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## Cognitive Science and the Cultural Nature of Music

Ian Cross

*Faculty of Music, University of Cambridge*

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### Abstract

The vast majority of experimental studies of music to date have explored music in terms of the processes involved in the perception and cognition of complex sonic patterns that can elicit emotion. This paper argues that this conception of music is at odds both with recent Western musical scholarship and with ethnomusicological models, and that it presents a partial and culture-specific representation of what may be a generic human capacity. It argues that the cognitive sciences must actively engage with the problems of exploring music as manifested and conceived in the broad spectrum of world cultures, not only to elucidate the diversity of music in mind but also to identify potential commonalities that could illuminate the relationships between music and other domains of thought and behavior.

*Keywords:* Music; Learning; Processing; Ethnomusicology; Culture

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### 1. The cognitive science and neuroscience of music

The study of music learning and processing seems to present a rich set of complex challenges in the auditory domain, drawing on psychoacoustic, perceptual, cognitive, and neuroscientific approaches. Music appears to manifest itself as complex and time-ordered sequences of sonic events varying in pitch, loudness, and timbre that are capable of eliciting emotion. Classically, explorations of music learning and processing within the cognitive sciences have tended to concern themselves with issues of process and structure, posing questions such as “How do we make sense of temporally ordered sonic events as music?” or “How do we acquire the capacities to make that sense?” More recently they have begun to focus on issues of function and value, aiming to understand why it is that we choose to engage with music. We now have a substantial and experimentally grounded body of theory

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Correspondence should be sent to Ian Cross, Faculty of Music, University of Cambridge, West Road, Cambridge, Cambridgeshire, CB3 9DP UK. E-mail: ic108@cam.ac.uk

concerning the cognitive and developmental processes underlying our experience of musical pitch, time, and musical structure, as well as a growing corpus of evidence that is elucidating music's affective potency; moreover, neuroscience is shedding ever more light on the neural substrates of our capacities to learn, process, and be moved by, music (for recent overviews of these topics see chapters 5–19 of Hallam, Cross, & Thaut, 2009; Juslin & Sloboda, 2010).

There seems much to be positive about; each year an ever increasing number of studies of music in cognition are conducted, and the range of topics appears ever broader. For example, as of the year of writing, more than 14,000 studies of music are listed on the ISI Web of Knowledge for the categories of *Psychology*, *Behavioral sciences*, and *Neuroscience*; from ca. 150 studies listed for the year 1980, the result has grown to 1,208 for 2009, a number that has been reached by an average year-on-year growth of 8%. Nevertheless, the ways in which cognitive science has conceived of and addressed music as an object of study may well have limited the reach, and the interpretability, of its findings. In general, cognitive science has dealt with music as though it consists of complexly patterned sounds engaged with through listening for their emotional or hedonic value, and with musicality as though it constitutes an autonomous domain of human thought and behaviour. Musicality seems to be interpreted as arising in two forms, one being the domain of the expert musician whose musicality is acquired partly through native talent and partly through extensive formal training, and who is responsible for producing music, while the other is broadly spread throughout the population, is manifested in the capacity to make sense of, and to be moved by, the complex auditory patterns that constitute music, and is acquired through processes of enculturation.

In many respects these are perfectly acceptable views of music and of musicality within contemporary Western societies. They chime with authoritative dictionary definitions such as that in the *Oxford English Dictionary*, which defines music as “the art or science of combining vocal or instrumental sounds” that have “beauty of form, harmony, melody, rhythm, expressive content, etc.,” and musicality as “musical sensibility.” They also fit with “folk theories” concerning music and its powers in Western culture: theories that are not intended to be definitive or to provide foundations for scholarly analysis, but rather that arise informally to guide action (see Walton, 2007). In Western folk theories, music is complex, humanly produced, expressive sound (Feld & Fox, 1994, p. 28), engaged with through listening because of its capacity to move our emotions (see McLucas, 2010, Ch 4) rather than for any message it might convey; it is produced—composed and performed—by the few and listened to by the many.

However, the folk-theoretic conceptions that appear to underpin much cognitive and neuroscientific research into music sit uneasily with the conceptions of music that emerge from current humanistic music scholarship (although they are consonant with views central to older musicological traditions) and may be wholly inadequate when addressing the forms in which music and musicality may manifest themselves in mind and action in many non-Western societies. While it may be that the concerns of present-day Western music scholarship are altogether other than are those of the cognitive sciences, and that “musics” in cultures other than our own really can be entirely assimilated to the conceptions in terms of

which music has been explored within the cognitive sciences, we need, at the least, to consider the consequences were such suppositions to be false. It could be that a conception of music as complexly patterned sound produced by the few and listened to by the many for pleasure is a late-19th-century Western chimera or an unacknowledgedly culturally specific subset of the full repertoire of humanly accessible musical behaviors and cognitions; if this were the case, then cognitive science would be forced to re-evaluate the import and scope of its findings and their interpretation.

## 2. Music in recent Western scholarship

For musical scholarship in the later 19th and much of the 20th century, music was explored as though it were “autonomous in its relations to culture and society” (Shepherd, 1994; p. 128). However, the idea that music and its significances are historical and social constructs has now become a central tenet of much contemporary musicology (Cook, 2001; DeNora, 2004; McClary, 1994; Shepherd, 1994). When music *qua* music is conceptualized at all (typically, in contradistinction to other meaningful human pursuits such as narrative fiction or visual art), it is envisaged and implicitly defined in discursive and/or social terms: it is explored in terms of the discourses that surround it and endow it with significance, the social and historical institutions that frame it, the social practices that embody it, and the roles and identities that it enabled and enables. These kinds of implicit definitions of music are wholly appropriate to its elucidation in the Western historical and social contexts that constitute the principal foci of musicological study, which tends to focus on the specificities of historical moments, of material practices, and of social circumstances. This focus on the specific arises partly from a historically conditioned concern with the unique artwork and its aesthetic correlates, partly from a disciplinary commitment to exploration of the types of cultural singularities associable with Geertzian thick description (see Geertz, 1973), and in recent writing, partly from an acceptance of Derridean concepts of deferral of meaning (or *différance*). The results of such approaches lead to views of music as affording more than just pleasure. A sample of views from the last two decades shows that music may be conceived of as participating “in the social construction of subjectivity, gender, desire, ethnicity, the body” (McClary, 1994, p. 69), as a means of creating and negotiating socio-cultural identities (Cohen, 1993), and as having performative properties that have an impact upon social and political action (DeNora, 2004, p. 219). These diverse views have in common an insistence on music as being intimately entangled with other domains of human experience; it is not “just for pleasure,” and engagement with music has significant individual and social consequences.

Nevertheless, one aspect of the Western folk-theoretic notion of music persists in current musicological literature: the idea that listening is the privileged mode of engagement with music. The processes of listening have rarely been explicitly addressed within musicology (for a brief account of exceptions see Bacht, 2010) but lie at the heart of much historical and recent musicological research (see, e.g., DeNora, 1999). They are equally, if not more, focal in cognitive and neuroscientific exploration of music. The vast majority of

experimental studies of music have investigated it in terms of the auditory perception of complex sonic pattern, and the relationship between auditory processes and the elicitation of emotion. For example, in the *ScienceDirect* database, of the more than 3,000 papers concerned with music in the psychological or neuroscientific literature, some 90% appear to address engagement with music in terms of listening. It is obvious that listening is not the only mode of engagement with music; someone has to produce the sounds that are heard, and there is a small but growing scientific literature on the processes of performance (for overviews see Parncutt & McPherson, 2002; Altenmüller, Wiesendanger, & Kesselring, 2006; chapters 24–36 of Hallam et al., 2009). That literature is, however, largely concerned with aspects of expert performance. Some musicologists have recently become concerned with the notion of music as involving active participation by non-specialists (Finnegan, 1989; McLucas, 2010); even in highly urbanised Western cultures where music can easily be interpreted as a consumable aural commodity—and, concomitantly, musicality can be interpreted as the ability to decipher, to experience appropriate emotions and to exercise preferences in respect of, the sonic patterns that constitute music—surprisingly high levels of active participation in collective and collaborative music-making, or, to use Small’s (1998) term, “musicking,” are to be found. In other words, the production of music in Western cultural contexts is not simply the preserve of the specialist; listening is not the only mode of engagement with music open to the non-specialist, enculturated Western individual.

### 3. Music beyond the West

That humans make music together without formal musical training; that humans make music together for reasons other than immediate pleasure (though they rarely do so without a modicum of pleasure!); that music is more than just complex patterns in sound that are beautiful, expressive, and listened to because they move us; that the default state of humans is to be musical, to be able to engage in culturally appropriate ways in musical activities; all these facts and ideas come as no surprise to ethnomusicologists. Music, or better, *musics*, in societies other than that of the contemporary West exhibit a range of musical practices, uses, and conceptions that far exceed the bounds of Western folk theories of music, and all known human societies engage in music. In some instances non-Western ideas of music are not easily reconcilable with Western conceptions; as Bruno Nettl (2005, p. 18) notes, while most Western definitions of music stress attributes such as combinations of tones, beauty, intelligibility, and expressiveness and suggest that these attributes are criterial in judging whether something constitutes “music,” “... there are societies and musics where these criteria make no sense at all.”

For example, Thomas Turino (2008) provides an account of a performance at a fiesta in an (indigenous) Aymara community in Peru, where two men joined in with the ensemble with which he was performing over the 2 days of the fiesta. Alas, their flutes were tuned quite differently from those of the other players and, as Turino notes (Turino, 2008, p. 34) “This drove me crazy ... [but] none of the other players gave any indication that

anything was wrong,” although the day after the fiesta his host, who had been performing in the ensemble and was a well-respected musician in the community, complained bitterly to Turino about how terrible the sound had been. As Turino notes, while his musician friend was happy to let him know that he was well aware that the sound had been unsatisfactory, in participatory contexts such the Aymara fiesta, more of a premium is placed on the motivation to contribute musically than on the quality of the contribution; in his words (Turino, 2008, p. 35), “participatory music and dance is more about the social relations being realized through the performance than about producing art that can somehow be abstracted from those social relations.” Here, beauty of sound was certainly a desideratum (from his friend’s point of view), but its lack was not sufficient to rob the event of its musical value.

In an attempt to provide a robust framework for addressing music across cultures, Alan Merriam (1963, p. 212, 1964, pp. 32–3) put forward a model that has since been widely cited, suggesting that music needs to be explored simultaneously at three analytic levels. The first, music as “*concept*,” is concerned with how music is conceived of within a specific culture. The second, music as “*behavior*,” is concerned with how the music-concept is actualized, or alternatively, with the practices that give rise to the concepts. Not until the third level do we encounter music as conventionally understood in Western societies, music as “*sound*,” concerned with the acoustical manifestation of musical practices.

In general, cross-culturally, musics tend to “sound like” music—not altogether a surprise. As Klaus Wachsmann (1971) suggests, we tend to label as “music” those phenomena outside our immediate culture that resemble what we habitually call music; in other words, we tend to use the music with which we are familiar as a prototypical instance of what music might be, and from a Western perspective, we are likely to interpret as music something that *sounds* appropriate. In the embarrassingly small cognitive literature that has explored music across cultures, it has been investigated in terms of the human response to, and capacities to process, music as sound. As Stevens and Byron (2009) note, the empirical evidence would suggest that cognitive processes involved in music listening—at least, in terms of abstraction of structure—are of a generically similar nature across cultures, though as Stevens (this volume) notes, some differences are also apparent. Music’s value or use as a means of eliciting emotion in the course of listening also appears to rely on similar mechanisms across cultures (Balkwill & Thompson, 1999; Fritz et al., 2009; Morrison & Demorest, 2009), suggesting that, at the level of music as *sound*, empirical methods rooted in Western conceptions of music provide appropriate investigative tools.

But the uses to which music is put in different cultures, the modes through which culture-members engage with music, and the values that music exemplifies or projects—Merriam’s “concept” and “behavior”—depart significantly from conventional Western models. In almost all musical cultures, music may exist as entertainment or be produced and experienced for its powers to move our passions. However, music is usually more than sound produced for the purposes of entertainment or the elicitation of affect. Music can be a participatory, communicative medium that may entail active contributions from all members of a culture (e.g., Seeger, 1987), involving not only sound but also movement in the form of

what, to Western minds, is dance; it can be a means of communicating with non-human agents (Lewis, 2002, 2009), or its forms and manifestations can be mediated by the influence of such agents (Basso, 1985); and it can be an integral component of coping with social change (Cross & Woodruff, 2009) or can be central to the maintenance of aspects of the social order (Marett, 2005). In the words of Stokes (in Pegg, Myers, Bohlman, & Stokes, 2010), “music-making is often itself the primary context in which a community reproduces and transforms itself.”

In non-Western societies, music is typically embedded in other domains of social action; it is rarely an end in itself, but a component of other activities that has instrumental value in respect of those activities. As Baily (1996, p. 173) puts it, “It is not the pure sound of singing or music that has meaning ... but singing or music as part of a larger system of beliefs and practices. It is not so much what is done, but why, where and when that is important. We do not perceive song or music as an isolated acoustical phenomenon but as part of the social and cultural institutions with which it is associated.” Moreover, as in the example given above, music is not solely presentational (as it appears to be in most Western contexts) but also participatory (see Turino, 2008). It involves—sometimes requires—active participation from a wide range of members of a culture, relying on a capacity to participate that is acquired not through formal instruction but through processes of enculturative learning involving exposure, often from infancy, to the sounds, activities, and meanings involved in making music (see Blacking, 1967), in a manner that appears more similar to the acquisition of linguistic competence rather than to Western models of musical development, predicated on formal instruction.

#### **4. Conclusions and future directions**

As demonstrated by recent studies of the ways in which music, its uses, and its significances may manifest themselves in Western societies (e.g., DeNora, 2004; Finnegan, 1989; McLucas, 2010), these characteristics of music and musicality in many non-Western societies are also evident in Western culture. Many of these characteristics appear to be humanly universal. Cognitive science must look beyond the Western folk-theoretic notion of music if it hopes to understand the biological foundations of the human capacity for music, exploring complementary or alternative models that derive from recent Western musical scholarship as well as from ethnomusicological sources.

The ways in which we conceptualize music have significant implications for the cognitive sciences of music, in terms of the hypotheses that we generate, the methods that we apply, and the interpretations that our results afford us. It might well be that music constitutes “an autonomous... representation of thought in non-verbal aesthetic images and percepts” (Hallam et al., 2009, p. 563) that has a degree of cross-cultural generalizability. Music’s human ubiquity, together with the fact that it appears to constitute a discrete domain of human thought and behavior in the emic conceptions of many societies, might support such a view and would suggest that identification and exploration of the distinctive features of musicality, in contradistinction to other modes of thought and behavior, should

be a primary focus of the cognitive sciences. Alternatively, musicality could be conceived of as a distinct human faculty yet sharing features and processes with other domains (as in the model proposed by Peretz & Coltheart, 2003), implying that a fine-grained exploration is required of the cognitive and neural parallels, convergences, and divergences in processing in music and in other domains (such as speech or language) with which resources may be shared. A further alternative might suppose that music is a “technology”—a human invention—that can be exploited by well-founded human (non-musical) faculties, which can simply afford transient pleasure (Pinker, 1997); in the light of that hypothesis it scarcely seems worth pursuing music as an object of scientific study. However, a more recent account, also viewing music as a technology, but one that has the potential to transform aspects of non-musical faculties through repeated and active engagement (Patel, 2010), reaffirms music’s interest as a subject of study for the cognitive sciences; this view implies that a multi-leveled approach to music is required to account for music’s cognitive, neuro-physiological, and social effects.

For all the support that these different views have garnered, the overwhelming weight of evidence from ethnomusicology suggests that we should conceptualise music as a medium for human interaction that is embedded in, and is efficacious in respect of, social processes. Music’s social efficacy—summarized in Nettl’s (2005, p. 253) proposal that one of music’s fundamental functions is “...to support the integrity of individual social groups”—together with the weight given in the ethnomusicological literature to the idea of music as a communicative—prospectively, pragmatic—medium (most clearly manifested in instances of participatory music-making) implies that cognitive science and neuroscience might most fruitfully address music in the context of the exploration of the social mind and brain, and in counterpoint with explorations of other communicative channels, particularly language. An increasing number of studies (e.g., Macrae, Duffy, Miles, & Lawrence, 2008; Oullier, de Guzman, Jantzen, Lagarde, & Scott Kelso, 2008) indicate that experiencing joint movement in time—an intrinsic component of music and dance across cultures—has significant effects on person perception and social behavior, while further studies (e.g., Oechslin, Meyer, & Jäncke, 2010; Ozdemir, Norton, & Schlaug, 2006; Steinbeis & Koelsch, 2008) point to an intriguing overlap between the structures and cognitive resources called on by engagement with diverse aspects of music and speech.

Irrespective of the particular conceptualizations of music that may be adopted in different research programs, an awareness must be maintained of the role of culture in framing the objects of study of the cognitive sciences. Music is perhaps more susceptible than most potential topics to being treated in terms that reflect current cultural practice; a conception of music as sonic and affective is legitimized by a long and enduring tradition within Western cultural history, yet even within that tradition conceptions of music have been, and indeed are, notably heterogeneous. While Western musical culture is well on the way to becoming the global musical superculture (Slobin, 1992), it is by no means the only musical culture in the global village; moreover, the practices, conceptions, and sounds that comprise music even in the Western tradition continue to reflect divergent cultural and individual needs and goals that need to be taken into account in cognitive-scientific investigations of music and musicality.

Music, even in the West, is more than just complex patterns of sound engaged with through listening for emotional effect; and musicality, even in the West, is more than just a matter of being able to listen to musical sounds *as* music. When viewed through a lens that can encompass the broad scope of human musicality, music's relationships to other domains of thought and behavior seem more varied, more complex, and perhaps more principled than when the focus is limited, albeit implicitly, to music's manifestations in contemporary Western culture. As Bender, Hutchins, and Medin (2010, p. 381) note in their paper in an earlier issue of this journal, "affect, context, culture and history ... define what 'cognized' means and why it matters," and this is likely to be no less true of music than it is of other domains of human life. Future studies must actively engage with the problem of addressing non-Western musical cognitions in culturally appropriate ways. This will require collaboration, particularly with ethnomusicologists sympathetic to the concerns of cognitive science; it will require innovation in experimental design so as to fulfil criteria such as those suggested by Cole (1996, p. 226) of maintaining the integrity of the real-life situations under investigation, being faithful to the larger social and cultural contexts from which experimental participants are drawn, and being consistent with the participants' definition of the situation; it will require the development of nuanced yet generically applicable definitions of *music* as a prerequisite for the exploration of human *musicality* across cultures. If cognitive science aims to elucidate dynamics of musical minds in ways that acknowledge relationships between culture, body, mind, and brain, it cannot simply seek to explore music as defined in relation to Western culture. The argument presented here is not intended to belittle the immense value of those studies that have already illuminated music in mind; it simply notes that we risk neglecting the variety—and the commonality—of the human experience of music if we mistake one historically and culturally particular set of concepts, behaviors, and sounds for its much greater, and significantly more diverse, superset.

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