

Music as biocultural phenomenon

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Abstract:

This paper claims that there is a need to clarify the domain of music as an object of cognitive and neuroscientific research and explores some ramifications of an inclusive delineation of the domain of music for such research.

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There is now a vast amount of cognitive-scientific research on music. Most of that research has focused on music as organised sound and on the human experience of organised sound. The question this paper will raise is 'is this enough?' - is a cognitive-scientific understanding of organised sound and the human experience of organisation in sound adequate to account for the human experience of music?

At a first approximation the answer may seem to be 'yes'. Indeed, although musical practices are hugely diverse and some remain virtually unexplored from the perspective of cognitive science, what is known about the human experience of musical sound can at least suggest hypotheses about how the cognition of these diverse and cognitively under-explored musics can be understood.

For example, within the *campesino* culture of Northern Potosí in Bolivia, there is a marked preference for the timbre of many musical sounds (particularly on wind instruments) to be severely inharmonic, a quality referred to as *tara*¹. This stands in sharp distinction to 'western' preferences for euphonious and harmonic timbres, but it is at least comprehensible. Timbral preference does appear to be one of the more culturally variable dimensions of music, and in this case it would appear to relate to qualities of sounds in the natural environment that have significant survival value - here, sounds made by rutting male llamas!

A somewhat more complex situation seems to pertain in respect of the several Central African cultures in which Simha Arom² found that the transposition of a melody which changed the interval size between equivalent pairs of notes was judged to be 'the same' melody as the original; here, it seems that that judgments about identity between transposed melodies are based not on preservation of exact interval sizes but on what he refers to as 'permutational' identity, involving the preservation of interval in terms of number of scale-steps, irrespective of the relative size of the scale-steps.

However, despite the fact that an understanding of the human experience of organisation in sound can explain much about music cognition, music has more dimensions than the sonic. There are instances in which the 'foundational' categories of theorised western musical practice which form the basis for most perceptual and cognitive theory and experimentation about music do not appear adequate to explain the practice and experience of music. For example, in certain Southern African cultures, John Blacking³ showed that the structure of melodies on kalimba (thumb-piano) can on occasion depend more on the sequence of movements involved in production of the melody than on the properties of the pitch patterns produced. And more recent work⁴ demonstrates that the pitch structures of blues guitar solos over the past century are better explained as consequences of constraints on dynamic patterns of hand and finger movements on the guitar fret-board than in terms of abstract principles of melodic or harmonic organisation.

It seems that to explore perception and cognition in respect of these instances of musical practice requires a reformulation of the dimensions of music and musicality, a re-definition of music in terms of both sound and movement and of the relationships between them. This notion is given added weight by the existence of cultures and societies where no term cognate with the conventional western term 'music' appears to exist, particularly evidenced in some African societies as, for example, in the Igbo notion of *nkwa* as embracing singing, making music and

dancing⁵. Here, it seems that music-making is conceived of as a component of a broader suite of practices, all of which involve overt action.

Indeed, just as with language, music is properly not a characteristic of individuals but of communities, evidenced not just in individual cognitions and behaviours but in inter-individual interactions which may especially involve entrainment of action and interaction^{6, 7}, based on the abstraction of temporal regularities from sound sequences⁸ and action patterns in time⁹.

It appears that the human experience of music is most adequately conceived of as having a social and interactive dimension¹⁰, though this may not be immediately evident if one takes the paradigm case of music in cognition to be represented by the solitary listener. However, the postulate that the predominant mode of engagement with music lies in the listening experience appears to apply only in certain (largely, western) cultural contexts, and although participation in western art-music as a mature listener may appear not to involve overt action or interaction, the acquisition of that capacity almost invariably does^{11, 12}.

In fact, the notion of music as best represented by individual engagement with the 'autonomous artwork' seems to be a product of the last two hundred years of western practice and theory. Music construed in a broader context than that which has been described as the 'élite, canonic practices in the West' seems to be embedded in more extensive suites of social practices in most cultures, gaining and returning meaning from and to the contexts within which it is embedded. As Philip Bohlman¹³ notes, 'Both ethnomusicologists and music sociologists insist that all human beings produce music and that expressive practices do not divide into those that produce music and those that produce something else, say ritual or dance. Music accumulates its identities... from the ways in which it participates in other activities...'

In other words, music is not only sonic, embodied and interactive, it is bound to its contexts of occurrence in ways that enable it to derive meaning from, and interactively to confer meaning on, the experiential contexts in which it occurs, these meanings being variable and transposable. Some instances from non-western sources might clarify the range of contexts within which music can be embedded and hint at the diverse significances it can possess and confer. Music has functioned as a medium for communication with the dead for the Kaluli of Papua New Guinea^{14, 15}, forming part of a nexus that binds birds, souls, places and people at a time of emotional and numinal transformation; music has been a mechanism for restructuring social relations, as in the *domba* initiation of the Venda¹⁶; for a shaman of Outer Mongolia, music helps constitute the path that they travel in the course of a healing process, while at the same time assisting to render their actions liminal for their patients¹⁷; and music provides a flexible and ambiguating medium for the complex social, ritual and sexual dialogues that make up the "flower songs" – *hua'er* – of northwest China^{18, 19}.

Indeed, music in globalised western culture is also embedded in a broad range of activities and contexts: just think of the embeddedness of music in religious and liturgical ceremonies, in theatre, television and film, in dance, and of course the ubiquitous 'background' music encountered as the soundtrack to life in supermarkets, malls, lifts, restaurants and bars. In each of these very different circumstances, music's meaning is rarely if ever explicit; the music can appear to be

about something, but its *aboutness* can vary from context to context, within a context, and from individual to individual.

To sum up; as I've suggested elsewhere²⁰ '*music embodies, entrains and transposably intentionalises time in sound and action*'.

Music's embodied nature is evident in the fact that, as noted above, many cultures do not differentiate between activities that in western and westernised societies might be separately categorised as 'music' and 'dance'. In other words, the western notion of music as, in essence, 'organised sound' might constitute a culturally-specific and partial demarcation of the correlates of human musicality. Moreover, the developmental precursors of music in infancy (in the form of proto-musical behaviours) and through early childhood are exploratory and kinesthetically embedded, being closely bound to vocal play and to whole body movement.

Music's embodied characteristics may provide the basis for music's capacities to coordinate and entrain action in time. While types of interactional synchrony may be observed in conversational interactions, music, unfolding within periodic and hierarchically-structured temporal frameworks that are grounded in bodily periodicities, enables patterned interaction in time that may involve entrainment to an isochronous repetitive pulse²¹.

Music's capacity to entrain overlaps with but is distinct from its capacity to mean; music is embedded in social action, deriving meaning from that action and in turn endowing it with significance - 'intentionalising' it - for its participants. Music's significances may arise from association, or by means of the evocation of emotional body-state, or through some mimetic mapping whereby attributes of musical patterns of sound and movement share or track temporal characteristics of events as experienced²². However, the significances of one and the same musical activity can be interpreted quite differently by participants without undermining the apparent integrity of collective musical behaviours. Such behaviours have an ambiguity of reference - but an unambiguous referentiality - that may afford cost-free modes of engaging in and rehearsing social interaction.

This model of music has various implications for an understanding of the neuroscience of music. In the first place, depending on the particular forms and situations in which music may be manifested for particular cultures, one would expect a greater or lesser likelihood that neurophysiological correlates of sonic pattern and of patterned movement are more or less likely to co-occur. Certainly, the notion of exploring music by examining the neurophysiological correlates of the acoustic signal that partially constitutes it must be recognised as severely culture-specific and as likely to afford only partial access to an understanding of the neurophysiology of music.

Similarly, it can be proposed that the capacity of joint musical behaviours to entrain collective behaviours might result in joint neurophysiological dynamics at various levels of specificity; in the absence of neuroscientific tools and methods that can address this question, it appears that the present focus on the individual within the neurosciences of music might again yield a severely incomplete account.

And given music's intentional status one would expect a significant overlap between the neurophysiological correlates of speech and music; it is conceivable that speech

and music are best considered as constituting poles of a continuum rather than existing as categorically discrete phenomena. Indeed, neurophysiologically speaking, it is likely that 'music' in this model will overlap with many if not most other domains of human activity and behaviour, particularly those concerned with social interaction.

What this implies is that an inclusive delineation of music is an absolute prerequisite if cognitive neuroscience is to aspire to an adequate degree of generalisability in respect of the theories that underpin empirical research and the findings that it generates in respect of music. The cognitive sciences need operational definition(s) of music that connect biology to culture. This contrasts markedly with the situation in the study of language, where current thinking and research has produced delineations of the language faculty in broad (concerned with sensory-motor, conceptual-intentional and computational systems and their interactions) and narrow (concerned solely with the computational system) senses²³ which are grounded in both biology and culture and which are likely to be productive in respect of empirical research. It seems probable that the empirical study of the cognitive and neural bases of music will require the development of similar broad and narrow delineations of the domain of research; the definition of music given above is only a minimal step towards achieving a broad delineation, while those theories that might form the substrate of a narrow delineation²⁴ are restricted in their applicability to specific types of western tonal music (although computational theories have been developed for a few non-western musics²⁵).

Given the diversity of musical practices and the variability in the ways in which music's meanings appears bound to its uses, this implies that a pluralistic and multidisciplinary approach is necessary, in which there is a continual and ongoing dialogue between cognitive neuroscientists, musicians, musicologists and ethnomusicologists. There is an imperative need for the cognitive sciences of music to 'triangulate' music as both a biological and a cultural phenomenon (indeed, as a peculiarly human phenomenon - as soon as we penetrate beyond music as organised sound, music appears to be quite outside the repertoire of behaviours of other species).

To close, does any of this matter? I'd suggest that there are at least two reasons why it should:

- If we are to establish cognitive-scientific understandings of musics, those understandings must be as generalisable as those that are applicable in, say, the domain of language.
- And the sciences have political consequences in the real world for their objects of study - given this, it would be reassuring to be able to believe that the sciences in question are as well-founded as they should be to qualify as science.

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