

The Evolution of Music, 2023

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ARTICLES REVIEWED

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INTRODUCTION

Interdisciplinary focus on the adaptive origins of the human capacity for musical communication and behaviour continues to contribute new

perspectives consistent with the recognition that this is a vital field which demands to be better understood. Recent publications provide evidence of a broadening relevance to the field, and wider specialist considerations that will prove influential to those engaged in related research.

Majno's article presents a synthesis in the form of an extensive literature review that focuses on the role of gender in the development of musicality and its relationship to the human voice, both actual and metaphorical. Strongly rooted in perspectives resulting from the European musical tradition and its educational transmission, from classical philosophy onwards, the article picks up its evolutionary bearings with Darwin's 1871 contribution. Majno pursues the relevance to her case of social, cognitive, and psychological factors rather than the clearly adaptive dimorphism of the vocal range and timbre of the two genders. It embraces consideration of research that reveals specific aspects of the endocrine and biological experience of human females as engaging with music in a manner that differs over the life-cycle from that of males. The consequences of such factors for musical opportunity (for instance, why so many composers and conductors have traditionally been male) is examined, though within a predominantly Western cultural context. In the concluding section, brief mention is made of recent research in non-Western societies. A response to or extension of the concerns of this article to embrace a wider cultural and geographical significance would certainly be enlightening. Majno's approach provides a useful

starting-point for the issues that could thus be addressed.

An influential research field that illuminates the human acquisition of musicality is that of comparative biology. The article by Zamorano-Abramson et al focuses on the role of imitation in animal behaviour and its parallel significance for human speech and song. The species they study are those of the whale family (bottlenose dolphins, orcas, and belugas), and the imitative traits are those that reveal social learning through the media of motor and vocal abilities, as well as multimodal interaction. A significant similarity between the behaviours of the species studied and those of humans resides in the role of synchrony, both of movement and vocalisation. Parallels have to an extent a gender dimorphic character, where hunting behaviours contrast with maternal care signals and interaction with calves. Procedurally, a fascinating aspect of the research reported is the nature of methodological development, sometimes defined in new techniques available to human studies and subsequently testable in other species, sometimes *vice versa*. Given the substantial differences in the media, air and water, in which humans and cetaceans exist and through which they transmit information visually and acoustically, the research agenda that examines behavioural parallels is likely to remain informative regarding the adaptive patterns that underpin behaviour.

Benítez-Burraco & Nikolsky is a further extensive literature review, with a stance that elaborates the adaptive sequence resulting in speech and language according to cultural patterns of self-domestication. The main text is extremely well-constructed (a link is also available to Electronic Supplementary Material: 'Key musicological terms for research on the evolution of music', which provides a comprehensive glossary of terms that may be unfamiliar to non-musicians, but which cover the detailed technical and theoretical language required to convey with precision differences of style and content). In depth and variety of citations, the paper is particularly well up-to-date within a range of

disciplinary frameworks drawing on several languages. Commencing with an illustration of the sequence whereby musical functions can be traced across the infant-to-adolescent life-cycle, the link is explored between such ontogenetic factors and the phylogenetic development that may have given rise to them. The authors then proceed to a convincing account of the range of tonalities that can arise through diverse cultural response to underlying universals, expressing precisely a multicultural solution to the Eurocentric impasse encountered in Majno's account as well as in so much of the music psychology literature. They link this to varieties of emotional motivation that they contrast with the limitation of 'creative play with sound' which they associate with a post-modern aesthetic stance (e.g. Stravinsky 1970) (though one might argue that playfulness, according to their own developmental model, itself represents an emotional category).

Having illustrated the richness of social and cultural processes whereby musical traditions can proliferate and transform, the authors return to similar considerations for the development of language. They invoke the 'human self-domestication' (HSD) hypothesis that has interpreted anthropological evidence for patterns of change in human life-style such as increased neoteny and its interdependence with co-parenting, life-long play behaviour, and more stable community living (an influential account of human self-domestication that captures this approach is Chisholm 1999). Their take on HSD is employed as the foundation of a proposed four-stage model. Stage 1 assumes the development of archaic, anatomically modern humans with protomusical communication, rudimentary but behaviourally influential technology (rhythmic, goal-oriented) and patterns of child-rearing consistent with the equivalent of lullabies and infant-directed speech. Babbling (solitary musical play) and mother-infant dyads provided a mechanism for socially-motivated vocal learning.

Stage 2 of the model introduces a “musical timbral mode”, building on the phenomenon of ‘personal song’ to establish tolerance of outsiders that is consistent with a more effective mediative and regulatory control. Stage 3, contemporary with more geographically widespread distribution of modern human behaviours, saw developments in technology, including the earliest surviving musical instruments and other examples of artistic endeavour, of which the evidence is associated with cave-dwelling. Singing in larger groups may have paralleled the exploitation of harmonicity. Stage 4, characterised by population growth, increased intergroup contact, and more stable networks for trade and intermarriage, provides the link to our current abilities.

In their article on the cultural evolution of music and language, Ozaki et al present a parallel yet contrasting interpretation of the literature to that of Benítez-Burraco & Nikolsky. Commencing with a quotation from Darwin (1871) that draws an analogy between the gradual processes responsible for the descent both of distinct languages and species, Ozaki et al cite examples of different research agendas that have revealed evidence of gene-cultural evolution, grouping the methodologies employed into three categories: observational; experimental; and simulation studies. Each of these is explored independently for both music and language, together with some of the evidence provided and conclusions drawn. The article then returns to consideration of the coevolution of music and language. The literature on gene-culture reconstruction in population histories is reviewed, together with that dealing with correlations between musical styles and language distributions, in which results have proved divergent. Ozaki et al.’s own previous research (2023), which brought together recordings of song, lyric performance, natural speech, and instrumental melody from representatives of over 70 linguistic varieties, presented compelling impressions of universal consistencies: song and instrumental melodies are higher, slower, and employ more

stable pitches than speech; while timbral brightness and pitch interval size are consistently similar between song and speech. These initial results of an ongoing project accord well with another recent large-scale investigation of 369 speakers/singers from 21 diverse societies by Albouy et al (2023), which additionally detected that song is slower and uses more energy in the upper harmonics than speech.

Podlipniak is also focussed on the mechanisms of gene-culture evolution, in particular those that represent the Baldwin Effect. His article examines the cognitive plasticity that led to the development of a cultural environment in which musicality played a specific role. Clearly, this relates to the social bonding model (Dunbar et al 2012) that accords to music (and dance) a biological function in establishing and maintaining the sense of well-being, which Podlipniak presents as a learned behaviour founded on instinctual signalling such as warning behaviours. But if this were the basis for the eventual role of music in culture, why did it proceed to involve such costly investment of time and energy? And how, if such expensive signals were to represent enhanced credibility, were they to be perceived as honest rather than deceptive? There is an additional tension between the evolutionary advantages of individual vocal display consistent with sexual selection pressures, and the naturally selective socially bonding behaviour of coordinated chorusing – ‘the “centripetal force” that sustains cooperation and the “centrifugal force” that promotes selfish behaviour’.

Podlipniak elaborates a model involving ‘free rider’ recognition as a solution to these potential lacunae in the Baldwinian explanation. Where ‘free riding’, an ‘egoistic strategy ... to reap the social benefits without contributing one’s own efforts’, involves deception of the group by the individual, a defence against it would have been variation of learned elements to expose fake signals. This involves further cost, but also confers benefits. Such a security system for coded signals that can be varied to protect resources

would have placed a burden on memory, and pushed the boundaries of variation within the parameters of pitch, rhythm, timbre, and relative loudness that gave rise to an enriched cultural repertoire which, in turn required enhanced capacities for it to be learnable. All such developments depended on increasing neural plasticity that gradually admitted the symbolic representation of mental concepts.

Podlipniak's free rider model poses the danger that failure to learn the vocal code represents, the threat of ostracism where the group detects errant performance. By this formula, all members of a group are open to the reward of continued participation via the iterative commitment to shared attention. 'Therefore, the adaptive value of "musical plasticity" is not social bonding itself but the recognition of "self-other" in terms of the assessment of trustworthiness'. This variant element within the Baldwinian scenario presents an evolutionary consideration worthy of further exploration. One wonders to what extent present-day research might be carried out in choirs whose members depend on mutual trust for their blended efforts to assume optimum performative success.

Singh & Mehr set out to explore three features of psychological responses to musical engagement, universality, domain-specificity, and early expression, with the intention of elucidating whether their underlying cognitive systems are specialized adaptations. The study focuses on two sets of musical response: emotional inferences and responses; and behavioural inferences and responses, particularly being soothed and dancing. Their specific concerns present a greater incidence of developmental variation in response to music over the life cycle, suggesting that, cross-culturally, emotional categorisation and assignment of valence and arousal may be learned or otherwise correlated against age and experience. The principal achievement of their paper is its elegant and balanced assembly of a wide and vivid literature of citations from infant development, cross-cultural comparison, and the aesthetic

interpretation of musical repertoires, rather than the synthesis of a new theoretical position.

The paper by Moss et al., by contrast, presents an analysis of intervallic features of pitch that may be unfamiliar in its precision and complexity. It is to such a source, including cross-cultural historical accounts of pitch organisation theory (e.g., Wood 2022), that we should perhaps turn if research into musicality is to be better informed regarding the nature of musical pitch and its perception. Moss et al, accepting the primacy of octave equivalence, examine the next most significant interval in the harmonic spectrum, the perfect fifth (the frequency ratio 2:3), together with its significance for the tonal systems and stylistic features that emerged in European music. A corpus of 2,012 compositions created between the 14th and 20th Centuries was transcribed so as to be open to analytical procedures able to discern processes of change in technique and style. Pitch classes assume octave and enharmonic equivalence ($G\# = Ab$), permitting the cycle of fifths to be set out as in a 12-position clock face. A more elaborate, linear presentation permits the extension 'flatwards' to *Fbb* and thence 'sharpwards' representing a total of 35 steps to *B##* as the practically applicable segment of a potentially infinite sequence. 'The distinction between the two types of pitch classes is not only relevant for the encoding and representation of music but also implies certain conceptualizations of the relations of tones to one another'. This permits a plotting of the corpus over the 450-year timescale of compositions included that presents clear shifts in the patterns of pitch-class distribution over time. One wonders to what extent these findings correlate with the experience of listeners orientating themselves in the varied sound-worlds depicted. The authors in the conclusions suggest 'the extension of the data base to a broader range of Western and potentially non-Western repertoires'.

Fenk-Oczlon's paper deals with a different feature of pitch perception, the categorical timbral properties of vowels, which the author

labels ‘the most musical and sonic elements of speech’. She initially conveys why vowels are so significant to speech, even in the case of whispering where the intention is to make minimal sound. They have a vital ‘role in talker identity discrimination, including characteristics such as age, biological sex, origin, or emotional state’. There is also evidence of the association across the vowel spectrum between perception of distance, colour and taste, but especially of underlying relationships that convey sound/size interaction.

The article proceeds to examine the sound/size phenomenon through a study of the repertoire of Austrian yodelling that has been transcribed and studied for over a century. There is a demonstrable correlation between the range of pitches, the vowels to which they are sung, and their duration: ‘syllables with low vowels like [a ɔ: o] ... [are] ... favored for long notes and syllables with high vowels like [i u y] for short notes’. Fenk-Oczlon suggests that songs with meaningless syllables present an insight into the evolutionary foundations of human vocalisation prior to the introduction of obstruents that endowed

the greater complexity of consonant-vowel syllables: ‘The tight relationships between vowel acoustics and musical intervals indicate that in the case of singing senseless syllables, where there is no pressure of text, vowels and melody seem to merge’.

CONCLUSIONS

This rich batch of new publications in its burgeoning field illustrates a wide variety of specialist perspectives and methods applicable to the evolution of music while also revealing some interesting patterns of coincidence. Amongst these, the traceable developmental trajectory captured for vocal learning and musical response across the human life-cycle suggests a re-evaluation of the phylogeny/ontogeny relationship that has not always met with approval. Similarly, a stronger than usual theme arises in several of these publications that recognises or calls for a greater focus of non-Western vocalisation and musical behaviour if the claims for universality arising from biological capabilities are to be fully revealed in cultural manifestation.

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