Music, Language and Human Evolution

Conference

September 28th - October 1st 2004

Hosted by the International Centre for Research in Music Education and the Human Origins Research Group, School of Human and Environmental Sciences. The University of Reading

Supported by the Humanities Standing Committee of the European Science Foundation

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Provisional Title

Language as music: future trends in interdisciplinary research into the origins of human communication.

Abstract

To approach musical vocalisation as adaptation requires us to imagine how components of our ability to sing may have had survival value. Given the culturally diverse nature of sung communication, and the fact that many humans deem themselves unable to sing, this might appear a fruitless task (Pinker, 1997).

Bickerton (1991) proposed a 'continuity paradox' whereby it is impossible to imagine a bridge between animal vocalisation and syntactic human speech. Models of how the capacities for musical communication and language might have evolved through successive adaptations and exaptations provide for the possibility that proto-music itself could be seen as the missing link. This involves devising a careful taxonomy of the song-speech continuum consistent with Tinbergen's (1951) definitions of instinctive behaviour.

This paper seeks to illustrate that the problem of researching the phenomenon of human musical behaviour in relation to language is partly a matter of inconsistent terminologies and methods. Proposals are made for means of overcoming these barriers through devising interdisciplinary programmes.

4 Keywords

Timbre; Harmonic series; Pitch contour; Participation

4 Key references

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Margaret Clegg

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Title

The evolution of the human vocal tract: specialised for speech?

Abstract
The human upper respiratory tract or vocal tract appears to have undergone a major reorganisation during our evolution. This reorganisation has resulted in a wide separation of the soft palate and epiglottis and a consequently low laryngeal position compared to other mammals. This difference is usually presented as both the result of and the reason for our ability to produce the sounds associated with human speech (Lieberman & Crelin, 1971). Furthermore, this low laryngeal position in humans is regarded as conferring a functional disadvantage on us in the form of choking to death on the food we eat (e.g. Wind, 1976).

The descent of the larynx during human evolution is usually considered to be a gradual process with the modern configuration being present in archaic *H. sapiens*. However, the Neanderthals are regarded as having a high laryngeal position and less developed speech capabilities. In effect, according to some authors, the Neanderthals have reversed the trend to a low laryngeal position.

Evidence will be presented to question these and other commonly held assumptions regarding the morphology of the vocal tract (e.g. Nishimura et al, 2003; Joseph et al. 1998) and possible selection pressures resulting in the descent of the human larynx.

Keywords: laryngeal descent, Neanderthals, evolution of speech, vocal tract morphology

References

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Ian Cross

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Provisional Title

Music as an emergent exaptation

Abstract

This paper will draw on neuroscientific, psychological, musicological and ethnomusicological sources in proposing that music can be broadly and functionally defined as *embodying, entraining, and transposably intentionalising time in sound and action*. It will explore the mechanisms through which music appears to effect these functions, with particular reference to the similarities and differences between the human capacity for music and that for language. It will put forward the hypothesis that music is an exaptation that has been adaptive in the late hominid lineage, and will suggest that this exaptation may have been in part an emergent consequence of selection pressures accompanying an apparently increasing degree of altriciality in successive recent species of *Homo.*

4 Keywords

Embodiment; entrainment; meaning; exaptation.

4 Key references

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Pedro Espi-Sanchis

Independent performer, Cape Town, South Africa

Provisional Title

Found objects and the origin of instrumental performance

Abstract

This lecture-demonstration presents in performance evidence of how natural materials are exploited and shaped, often with little or no modification, to provide sound sources in a variety of musical traditions in sub-Saharan Africa.

Solo performance will illustrate some of the properties of sound whose influence on universal human capacities for discrimination and gesture have given rise to what we might term 'theories of music'. Chief amongst these is an innate response to the harmonic series that underpins characteristics of both vocal music and tonal language, and that transfers directly to musical bows and 'jews' harps' as well as more indirectly to other melodic styles.

The session will also develop through group participation an experimental understanding of the features of collective music-making that exemplifies both social co-ordination and the structural potential of musical co-operation and turn-taking.

Keywords

Harmonic series, timbre, resonance, ritual, *ubuntu*.

Key references

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W Tecumseh Fitch

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Title

The Evolution of Music and Language: A Comparative Perspective

Abstract
According to Darwin, the human musical faculty "must be ranked amongst the most mysterious with which he is endowed". Music is a human universal, found in all cultures, that serves no obvious adaptive purpose, making the evolution of music an interesting puzzle for evolutionary biologists.

In this paper I suggest that the deep similarities between language and music indicate a shared evolutionary history. In particular, the fact that both language and music are human universals, have phrase structure, and entail learning and cultural transmission, suggests that any theory of the evolution of language will have implications for the evolution of music, and vice versa. Unlike language, however, there is great inter-individual variation in human musical skill, making it an excellent system to study neural mechanisms (comparing musicians to non-musicians).

I first discuss the similarities and differences between language and music, focusing on mechanisms of music perception and the ontogeny of prosodic communication, and discussing comparative data regarding various animal communication systems commonly called musical (such as bird and whale "song"). After briefly discussing possible functions of human music (courtship, group cohesion, mother/infant communication) I will end by discussing the phylogenetic history of music. I conclude that many strands of evidence support Darwin's (1871) hypothesis of an intermediate stage of human evolutionary history. This hypothetical stage was characterized by a communication system that resembled music more closely than language, but was identical to neither. This pre-linguistic system, which I call "prosodic protolanguage", provided a precursor for both modern language and music.

Keywords

Evolution, music, language, animal communication

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Robert A. Foley

Leverhulme Centre for Human Evolutionary Studies
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Title

Music and mosaics: the evolution of human abilities

Abstract
While there has been an explosion in the range of disciplines interested in human evolution in recent years, it remains the case that the historical record preserved in fossils and archaeology provides the core historical framework within which Darwinian models must be formulated and tested. This paper provides a brief overview of the major radiations that occurred over the course of hominin evolution, and suggests their adaptive bases. The evolution of human abilities, including that of producing and appreciating music, are considered in this context, and in terms of the adaptive basis for them. It is suggested that the period prior to the evolution of modern humans (500,000 to 200,000) may have been a time of major evolutionary change. Developments occurring less than 150,000 years ago are unlikely to be part of any universal human genetic heritage.

Clive Gamble

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Title

Dances with wolves or a dance to the music of time: the rhythms of social life half a million years ago

Abstract

Archaeologists use a variety of proxies to infer both language and music. These include art and instruments that are taken to reflect the appearance of linguistic and musical potential. In many instances this potential is considered outside of the social context in which it evolved. In this paper I will therefore complement such studies by considering the temporal rhythms established by the creation and negotiation of social life. To do this I will use a model of social occasions and gatherings and examine the archaeological evidence for their duration, scale and commitment. I will present some archaeological examples from the last one and a half million years of human existence to consider the role of language and music in the varied performance of social relations.

Key words

Performance, Palaeolithic, temporality, social relations

Key references

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Tran Quang Hai

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Title

Register vs. Timbre / Overtones vs. Undertones : A live demonstration

Abstract

A general typology of the human singing voice does not exist, resulting in a number of problems that ethnomusicologists are far from knowing how fully to resolve. On the one hand, procedures and techniques of singing are insufficiently described, and the inventory is incomplete. On the other hand, the task is complicated by the fact that acoustical terminology and ethnomusicological methods are often without consensus, may be largely metaphorical, and are, all things considered, somewhat approximate.

Aware of these difficulties, a typology proposed herewith is based on the function of the phonatory apparatus: calls, cries, breath, spoken, declaimed and sung voices, register, timbre, disguised voices, ornamentation, voice imitating instruments, employ of overtones, etc.

This lecture recital, with live demonstrations assisted by the computer, which shows the different pictures of some specific types of voices (Peking opera voice, Tibetan low register, and overtone singing), presents the latest results of experimental research on overtone and undertone singing .

Keywords

Register – Timbre – Overtones – Undertones – Phonation – Ethnomusicology – Experimental Research – Acoustics.

Bjorn Merker

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Provisional Title

Vocal learning as key to the origins of music and language

Abstract

Human song and speech can not develop without vocal learning, i.e. the capacity to shape, through a learning process, vocal output so as to duplicate an external vocal model containing arbitrary pattern characteristics. This capacity is rare in the animal kingdom, conspicuously so among mammals, who excel in other domains of learned behavior. Since vocal learning is rare, but an absolute prerequisite for human song and speech, this mechanism supplies much-needed and powerful constraints on attempts to reconstruct the evolutionary origin of these twin diagnostic features of our species. This was recognized by Darwin, and was emphasized by students of bird song in the 1970's, but has received scant attention since. By supplying a selection pressure for brain expansion on both the receptive and productive side of cerebral organization, vocal learning may indeed supply the key to the trajectory of the genus Homo from its ape-brained beginnings some two-and-a-half million years ago. This suggestion will be elaborated with reference to the origins of music, language and cultural learning more generally.

4 Keywords

Vocal learning, conformal motive, brain expansion, cultural learning.

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Iain Morley

Trinity Hall, Cambridge

Title

Hominid physiological evolution and the emergence of musical capacities

Abstract

The production and processing of the various elements of musical behaviours relies upon the integration of a number of physiological and neurological capacities. These have evolved into their current form in modern humans from foundations present in our hominid ancestors. Fundamental questions associated with this process concern the original roles of these component capacities, and how and why they developed and integrated in the way that they did, allowing musical behaviours of the form with which we are now familiar to be possible

Examination of the fossil record of hominid physiological evolution, and of neurological interdependencies, can go some way towards answering these questions, and give some insight into the essential underlying foundations of musical behaviours.

Keywords

Music, vocal physiology, neurophysiology, hominid evolution

Key references

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Isabelle Peretz

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Title

Modularity of music processing

Abstract

Considered as a human invention, music is often studied as an evolutionary by-product of more important functions, such as language. Over the last decade, there has been a radical change in perspective. A growing number of researchers, especially from neuropsychology and developmental psychology, have initiated research programs on the premise that music is cognitively unique and evolutionary distinct. Musical abilities are now studied as part of a distinct mental faculty with its own procedures and knowledge bases that are associated with dedicated and separate neural substrates. In doing so, researchers have, more or less explicitly, adhered to the concept of modularity of music processing. In my talk, I will present what is currently meant by modularity and why this concept is so central to cognitive neuroscience. Then, I will illustrate how modularity shapes our current thinking of how the brain processes music. In doing so, I will mostly rely on evidence provided by the study of the abilities and disabilities of neurologically impaired individuals.

Keywords
Brain specialization, domain-specificity, neuropsychology, musical disorders.

Key references

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Klaus Scherer

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Provisional Title
Cognition and voice as the binding mechanisms for affect expression in speech and music

Abstract
Voice and emotion have played a central role in the co-evolution of music and language and still represent vital and powerful elements in present day speech communication and music making. It is certainly true that in the course of human phylogenesis both music and language have evolved towards complex symbolic systems with components and rule structures that largely depend on the development of human cognitive processing capacities unprecedented in the course of evolution. The latter has given rise to the development of sophisticated instruments for the production of a virtually limitless variety of musical sounds and sound combinations together with the invention of elaborate formal prescriptions for composing music. As for language, complex syntactic and semantic rule systems for the representation of meaning and various non-vocal means for language production and transmission have evolved. During the past decades, most scientific analyses of language and music have focused on these formal systems, stressing competence aspects rather than performance. The pendulum of scientific fashion is about to swing back and interest in the voice as the primary human instrument for language and music production - speech and singing - is growing, particularly with respect to the voice as a medium of expression of emotion. I am convinced that the vocal expression of emotion constitutes a central element of the investigation of the interrelationships between music, language, speech, and brain. In this paper, I will advance some theoretical arguments to this effect followed up by a summary review of some of our own research efforts in this area.

Keywords
vocal comunication of emotion, emotional expression in music, emotion-antecedent appraisal, evolution of cognition

Key references
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Johan Sundberg

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Title
Musicians' performance prosody

Abstract
Music and speech are specific to humans. In our time we have many opportunities to hear music that is interpreted and executed by machines rather than by living musicians. Such examples mostly sound quite pathologic, particularly for music from the classical western repertoire. This demonstrates the relevance of the performance to the musical listening experience.

For many years a research group at the department of Speech Music Hearing, KTH has studied the reasons for the computer's shortcomings as a musician. Our method has mainly analysis-by-synthesis, i.e., we have the computer play music files on a synthesizer. A professional musician, the late violinist Lars Frydén, assessed the emerging performances and recommended how they could be improved. We implemented his recommendations as performance rules in the control program and then tested them on various music examples. After many years of such experiments we had a dozen or two performance rules.

These performance rules significantly contribute to improving performance, and the reason for this is an interesting question. The rules seem to be of three types. One type, the grouping rules, serves the purpose of grouping, i.e., showing where the structural boundaries are in the composition and which tones belong together. Another type enhances the difference between musical categories such as note values or scale tones or intervals, e.g., by increasing the dissimilarities between them. A third type adds emphasis to unexpected tones and de-emphasizes expected tones.

It is thought-provoking that the principles of grouping, category enhancement and emphasis of the unexpected are not specific to music. They occur also in other types of communication, such as speech, architecture, and others. This suggests that they emerge from demands raised by the receiving system. For example it is tempting to speculate that emphasis by delayed arrival, common both in music and speech, and delaying the emphasised information somewhat, is appropriate because it allows the neural system to finish processing the old information before it starts with processing the emphasized and hence particularly important information.

In any event it seems likely that music performance as well as speech is tailored to the human cognitive system and that a comparative study of these two examples of systematic inter-human communication by acoustic signals will contribute to the understanding of human perception and cognition.

Keywords

Synthesis, performance, emphasis, cognition, perception

Key references

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E**lizabeth Tolbert**

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The Evolution of Music and the Birth of Representation

This paper develops a theory of music evolution informed by recent research on the social bases of human cognitive evolution and the intersubjective nature of representation. It proposes that music has a social ontology rooted in an understanding of vocal sound as evidence of movement, subjectivity, and intention, and is a result of the social intelligence required to understand others as fully intentional beings such as oneself. This relational thinking about others allows for the creation of an intersubjectively verifiable vocal object, which then becomes the focus for collective representations.

Although various music evolution scenarios invoke bodily movement as the basis for intersubjectivity, citing music's ability to facilitate group bonding through rhythmic, interactional synchrony, they do not explain how music becomes socially meaningful in reference to salient cultural beliefs. In contrast, this paper integrates ethnomusicological data with recent evolutionary theory to delineate the cognitive abilities and social processes that would have been necessary to interpret vocal movement and collective interactional synchrony as a guarantee of sociality.

Basing this evolutionary scenario on the socio-cultural, phenomenological, and logical entailments of vocal gesture, this paper challenges both ethnocentric concepts of music as pure emotion and subservient to language, as well as purely formalist approaches to music in mainstream music theory. Furthermore, by addressing the social mediation between form and content in music, it engages with more general issues such as the nature of reference and meaning, the uniquely human characteristics of symbolic thought, and the interface between individual and collective representation.

Sandra Trehub

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Provisional Title
The Role of Vocal Music in Infancy

Abstract
The use of vocal music in the care of infants is universal. Mothers sing to their infants in a distinctive manner that regulates infant arousal and attention and fosters reciprocal emotional bonds. Typically, mothers hold or touch infants while singing to them. When they are unable to do so, their music provides a means of "keeping in touch" in the sense that music and touch have similar consequences. Moreover, infants exhibit long-term memory for the songs that mothers sing and for surface (indexical) features of performances in the maternal style.

Key words
music, vocal, infants, mothers

Key references

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