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The Origins of Music

Edited by Nils L. Wallin, Björn Merker and Steven Brown, Cambridge, MA: MIT Press, 2000, \$60 (cloth) (498 pages) ISBN 0-262-23206-5

The origins of music... not a topic that could readily be accommodated within the edifice of cognitive science in its late twentieth century heyday. But a recent upsurge of interest in and research on 'how we got music', prefigured in Roederer's (1984) article in this journal, has begun to open some doors; and this book firmly brings the subject in from the cold.

Several intellectual currents flow towards this volume, all to some extent inter-related, and all intensifying in their effect over the last decade: an increase in the acceptability of sociobiological explanations of behaviour, which treat the understanding of human behaviour as an issue solely for biology; the rise of 'evolutionary psychology', which attempts to account for current human behaviours by reference to the pre-historical contexts within which such behaviours would have been evolutionarily efficacious; and an increasing awareness within cognitive science of the need to embrace and to address issues of embodiment and of culture.

Memories of noxious effects of the first two of these currents in our own historical times perhaps contributed to the conditions that precipitated the third. Theories of behaviour that are biological, teleological and ontologically reductive can bear, for us, the stamp of the rancorous eugenics that totalitarianism and National Socialism employed to justify to themselves their own atrocities. The nature of the 'clean' cognitive psychology that emerged in the post-war boom - formal, logical, separable from issues of biology, and neither descriptive nor prescriptive of the embodied human interactions and shared ways of understanding that constitute culture - probably owed at least something to a moral sensibility determined to avoid, in the construction of a research programme to explore the nature of mind, any latitude for malevolent misinterpretation.

But an avoidance of engagement with culture and biology was always going to be problematic, and here the cognitive psychology of music can serve as an example; if we are to explore music in mind, how do we deal with those differences in preference, judgment and capacity that seem more closely tied to individual and collective histories of human action and interaction than to any immutable, formal and logical, principles? Wittgenstein's argument against the existence of a private language holds also for music; when we explore human behaviour, and hence human mind, in cognitive terms through a medium such as music, we are immediately confronted with music's cultural dimension. How can we deal with this? Several escape strategies present themselves: we can abjure the cultural dimension and explore only formal resonances of music; we can reject the rigorous methods and commitment to materiality of science and expound only the cultural dynamics that make music; or we can search for frameworks that enable a degree of reconciliation between the cultural and the biologically material.

This book employs the third strategy, looking for possible reconciliatory frameworks within contemporary theories of evolution. Much recent evolutionary theory is, while biologically grounded, by and large aware of the problems of unfettered teleological ascription, and of the pitfalls of

ontological reductionism. The spectre of genetic determinism can be exorcised by noting that a gene is only a gene when it encounters the environmental conditions that enable it to be expressed - which can as clearly be cultural as natural; as Jerison notes in the abstract to his contribution in this volume (p177) "the genetic blueprint for a brain to develop this intelligence-creating capacity is actually an epigenetic blueprint requiring a normal environment for the growth and development of the nervous system.". And well founded arguments have been expressed that enable rejection of the idea that discussions of the biological substrate of behaviour necessarily entail a commitment to ontological reductionism (see, for example, Rose, 1997, and Fodor, 1998), while sophisticated accounts of the multi-levelled operation of evolutionary processes have emerged (see Plotkin, 1997, Ch 6) that may provide sufficiently refined tools to dissect and re-articulate notions of the origins of music.

It should be said at the outset that not all contributions to this book show evidence of the employment of such refined tools, but at the very least each contribution clears some space for their deployment. Indeed, the contributors do not all speak with one voice; while the concept of evolution underlies most of what appears here, it is interpreted quite differently in different chapters as are its consequences for an understanding of music and its origins.

This volume is divided into six sections. The first, comprising a single chapter by the editors, outlines an agenda for 'evolutionary musicology'. The second, 'Vocal communication in animals', concerns music's prospectively ancient provenance, largely from the perspective of the structural analogies and homologies between music and animal uses of sound. The next section, though entitled 'Music, language and human evolution', is largely concerned with examining the traces that music may have left in our behaviours, neurophysiologies, and in the archaeological record, as well as tracking some of the differences and similarities between the cognitive and neurophysiological substrates for language and for music. A subsequent section, 'Theories of music origin', explores different possible bases for the (largely, social) functionality of music, while the following section, 'Universals in music', discusses innate infant musicality and reflects on music in the context of the specificities of western contemporary culture as well as within the broader framework of general dynamics of human society. A brief reflection on music as a 'human necessity' - presumably by the editors, though unattributed - concludes the volume.

The editors' introductory chapter, 'An introduction to evolutionary musicology', stresses the necessary multidisciplinary of any attempt to examine the "origins" of music, and notes the tension between the type of generalisable theory that would be a prerequisite for considering music's evolutionary status and the particularity that marks out most contemporary musicological and ethnomusicological scholarship. In its breadth, and in its advocacy of an adaptive value for music in evolution, it sets the tone for the remainder of the volume, in this way reflecting in microcosm the book's principal strengths and weakness. While cogent reasons for regarding music as having been evolutionarily adaptive are advanced from different standpoints throughout the book, nowhere is much consideration given to opposing views of music as "spandrel" (after Pinker, 1997) or even as maladaptive (a possibility raised by David Huron, 1999). The value of the

book is not diminished by the exclusion of these views, but would have been enhanced by their consideration. Nevertheless, the wide scope of the enterprise is ably represented in this introduction.

The second section is briefly introduced by Simha Arom, and comprises seven chapters that consider possible animal origins for human musicality. Three chapters by Marc Hauser, Thomas Geissmann and Maria Ujhelyi consider primate vocalisation, in general stressing the limitation of primate vocal behaviour to social contexts. Three, by Peter Marler, Peter Slater and Carol Whaling discuss the relation between birdsong and music; alas for nominative determinism, the remaining chapter, on the songs of humpback whales, is not by Whaling but by Katharine Payne. The contents of this section are detailed and highly informative; in general, the consensus is that a cautious approach must be taken in making any claims for a homologous - rather than an analogous - relation as holding between the capacities of, and functions for, sound patterning by animals and by humans.

The principal exception to this is the chapter by Marler, 'Origins of music and speech: insights from animals', where he suggests that 'phonocoding' - the capacity to 'create new sound patterns by recombination simply to generate signal diversity' - is a general characteristic of animal song that 'like human music, [are] primarily nonsymbolic and affective', and hence 'their study may be a source of insights into the animal origins of human music'. The fundamental problem in imagining a common basis for birdsong and for human music is that, while one has complex sound pattern in birdsong and in human music, as one traverses the evolutionary space that separates birds and humans the incidence of the use of complexly patterned sound diminishes vastly. When we reach our closest evolutionary neighbours, those with whom we share most characteristics and with whom we diverged from a common stock some 5 to 10 million years ago, the primates, we find a very limited role and a very limited stock of complex patterns in sound employed and produced, as the chapters on primate vocalisation here make clear. To suppose that the complex sound patternings of birdsong and of human music are evolutionarily homologous, that is, have a genetic basis that is common in both birds and humans, is a thesis that is very difficult to sustain, as it would suggest that somehow the genetic basis of this trait lay dormant and unexpressed through many phases of evolutionary change. This is at best highly unlikely.

If there is any phylogenetic basis for the similarity between birdsong and human song such as Marler's phonocoding, it might lie in some phylogenetically general attribute of neural systems that is likely to be expressed only when those neural systems have at their disposal a complex and flexible apparatus for the making of sound. And of course both birds and humans have just such a flexible apparatus at their disposal, but of very different kinds and capacities. At that level, and at that level only, one might consider phonocoding to be a result of this phylogenetically general attribute of neural systems. But of course that general attribute would be being exercised in birds and humans within very different biological contexts and within very different neural architectures; avian capabilities, avian interactions, avian modes of life and avian cognitive flexibilities are very different from those of humans. Hence the expressions of some phylogenetically general neural attribute such as phonocoding amongst birds

and amongst humans are likely to be so divergent in their forms and functionalities as to bear no significant relation from one species to the other. Rarely, if ever, is human music a keep out sign, a danger signal, a pair-bonding medium or a mechanism for species-specific identification. But music, with the possible exception of the last function, can be all of these things. If there is any commonality in music across different cultures it is its flexibility, the fact that it can be used for different ends in different contexts. And birdsong, for any given species, is likely to fulfil one or at most two of these functions.

The third section, as noted above, not only addresses issues of language and music but also considers broader issues in neurophysiology and in biological anthropology as well as exploring 'musical' artefacts in the archaeological record. A chapter by Derek Bickerton answers 'Yes!' to the question posed in its title 'Can biomusicology learn from language evolution studies?', but principally by adjuring biomusicology to avoid the error that he perceives as having occurred in studies of language evolution, that of subscribing too strongly to 'the belief that evolutionary continuity between human and other creatures entails direct linkage between human and antecedent nonhuman traits'. Jean Molino's rather more abstract chapter stands apart from many others in this volume in suggesting that 'Music and language are cultural artefacts that do not correspond to natural objects'; however, in propounding this view he does seek to ground both in affect and rhythm, leaving some space for the natural in the cultural. The two subsequent chapters, by Harry Jerison and Dean Falk, address, respectively, the palaeoneurology and the neurophysiology of music. The difficulties of these enterprises are not minimised by either author. Jerison notes that his evidence is largely in the form of endocasts, which are casts of the internal surface of ancient skulls which may reflect something only of the surface structure of the brain that they once encased; hence, few specific details can be inferred about ancient neural organisation that can be informative about musical capacities. Falk is more directly concerned to explore the consequences of what is known about the neurophysiology of music for an understanding of music's origins, and notes that what is known is in a constant state of flux as new techniques and modes of interpretation yield new data and theory. Both claim that music and language share origins and that these origins are ancient, Falk placing them at around 2 million years BP with the appearance of *Homo rudolfensis*. Both chapters are wide-ranging and detailed; but both are marked by a tendency to treat 'music' as it exists within contemporary western culture almost as a 'natural given'. For example, both accept differences in neurophysiological organisation between the brains of western musicians and non-musicians as providing unambiguous criteria for identifying the neurophysiological correlates of 'music' without questioning the degree to which these differences might be conditioned by the culturally specific forms, practices and values involved in contemporary western music. The subsequent chapter, by David Frayer and Chris Nicolay, examines the nature of the evidence that has been used to assess whether or not early hominids were capable of producing speech-like sounds; they conclude that the 'morphological features... correlated to speech production sounds in modern humans' are present in early *Homo*, perhaps as early as 1.5 million years BP, suggesting that these remote ancestors of *Homo sapiens sapiens* possessed the capacity to sing.

The last chapter of the section, by Drago Kunej & Ivan Turk, focuses on the archaeological and musicological analysis of a Middle Palaeolithic bone 'flute' (for readers whose archaeological periods are somewhat rusty, 'Middle Palaeolithic' stretches from about 200,000 to about 35,000 years BP, 'Before the Present'). In fact, the 'bone flute' in question, found in the cave of Divje babe in modern Slovenia, dates to ca 45,000 BP,. This is early in human history; indeed, the implication of the date and context is that it is not part of *our* history, that of *Homo sapiens sapiens*, at all, but is part of the story of *Homo neanderthalensis*, Neanderthal man. Over the last ten years it has become very clear that the Neanderthals were not our ancestors but a rather older sibling species with whom we co-existed in Europe for some millennia and whom we ultimately replaced some 30,000 years ago. Hence, if the Neanderthals had musical instruments, it might be inferred that music most likely predates the emergence of our species. But the inference is not necessarily warranted; there do appear to have been instances where Neanderthals adopted practices from co-extant modern human populations. Moreover, the identity of the artefact as any sort of musical instrument has been questioned, as the authors honourably point out. In the chapter, Kunej and Turk are concerned to defend the identity of the artefact as a flute, and explore in considerable detail the processes that might have given rise to the object as well as the sound-producing potential of a number of 'reconstructions'. However, they do not make clear just how extraordinary would be the occurrence of a worked, 'symbolising' artefact in a Neanderthal context; it would, after all, be the **only such** ever identified. The present archaeological consensus, based on the weight of evidence, is that Neanderthals were extremely unlikely to have engaged in behaviours that involved symbolic representation, and it is difficult to envisage how a flute might have appeared without some sort of symbolising somewhere in the process. The inclusion of this chapter, albeit that it presents much interesting material and is in itself judicious and careful in its claims, could well have been balanced by an alternative and more general account of music in the archaeological record.

The next section, 'Theories of music origin', comprises seven chapters which together present a range of different rationales for the emergence of music. That by Geoffrey Miller suggests that musicality arises because of its functionality in sexual selection; Björn Merker proposes an ancient provenance for music in synchronous chorusing, an activity that he suggests could have been adaptive at the level of the group; both Steven Brown and Bruce Richman see shared aspects of language and music as crucial in understanding the beginnings of music; Ellen Dissanayake and Walter Freeman both focus on the functionality of music in human interactions; and Peter Todd presents computational models of the emergence of musicality through evolutionary processes. The chapter by Steven Brown, 'The "musilanguage" model of music', takes as its starting point the notion that substantial and significant features that music and language share, including lexical tone, combinatorial phrase formation and expressive phrasing, can best be accounted for by proposing a common origin for music and language in a 'referential emotive' communication system. Brown provides cogent arguments in favour of this proposition and produces a model that is convincing and that may afford grounds for experimental exploration. He concludes that "multilevel selection models involving group selection... offer great promise in elucidating the cooperative and group nature of music".

Bruce Richman's chapter, while also arguing for a common basis for speech and music, does so on the grounds that both constitute media for 'collective, real-time repetitions of formulaic sequences' that would enable communities to 'fix' the structure and function of acoustical signals within communicative systems. Bjorn Merker's chapter is a brief but wide-ranging argument for the notion that music may have arisen as a consequence of cooperative primate behaviours in sound-production; in its nine pages it presents what appears to me to be the only compelling explanation that has yet been advanced for conceiving of the human capacity for musicality as deriving, **in part**, from specific adaptive competences that may have been possessed by our primate ancestors.

Geoffrey Miller's chapter takes a different stance. He proposes that humans do music because it has adaptive value in evolutionary processes of sexual selection. Specifically, he suggests that music constitutes a marker for the 'protean' attribute of unpredictability that would confer evolutionary advantages on its possessors in terms of their likelihood of success within social groups. The argument is not without merit, but unfortunately the evidence that is adduced here in its favour is so ethnocentric and superficial as to render it wholly worthless. Miller's concept of music appears confined to music as it is manifested in late twentieth century western popular culture; indeed, the fact that the dynamics of that music's production and reception are self-evidently bound by the complex processes of late twentieth century global capitalism - the fact that that music has been commodified and technologised to an extent that renders it minimally representative of what music might have been or might be at other times and in other cultures - is entirely absent here. The subsequent chapter, by Peter Todd, on 'Simulating the evolution of musical behaviour' can also be charged with adopting a definition of music that is over-simplistic, although Todd can claim considerably more justification for his approach; in essence, he describes computational implementations, using genetic algorithms, of a situation analogous to that proposed by Miller, where sexual selection processes are motivated by 'female' agents acting as 'critics' of 'male' songsters. In the context of such an approach reductionism is unavoidable; however, the inferences about human musical processes that can be drawn from computational models are limited by the degree of commensurability of the terms of the models with the terms that appear necessary to account for human musicality.

With Ellen Dissanayake's chapter we regain the broader view of music evident in the chapters by both Brown and Merker. In a contribution ranging widely over ethology, anthropology, developmental psychology and evolutionary biology she addresses the notion of the origins of music in terms of the manifestations and functions of 'musicality' in early mother-infant interactions. She concludes that 'the biologically endowed sensitivities and competences of mother-infant interaction were found by evolving human groups to be emotionally affecting and functionally effective when used... in culturally created ceremonial rituals', and that 'these features were then developed... as music'. The last chapter of this section, Walter Freeman's 'A neurobiological role of music in social bonding', is somewhat betrayed by its abstract, which gives little indication of just how stimulating the subsequent text will prove to be. In his chapter Freeman propounds a theory that links neurobiology and human interaction, and suggests that music is

likely to have played a significant role in the instantiation of social cohesion in hominid evolution; while at times appearing to rest on proof by assertion, for the most part his chapter provides a lucid and apposite conclusion to this section.

The volume concludes with "Universals in music", a notion that the four contributors to this section treat rather divergently. In 'Human processing predispositions and musical universals', Sandra Trehub presents a useful conspectus of the research that she and her collaborators have carried out on infant musical competences over the last twenty years in the context of a comprehensive review of the relevant research literatures. While one might take issue with the conclusions that she derives from her research programme, her rationales for these are never less than fully explicit. The next chapter, 'The question of innate competencies in musical communication', is by Michel Imberty and is generally concerned to reassess the implications of recent theories of music cognition (in particular, Lerdahl and Jackendoff's GTTM) for general and potentially 'innate' cognitive processes in the light of the developmental theories of Daniel Stern. Bruno Nettle proclaims his profession in the title of the following chapter, 'An ethnomusicologist contemplates universals in musical sound and musical culture', although most of the examples that he adduces, and most of the conclusions that he draws, in this brief chapter appear to fall into the domain of musical sound rather than musical culture. Nevertheless, the issue of whether 'music' really does constitute a class of human behaviour that is universally distributed and unambiguously identifiable is here cast into sharp relief. The section closes with François-Bernard Mâche's 'The necessity and problems with a universal musicology', a definite regression from the clarity of those preceding it in its unanalytic sketch of music's significances, and the volume itself closes with a brief and anonymous codetta on '*Listening to Music*'.

Overall, this volume is a success; its principal strength lies in the bringing together of many, and many-voiced, disciplines. Several chapters, particularly those by Brown, Merker, Dissanayake and Freeman, constitute engaging and prospectively fertile contributions to the debate on music and its origins, while many others provide extremely helpful overviews of diverse fields. The only caveats that I would express are concerned with the volume's generally uncritical acceptance of music as having adaptive value, and with its over-selective account of the archaeology of music. But this is an extraordinarily broad field and one that is itself in a constant state of evolution: like any scientific area, the consensus is susceptible to overthrow by emerging data or interpretation of existing data; like any field of social debate whose terms and arguments are shaped by the cultural context in which they arise, those terms and arguments are susceptible to change as the cultural framework changes. This book is a significant achievement; the editors have produced a volume that, at its least convincing, provokes the need for explicit and coherent counter-argument, and at its best serves to illuminate previously unrevealed facets of music and of musical experience.¹

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