at the same time music's meanings appear to be multiple and unresolvable (see, e.g., Qureshi, 1987). As Swain (1996, p135) puts it, "...music seems full of meaning to ordinary and often extraordinary listeners, yet no community of listeners can agree among themselves with any precision that comes close to natural language about the nature of that meaning", an attribute that I have described elsewhere (Cross, 1999) as "floating intentionality". This paradox—that music appears to embody unmediated, direct meaning, but what any particular instance of music may mean seems different in the experience of different individuals—can be dealt with by the realisation that, unlike in speech, the meanings elicited by music are *not* required to be made mutually explicit by individuals interacting in music. Each interacting individual can thus interpret musical meanings more-or-less entirely idiosyncratically without necessarily coming into conflict with the interpretations of others, a situation that seems to stand in direct opposition to that manifested in language where most speech acts require a degree of consensual referentiality between participants in order to be interactively efficacious.

Hence music provides a minimally-conflictual framework for apparently communicative interaction; its seemingly direct expression of meaning, together with the affiliative qualities that derive from its temporal regularity, afford participants the sense that their experiences are in alignment even while the meanings that each is attributing to a joint musical activity may diverge widely. In a very generic sense, making music together can be thought of as a process of establishing and sustaining a sense of inter-relatedness between participants. As an interactive medium, music's proximal functions appear more directed towards managing the relationships between participants rather than towards goals extrinsic to those relationships, in apparent contrast with speech. In my own recent work (see, e.g., Cross, 2012a, 2012b) I have suggested that music may best be thought of as *a communicative medium that is optimal for the management of situations of social uncertainty*; music is, at root, an excellent means of coordinating social attitudes and behaviours, and can be viewed as complementary to and coextensive in its forms, structures and primitives with speech as an interactive medium.

Of course, speech can also be employed to coordinate social attitudes and behaviours, by means of its *phatic* dimension, concerned with the mutual recognition of each other's presence by interlocutors in conversational contexts. The term *phatic*, introduced by Malinowski (1923), is often conceived of as applying only to the function of formulaic phrases such as greetings at the outset of an interaction.

However, the phatic dimension permeates conversational interaction and is not limited to formulaic opening or closing phrases; the phatic dimension is better interpreted as applying to those elements of a conversation that are concerned with both establishing *and* maintaining its social context—with the *relational* dimension of the conversation—rather than with any referents or goals that are extrinsic to it (see Coupland, Coupland & Robinson, 1992).

Of course, the phatic, relational aspect of language is rarely clearly distinct from other, *transactional*, aspects; as language has the capacity for direct and unambiguous reference, even a formulaic phrase can be interpreted as an attempt to convey or elicit information rather than an attempt simply to make social contact. If an interlocutor, in response to the invitation to phatic interaction embodied in the utterance "Nice day today" interprets the assertion as informative of the speaker's interpretation of the local climate and the likelihood of fair weather and proceeds to disagree with it—if the interlocutor misinterprets the speaker's cue to engage in phatic interaction as a cue to engage in debate—then the speaker's intent fails. Language, precisely because of its capacity for unambiguous reference, is less efficacious than music in guaranteeing a framework for supportive and mutually affiliative social interaction.

Bearing these ideas in mind, we can propose that music can be interpreted as functional in the phatic dimension. Indeed, in contrast to the situation in speech, in music the phatic or relational dimension is foregrounded, the transactional dimension being more-or-less absent. But rather than constituting discrete domains, music and speech are perhaps better conceptualised as opposing poles on the continuum of human communicative resources, in terms of function. While speech is optimal for mobilising joint action by virtue of language's powers of unambiguous reference, music is optimal for motivating shared intentionality (cf Tomasello *et al.*, 2005) because of its provision of an explicit framework for "sharing time" and its inexplicitness in respect of meaning. In music, we cannot formulate or convey semantically decomposable propositions—we cannot communicate transactionally. But music has the advantage over language in the relational domain in that music sets up and maintains its affiliative, relational, frame, without its affiliative qualities having to be continually re-negotiated. Music thus provides an excellent means for groups to navigate situations where social solidarity is required, all the more so as, unlike speech, multiple participants can all contribute equally to a musical activity. And we find in almost all cultures that music is a focal component of such situations as weddings, funerals, transformation of social status, or encounters with strangers; all these we can think of as *situations of social uncertainty*.

[Emotion and music as participation](#)

Music as a mode of social, communicative interaction necessarily engages our affective systems, but music is not "the language of the emotions". The meanings of a musical act, song, piece or work cannot be reduced to its affective significance, but emotion often appears central in our experience of engaging with music. A huge amount of research has been devoted to exploring music's powers to elicit emotion over the last twenty years (see Juslin & Sloboda, 2010), with somewhat varying results. We consistently find that certain features of music, such as tempo and mode (major versus minor) are associated with different emotional responses, and that certain musical pieces with which we are familiar tend to elicit neurophysiological

responses associated with reward, but the fine-grained emotional responses to the ongoing flow of music's structure that is implied in the theories of Leonard Meyer (1956) and Eugene Narmour (1989,1992) continue to elude experimental clarification.

The question of how music engages our affective systems is dealt with by Juslin & Västfjäll (2008) in their excellent and comprehensive theoretical synthesis of the experimental literature. However, their theory necessarily reflects the nature of the experimental literature on the psychology of music which, as I've suggested elsewhere (Cross, 2012c), takes as its focus the exploration of music as primarily an aural phenomenon. As we have seen, this focus may be misplaced; music as participation has begun to be explored experimentally, but is far less accessible to laboratory-based methods than is music as the focus of listening behaviour. Hence we lack a substantial empirically-grounded account of the ways in which emotion is associated with participatory music. However, some aspects of Juslin & Västfjäll's theory are certainly applicable, though resituating music in the domain of social interaction—giving primacy to the participatory over the presentational mode—privileges certain aspects of emotion in music that are not foregrounded in their account.

Juslin & Västfjäll suggest that six distinct mechanisms are implicated in the experience of emotion in music: Brain stem reflex; Evaluative conditioning; Emotional contagion; Visual imagery; Episodic memory; and Musical expectancy. Of these, the most applicable to participatory contexts is emotional contagion, which they describe (Ibid: 565) as referring "...to a process whereby an emotion is induced by a piece of music because the listener perceives the emotional expression of the music, and then 'mimics' this expression internally". This process, they suggest, is based on the operation of mimetic, social mechanisms, in which we reflexively adopt the emotions that we observe in others and that we interpret as directed towards us by means of facial expression, gesture, and voice. In real-time musical interaction, emotional contagion probably operates in a manner similar to that in which it occurs in any real-time communicative interaction, including speech; hence we can think of emotion in participatory music as mediated through the same channels as in speech. Elsewhere (Cross, 2008; 2009) I've referred to the features underlying this type of affective significance in music as *socio-intentional*, reflecting the idea that the basis for some affective aspects of music in interaction can be found in the generic organisation of human communicative resources and are common to all forms of social interaction.

An example of this type of generic organisation in human communication resources is identified by Gussenhoven (2004), who suggests, *inter alia*, that a listener will perceive the degree of effort involved in a speaker's utterances (in terms of the physiological processes of speech production) as signalling the speaker's commitment to the act of communication. Production of a large pitch interval is more effortful than a small one, hence speech that involves large pitch intervals is likely to convey the sense that a speaker is strongly emotionally committed in the act of communication: hence Gussenhoven's *effort code*. Chen, Gussenhoven & Reitveld (2004) found some evidence for the effort code in respect of speech, and we (myself and one of my ex-graduate students, Ghofur Woodruff: see Woodruff, 2010) have begun to explore the extent to which it might be applicable to music. In two

experiments we required listeners to rate musical intervals on states associated with high and low communicative effort (such as assertiveness, enthusiasm, etc.); we found that as interval size increased, ratings consistent with increasing effortfulness also increased, and that this effect was stronger for ascending than descending intervals. This is a crude first attempt to tackle the complexity of the social affective signals likely to be embedded in the experience of participatory music, but our results do suggest that conceiving of emotions in music as fundamentally social and communicative will be a fruitful area for research.

Learning and music as participation

From the presentational perspective, music learning is conventionally equated with the acquisition of skills of performance and composition, involving formal training and arduous practice. But, of course, not only the producers must learn music; the consumers must do so as well. Almost all societies expect their members to be able to engage with music in culturally-appropriate ways, and Western societies are no exception. The enculturative processes that underpin the processes of learning to experience music as music—learning to make sense of music—are likely to be of the same sort as are implicated in learning music in a participatory context.

These enculturative processes are rooted in human abilities as statistical processors; we are extremely good at picking up regularities in our environment, whether physical or social, and schematicising these regularities so as to enable us better to navigate or manipulate our environment. These processes apply in apparently passive listening, but in respect of music, even in Western contexts and even for those who are not undergoing formal musical training, involve action and active exploration. There is an increasing weight of evidence from studies in the psychology of musical development that such processes are in play for humans from the foetal stage onwards, and that they underpin children's abilities to engage with music and musical behaviours (see Hannon & Trainor, 2008). Similar patterns of statistical learning are common across all domains of communication, including music and speech, involving processes of cultural particularization of sensory and cognitive capacities. For example, Hannon & Trehub (2005) showed that while six-month old Canadian infants responded appropriately to violations of both simple and complex metres (the latter typical of Bulgarian folk-music), Canadian adults could only identify violations of simple metres. The context of musical enculturation of the Canadian adults, in which they were unlikely to encounter complex metres, had led them to focalise their metrical capacities so as to deal only with those types of metres that they were likely to encounter while their ability to make sense of complex metres had waned.

Musical enculturation is grounded in processes of statistical or implicit learning, which need not be conscious. In experimental studies with another ex-graduate student, Martin Rohrmeier (Rohrmeier, Rebuschat & Cross, 2011; Rohrmeier & Cross, 2013), we explored whether or not listeners could learn the "rules" underlying sets of melodies even when they were not instructed to try to do so. In our first experiment we exposed listeners to a long series of melodies, all constructed from the same underlying grammar, asking listeners to focus on a distractor task (such as counting the number of notes in each melody). We then asked them to indicate whether melodies in a subsequent series were familiar or not; some of the melodies had been encountered before ("old-grammatical"), some had not but conformed to

the same underlying rule-system ("new-grammatical") and some could not be generated by the grammar ("ungrammatical"). We found that listeners were able to recognise melodies that conformed to the grammar at well above chance levels, whether they had heard these before or not, and that they were almost equally able to recognise as unfamiliar melodies that were ungrammatical. In our second experiment we employed musical pitch sequences that were highly atypical in Western music, and found that although listeners' performance was lower than in the first experiment it was still significantly above chance.

But musical enculturation involves more than just listening; it involves active exploration, and movement. In a series of studies (see, e.g., Phillips-Silver & Keller, 2012), Phillips-Silver has shown that movement is integral to a child's ability to distinguish different metrical patterns, while Trainor et al (2009) have shown that the vestibular system is central in the perception of musical rhythm. Hence even in presentational musical cultures, movement is integral to the enculturative processes involved in acquiring the competences required for musical listening. And it is unquestionably the case that movement is also integral to children's enculturation into participatory music systems. In the one comprehensive study that exists of music learning in a participatory system—*Venda Children's Songs*, published in 1967—John Blacking (1967: 30) states that "Strapped to a mother's back a child will share all her musical experiences". As he puts it (ibid: 29) "Most Venda children are competent musicians... and yet they have no formal musical training. They learn music by imitating the performances of adults and other children... [mistakes being] corrected by more experienced musicians". Moreover, Venda children appeared to have their own music, which initially puzzled Blacking, although he eventually realised that:

"...although the songs are apparently unrelated to adult music, their structure is in fact related to the adult music which the conditions of their social life enable them to hear on numerous occasions. I think it even conceivable that many of the songs were composed by children and not handed down to them..."

From the few ethnographic accounts that have since been provided of the acquisition of musical expertise in tradition, non-Western, participatory cultures, these types of processes—of contingent and repeated exposure leading to implicit learning, and of mimesis that is managed by trial-and-error and occasional explicit correction—are likely to be central to music learning in participatory musical contexts.

Whilst something like participatory musical interaction sometimes figures in Western educational contexts, it is much less in evidence than the formal types of training oriented towards attainment of performing expertise. I would argue that music as interaction requires to be given at least equal priority in education. In a recent large-scale study with another ex-graduate student, Tal-Chen Rabinowitch (2012), we explored the effect of a long-term (nine-month) programme of Musical Group Interaction (MGI) on the empathic capacities of children aged between 8 and 11 years. We found that the children who had participated in the MGI programme showed a statistically significant increase in their scores on a number of empathy measures over a matched group of children who had not participated. These findings complement those of a study by Gerry, Unrau and Trainor (2013) conducted with six-month old infants. They found that infants who participated in an active musical experience programme (Suzuki Early Childhood Education classes) over a

six-month period showed significant enhancement of their capacity for positive social engagement. In contrast, infants who were assigned to a condition where their experience of music was limited to listening showed no such enhancement. Hence active engagement in musical interaction does appear to have powerful effects in the social domain that go beyond the "purely musical", and that highlight the advantages of viewing music as primarily a participatory medium.

Conclusions

If we are to draw any conclusions from this, we would start by highlighting the need for more research; at present, from the perspective of cognitive science, we know far too little about the processes that enable humans to interact musically, and about the consequences of such interaction. From humanistic, sociological and anthropological perspectives we know a great deal, and we need to promote and nurture research that draws on and seeks to integrate insights from all approaches to human behaviour— particularly in societies other than those of the West—if we are to understand the roles of music in human life.

What we can say is that the limited amount of research that is available strongly indicates that we should be adopting a pluralist strategy, in both music research and music education. From a research perspective, we need to understand the processes that underpin the abilities of musical experts—performers, composers, conductors, producers and listeners, as well as those that enable the typical musically-enculturated members of diverse societies to engage with music in their different ways. From an educational perspective, we need the types of education that produce expert practitioners, but we also need the types of education that can produce community musical amateurs, and that enhances children's capacity to engage with each other musically, and potentially, that enhances their capacities to be more empathic members of society.

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