Interdisciplinary Studies in Musicology 8, 2009

PIOTR PODLIPNIAK (Poznań)

Music: a natural phenomenon or a cultural invention? A few remarks on the currency of the polemic and its musicological consequences

ABSTRACT: The question of musical naturalness has increasingly often been the subject of lively debates within both natural and human sciences. In the present paper the issue is discussed primarily in terms of the propositions which accord with the contemporary naturalistic vision of a human and the world. One of the most important problems in this context is the opposition between a natural phenomenon and a cultural invention. Among the vast amount of different human achievements, some demand strenuous learning whereas other emerge spontaneously in all societies. The latter type of achievements is the result of the natural selection of human abilities. Recently, it has been hotly debated whether or not music is a biological adaptation. If it is, musical abilities should give an important advantage to individuals. There are numerous examples of the possible advantages. Namely, the music abilities play an important role in the enhancement of bonding between the mother and her infant child. Moreover, they are salient in the indication of fitness during sexual display. The abilities are also vital in the consolidation of a group during social music performance as well as in the transmission of information about the stability and cohesion of the group.

If musical abilities are indeed a vital form of adaptations, they may imply some further questions such as the existence of music-specific abilities and of musical universals, as well as the distinction between music understood as art and music understood as universal communication (like language). All these issues have different methodological consequences for the shape of musicology as a discipline of science. These are, among others, pre-empting Europocentrism in research, the possibilities and extension of the use of comparative methods in ethnomusicology, the scope and applicability of the interdisciplinary studies based on the reductional structure of knowledge.

KEYWORDS: naturalism, evolution, cultural invention, adaptation, musical universals, musical abilities, methodology of musicology, reductionism

The dispute over musical naturalness dates back to the beginnings of reflection on music and has attracted an almost countless number of stances, including those which ascribe to music a number of universal natural laws and others which treat the musical products of man as phenomena wholly independent of the world of nature. Yet while up to the beginning of the twentieth century, due to our limited knowledge about the nature of human behaviour, all proposed solutions to this dispute still remained necessarily in the realm of speculation, in recent years, thanks in particular to rapid progress in the natural sciences, the question of the naturalness of music has begun to enter the scope of sciences with 'hard' methods of verifying knowledge. Consequently, this problem area is increasingly often the subject of lively debate not only among natural scientists, but also among humanists, with musicologists among their number.[1] Although none of the answers to the question of the naturalness of music can as yet be considered indisputable, accumulated evidence both supporting and undermining the thesis is bringing us considerably closer to a solution. Since research in the fields of cultural anthropology, ethology, evolutionary and developmental psychology, neuropsychology, behavioural genetics, etc. are verifying former speculation and precluding many opinions hitherto advanced, contemporary discussion on the naturalness of music focuses primarily on those propositions which accord with the present-day scientific vision of man and the world. For this reason, those views and convictions which from the present-day perspective can be ascribed only historical significance will not be addressed by the present considerations.

In order to examine the consequences suggested in the title, we must first answer the question as to how, today, we should understand the opposition of natural phenomenon versus cultural invention. According to traditional views, still often present in many areas of learning, natural phenomena are understood in opposition to culture, which is governed – in the opinion of advocates of this distinction – by its own distinct, autonomous laws and is a phenomenon completely independent of nature.[2] In this vision, culture is seen as an attribute serving man alone. This vision reflects '[...] a "spiritualistic" idea' [deeply rooted in European tradition], 'according to which man is an

[1] Maciej Jabłoński and Piotr Podlipniak, 'Music as a Medium of Communication. Two Visions of Musicology', *Interdisciplinary Studies in Musicology* 7 (2008), 15–34; Ian Cross and Iain Morley, 'The Evolution of Music: Theories, Definitions and the Nature of Evidence', in *Communicative Musicality*, eds. Stephen Malloch and Colwyn Trevarthen (Oxford, 2009), 61–81.

[2] Nils L. Wallin, *Biomusicology: Neurophysiological, Neuropsychological, and Evolutionary Perspectives on the Origins and Purposes of Music* (Stuyvesant, 1991), 7.

exceptional "creature", metaphysically different to the rest of living beings'.[3] In attempting to reconcile this idea with the view of man's natural origins, now universally accepted in the world of science, culture would have to be a phenomenon which appeared during the evolution of our species, and not before, after which it must have become entirely independent of the laws of biology.[4] According to these views, culture is an autonomous domain of reality with entirely new, emergent features which are no longer affected by the genetic and psychological processes which originally gave rise to them.[5] A dichotomy understood in this way underpins, among other things, one of the contemporary divisions of the sciences into the natural and the human. From this perspective, all human products, as long as they are the effect of purposeful, intentional action, should be treated as cultural inventions. Therefore, everything which is connected with man's mental activity must be regarded as cultural phenomena. Natural phenomena, meanwhile, are confined here exclusively to the domain of 'human corporeality'.

However, we are forced to revise these views by research advances in the natural sciences of the last few decades, particularly in genetics, neurobiology and the cognitive sciences. Instead of supporting the thesis of the autonomous process of cultural evolution, the results of such research point to a crucial influence of biological factors both on people's social organisation and also on the actual process of social development. By 'biological factors', one should understand here all the effects of the action of the process of natural selection. We know today that this process shapes not only the physical features of organisms, such as the immune system or the cardiovascular system, but also influences individual mental characteristics, such as cognitive functions, perception, emotion, temperament and our practical attitudes and behaviour.[6] This influence is possible thanks to genetic information passed down from generation to generation. Although cultural information is treated today in the natural sciences as a non-genetic kind of information,[7] this does not mean that genetic information which is subject to evolutionary selection does not influence the form of the productions of human culture. In fact, it is genetic information that conditions the possible ways in which cultural in-

[3] Luc Ferry and Jean-Didier Vincent, *Qu'est-ce que l'homme? Sur les fundamentaux de la biologie et de la philosophie* (Paris, 2000), trans. Monika Milewska as *Co to jest człowiek? O podstawach filozofii i biologii* (Warsaw, 2003), 8.

[4] Wallin, *Biomusicology*, 7.

[5] Edward Osborne Wilson, *Consilience. The Unity of Knowledge* (New York, 1998), trans. Jarosław Mikos as *Konsiliencja* (Poznań, 2002), 197.

[6] David Huron, 'Is Music an Evolutionary Adaptation?', in *The Cognitive Neuroscience of Music*, eds. Isabelle Peretz and Robert J. Zatorre (Oxford, 2003), 57–75, at 57.

[7] Edward J. Gorzelańczyk, 'The Neurobiological, Biomedical, and Evolutionary Sources of Human Culture and Language', *Acta Neuropsychologica* 1/4 (2003), 436–448.

formation is exchanged, which is why nature and culture as traditionally understood are strictly linked to one another.[8] From this perspective, culture is a consequence of the existence of particular human cognitive abilities,[9] which have emerged along the path of natural selection. At the same time, the cultural environment which is formed in this way becomes a selective factor in the process of natural selection. What is more, non-hereditary behavioural reactions to changes in environmental conditions can, with time, become replaced by similar, but hereditary, behavioural characteristics,[10] which suggests that some adaptive solutions can be achieved in many different ways, and that culture constitutes one of the adaptational mechanisms enabling man to react more quickly to environmental changes.

More precisely, the relationship between nature and culture looks as follows. Genes determine the shape of epigenetic rules, which in the case of the development of the brain influence the pattern of the paths of neuron connections, resulting in certain regularities occurring in the development of the cognitive functions of man.[11] At the same time, the mind, in the process of its development, also absorbs elements of the cultural information which is present in the environment in which it functions, although employing selection criteria determined by the epigenetic rules inherited by the brain.[12] It is considered that separate domain-specific cerebral modules are responsible for the presence of the majority of these regularities.[13] Of course, the specific range to the activity of these modules does not equate to a developmental rigidity. Genetic predispositions can only develop when they encounter specific environmental stimuli.[14] Although the question of the innateness of the cerebral modules remains the subject of lively debate,[15] we do know that the human mind is characterised by a set of predispositions and limitations, thanks to which some skills are acquired by man in an 'effortless' way, others require long and laborious exercises, whilst some are impossible to assimilate

[8] Jerome H. Barkow, 'Introduction: Sometimes the Bus Does Wait', in *Missing the Revolution: Darwinism for Social Scientists*, ed. Jerome H. Barkow (New York, 2006), 3–59, at 5.

[9] Dan Sperber and Lawrence Hirschfeld, 'Culture, Cognition, and Evolution', in *The MIT Encyclopedia of the Cognitive Sciences*, eds. Robert A. Wilson and Frank C. Keil (Cambridge, Massachusetts, and London, 1999), cxi–cxxxii, at cxv.

[10] This phenomenon is known as 'the Baldwin effect'. See John Cartwright, *Evolution and Human Behavior* (Cambridge, 2000), 19.

[11] Wilson, *Konsiliencja*, 191–192.

[12] Ibid.

[13] Sperber and Hirschfeld, 'Culture, Cognition, and Evolution', p. cxvii.

[14] See Richard Dawkins, *The Extended Phenotype. The Long Reach of the Gene* (1982; Oxford, 1992), 38.

[15] Annette Karmiloff-Smith, 'Modularity of Mind', in *The Massachusetts Institute of Technology Encyclopedia*, eds. R. A. Wilson and F. C. Keil, 558–560, at 559.

altogether.[16] So the innateness of the cerebral modules can be understood in this instance as the existence of specific hereditary learning mechanisms governed by their own specific logic.[17] However, depending on the environmental conditions, these genetic predispositions may express themselves in different, culturally specific, ways or – in the case of a lack of favourable circumstances, in the form of suitable stimuli – not develop at all.[18] Therefore, the cultural environment plays in this instance a crucial role both in selection and in the ultimate shaping of people's intellectual skills. On the other hand, however, every aspect of culture is to a greater or lesser extent a product of a set of co-operational human minds, characterised by a number of common properties which result from the action of natural selection.[19] And it is these which are responsible for the genesis of the majority of similar phenomena observed in different cultures: the cultural universals.[20]

Enumerated among these today are such exceptional human characteristics as language and intelligence, and also some ethical values[21] or aesthetic preferences[22]. Many of these features appear to be sufficiently widespread and characteristic of *Homo sapiens* to suggest their biological adaptivity. Therefore, in the light of contemporary knowledge, some of man's behaviours and products can be treated as those biological adaptations, and so phenomena *par excellence* natural.[23] On the other hand, the remarkably rapid – compared to genetic evolution – changeability of cultural information that has been observed points to the possibility of the emergence of equally effective

[16] Michael S. Gazzaniga, *Human: The Science Behind What Makes Us Unique* (New York, 2008), 140; Gene Wallenstein, *The Pleasure Instinct. Why We Crave Adventure, Chocolate, Pheromones, and Music* (Hoboken, 2009), 31–32.

[17] Steven Pinker, *How the Mind Works* (London, 1998), 33.

[18] Sperber and Hirschfeld, 'Culture, Cognition, and Evolution', cxviii.

[19] Leda Cosmides and John Tooby, 'Evolutionary Psychology: A Primer', <http://www.psych.ucsb.edu/research/cep/primer.html> accessed 13 December 2009.

[20] Donald E. Brown, *Human Universals* (New York, 1991); Donald E. Brown, 'Human Universals', in *The MIT Encyclopedia*, eds. R. A. Wilson and F. C. Keil, 382–384.

[21] Michael S. Gazzaniga, *The Ethical Brain* (Washington, 2005).

[22] Ellen Dissanayake, 'Kunst als menschliche Universalie: Eine adaptionistische Betrachtung', in *Universalien und Konstruktivismus*, ed. Peter M. Hejl (Frankfurt am Main, 2001), 206–234, at 208; Geoffrey F. Miller, *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature* (New York, 2001), 270; Vilayanur S. Ramachandran, 'The Artful Brain', in *The Internet and the University: Forum 2004*, ed. Maureen Devlin, (Cambridge, 2004), 169–198; Denis Dutton, *The Art Instinct. Beauty, Pleasure, and Human Evolution* (New York, 2009).

[23] From a very general perspective, culture as distributively understood (generic properties arose thanks to the evolution of the brain) is also treated as a natural phenomenon. However, due to the distinction posed in the title of the article between natural phenomenon and cultural invention, all phenomena constituting cultural information will be called 'cultural'.

and adaptive behaviours and phenomena sufficiently specific and original to a particular culture that we would wish to consider them as cultural inventions.

So what does the difference between cultural invention and biological adaptation involve? To put it most simply, adaptation is regarded as a trait, the form of which can be explained by means of natural selection.[24] In other words, it is a trait[25] which in particular environmental conditions enables an organism to survive and reproduce, and which was shaped by natural selection. A separate problem, meanwhile, is the possibility of ascertaining the adaptivity of a given trait. One of the main clues that a given phenomenon constitutes a kind of biological adaptation is its widespread occurrence. One example of a phenomenon that is part of human culture as attributively understood and at the same time a complex biological adaptation is natural language.[26] Similarly to music, natural language is and has been present in all known human communities. However, widespread occurrence is not itself sufficient for asserting the adaptivity of a particular phenomenon, since among the essential features of cultural information are its 'contagiousness', or the ease with which it is disseminated,[27] and, as is characteristic of our species, its cumulativeness[28]. Thanks to these traits, it is likely that a phenomenon which is widely disseminated today is the result not of the action of 'instinct', but of the exchange and storage of cultural information. For example, very widely disseminated in contemporary times is writing, which is, however, one of the groundbreaking cultural inventions with such a great adaptational significance that not only has it become established in a large proportion of cultures, but it was independently invented at least three times.[29]

One of the possible paths along which we may seek evidence of adaptivity might be to attempt to estimate the adaptational value of a particular trait. For a trait to be deemed adaptive, it must give an advantage to the individuals possessing it over other individuals. Things are made more complicated, however, by the fact that the same phenomena which in the evolutionary history

[24] Paul Griffiths, 'Adaptation and Adaptationism', in *The MIT Encyclopedia*, 3–4, at 3.

[25] Understood here under the notion of 'trait' is '[...] any property of an organism, from a synthesis of chemical molecules to complex individual behaviour'. See Jan Strzałko, *Słownik terminów biologicznych* (Poznań, 2006), 13–14.

[26] Steven Pinker, *The Language Instinct* (1994; New York, 2000).

[27] Of course, hereditary properties of the human mind also influence the ease with which specific cultural information is disseminated; hence the difficulty with determining whether a given phenomenon is adaptive.

[28] Michael Tomasello, *The Cultural Origins of Human Cognition* (Cambridge, 1999), trans. Joanna Rączaszek as *Kulturowe źródła ludzkiego poznawania* (Warsaw, 2002).

[29] Robert Wright, *Nonzero. The Logic of Human Destiny* (New York, 1999), trans. Zofia Łomnicka as *Nonzero. Logika ludzkiego przeznaczenia* (Warsaw, 2005), 114.

of our species were once adaptive need not be so today.[30] The nonadaptive use of abilities which are *ex definitione* adaptive is linked to the dynamic character of the phenomenon of biological evolution,[31] in which the changeability of organisms and their traits results from the changeability of the environment. The fact that a particular human trait was adaptive in the environment of our ancestors does not mean that it is necessarily equally adaptive in the present environment.[32] Examples here might be fat- and sugar-rich cuisine, as well as drug addiction or pornography, which arose through the action of a particular mechanism known as 'nonadaptive pleasure-seeking'.[33] This means that adaptive tendencies become, in some circumstances (different, of course, from those which selected those adaptations), nonadaptive. For instance, the tendency to choose a diet rich in fat and sugar in circumstances where food was more difficult to obtain undoubtedly constituted a trait which increased the chances of survival. When, however, as occurs today, access to food for the average person living in the world of Western civilisation is practically unlimited, this tendency ceases to be an adaptive trait. Thus the lack of clear evolutionary benefits in the observed contemporary social reality of man does not yet prove the non-evolutionary origin of a given phenomenon.

Another important property indicating the adaptivity of a particular phenomenon is the spontaneity with which it appears. One of the most distinctive examples of such a process is the transformation of the jargon known as pidgin[34] into the creole language. This occurs when a group of children at the age of native language acquisition is exposed to pidgin without access to any natural language.[35] The new creole language produced in this way displays a grammatical complexity characteristic of natural languages, which was not present in the pidgin jargon. Yet while in the case of a natural language characterised by specific grammatical properties the phenomenon of spontaneous emergence can be easily demonstrated, in the case of other phenomena, such as music, ascertaining this spontaneity is not so straightforward. There is another feature of adaptation linked to spontaneous emergence, namely the occurrence in personal development of 'critical periods' for the acquisition of specific skills employed within a given phenomenon. In this case, too, one

[30] Griffiths, 'Adaptation and Adaptationism', 3.

[31] See 'Time lags', in Dawkins, *The Extended Phenotype*, 35–38.

[32] Sperber and Hirschfeld, 'Culture, Cognition, and Evolution', cxiv.

[33] Huron, 'Is Music an Evolutionary Adaptation?', 59.

[34] Pidgin is a kind of quasi language created by individuals speaking different native languages who are forced to communicate with each other and do not have the opportunity to learn another language. Pidgin is formed on the basis of words from the native languages of the individuals creating it, but it does not possess the fully-developed grammatical features of a natural language. A classic example of this phenomenon is the pidgin created by nineteenth-century slaves from the Southern Pacific.

[35] Pinker, *The Language Instinct*, 20–21.

may employ the example of the acquisition by man of linguistic skills. The occurrence of a critical period for the learning of one's mother tongue is attested most starkly by cases of individuals isolated from society during childhood, who on reaching the age of ten were incapable of learning correct language use, in spite of pedagogic efforts over a number of years.[36] In addition, the forming of linguistic skills takes place in a specific order, and particular critical periods connected with specific linguistic subskills open and close in corresponding phases in a child's development. For instance, the critical period for the acquisition of the skill of recognising the phonemes of one's mother tongue precedes the period of the development of the skill of producing speech sounds, which in turn is followed by the period of grammar acquisition.[37] However, the indisputable demonstration of the occurrence of critical periods requires research procedures involving the isolation of individuals within a specific age range from stimuli of a particular sort, which in the case of a human is impossible to carry out for ethical reasons.

Another classic criterion for being a complex adaptation is the specialisation of processing information of a particular kind in the nervous system. One example here may be the occurrence of a separate cerebral module processing speech phonemes.[38] As has already been mentioned, however, the innateness of modules and their direct innate functional connection with a particular phenomenon is a matter of contention. For example, a functional speciality for processing writing while reading has been observed, as has a functional speciality in professional chess players for operations analysing moves during a game. However, it seems unlikely that both these phenomena – writing and playing chess – were adaptations, although the actual skill of reading is today certainly an adaptive trait.[39] The hardest evidence of adaptivity is undoubtedly the demonstration of a direct link between a concrete gene or genes and a given cognitive ability conditioning a specific phenomenon. Examples here may be the human version of the gene FOXP2,[40] a mutated copy of which is

[36] There are several known cases of children who were not exposed to any language, including the case of Genie, who in 1960 was imprisoned at the age of twenty months by her psychopathic father and kept in complete isolation for ten years, or the case of Victor, who lived alone in a forest at the beginning of the nineteenth century and was captured at the age of twelve or thirteen. See John E. Dowling, *The Great Brain Debate. Nature or Nurture?* (New Jersey, 2004), 64.

[37] Dowling, *The Great Brain Debate*, 65.

[38] Jeffrey R. Binder, Julie A. Frost, Thomas A. Hammeke, Robert W. Cox, Stephen M. Rao and Thomas Prieto, 'Human Brain Language Areas Identified by Functional Magnetic Resonance Imaging', *The Journal of Neuroscience* 17/1 (1997), 353–362.

[39] Griffiths, 'Adaptation and Adaptationism', 3–4, at 3.

[40] Cecilia S. L. Lai, Simon E. Fisher, Jane A. Hurst, Faraneh Vargha-Khadem and Anthony P. Monaco, 'A Forkhead-domain Gene is Mutated in a Severe Speech and Language

observed in people who have difficulty in moving their lips and tongues, in recognising speech sounds and in understanding the meaning and grammatical rules of language. In spite of the fact that highly intense research is under way into the links between genes and human traits, the ascertaining of the exact functions of genes, and in particular their influence on human cognitive abilities, remains in the realm of unanswered questions. There do exist, of course, a number of secondary ways of establishing adaptivity. Apart from developmental, anatomic or genetic factors, the functional perspective (e.g. seeking analogical phenomena among other animal species[41]) and the philogenetic perspective (seeking the stages through which a given trait develops in the evolutionary history of a given species[42]) may also help us to understand the nature of the observed phenomena, yet the evidential strength of these methods is much weaker than that of those mentioned earlier.

But what about music? Is it really not a 'product of nature', as Nicholas Cook categorically states in his succinct introduction to music addressing some fundamental questions?[43] Of course, it would be difficult for us to accept the assertion that Ludwig van Beethoven's 'Moonlight' Sonata or a particular musical style were biological adaptations, just as William Shakespeare's Sonnets or the English language itself are not.[44] When speaking about language or music in terms of evolutionary adaptations, we have in mind the fact that natural selection has favoured those individuals who possessed genes enabling them to pursue linguistic and musical activities. Had specific properties of our ancestors' minds linked to linguistic and musical abilities not given them an advantage over persons without those traits, neither natural language nor music would have been created, and they would not have been transmittable from generation to generation, at least not in the form in which we can perceive them today. Thus the category of adaptation refers solely to a phenomenon in general, and not to its particular exemplifications, although all of the latter must possess certain features in common. So is it possible to show, in the light of present-day knowledge, that music understood as a universal human phenomenon is an adaptation?

Disorder', *Nature* 413 (2001), 519–523; Edward J. Gorzelańczyk, 'Genetyczne źródła języka' [The genetic origins of language], *Scripta Neophilologica Posnaniensia* 5 (2003), 49–54.

[41] The occurrence of such analogical phenomena may point to convergent evolution, and thereby make the adaptivity of an analogical trait more likely. However, this method engenders a number of problems connected with the accuracy of the analogy applied and the extent of the similarity in the observed traits.

[42] However, in the case of asserting the adaptivity of human traits, this method encounters fundamental difficulties linked to the fact that the species which were the direct ancestors of *Homo sapiens* have died out.

[43] Nicholas Cook, *Music: A Very Short Introduction* (Oxford, 1998) trans. Mateusz Łuczak as *Muzyka – bardzo krótkie wprowadzenie* (Warsaw, 2000), 27.

[44] Huron, 'Is Music an Evolutionary Adaptation?', 57.

In contemporary views on the adaptivity of music, one notes a periodic changeability, brought about by the progressive character of research carried out in many scientific disciplines and also, to a certain extent, by the popularity of the views of certain scholars. Although this problem failed to attract any greater interest almost until the end of the 1980s,[45] already in the 70s the musicologist John Blacking suspected that music, like language and religion, was a species-specific trait of man,[46] and so consequently must constitute an evolutionary adaptation. However, the first attempts at providing serious arguments supporting the natural genesis of man's musicality did not appear until the 80s[47] and early 90s[48], when scholars most frequently pointed to the possibility of the evolution of man's musical abilities as the effect of the adaptive function of music in the consolidation of social groups. One finds a somewhat different argumentation in favour of music's adaptivity in views from that period accentuating the connection between music and the genesis of natural language.[49] According to Bryan G. Levman, for example, the principal function of music which increased the chances of survival was that of communication, and musical ability – earlier than linguistic ability – was selected by evolution as an important survival aid to assist the organism in its intra- and interspecies and environmental navigations.[50]

Towards the end of the 90s, discussion on the naturalness of musical abilities was dominated by the views of the highly popular evolutionary psychologist Steven Pinker,[51] for whom music was an example of 'pure pleasure

[45] Of course, the first serious discussion of the adaptivity of music was Herbert Spencer's polemic (Herbert Spencer, 'The Origin and Function of Music', in *Essays: Scientific, Political, and Speculative*, vol. 2 (Edinburgh, 1891), 400–451, 1st edn in *Fraser's Magazine*, October 1857; Herbert Spencer, *An Autobiography* (London, 1904), 238–239 (Spencer's letter to Charles R. Darwin of 16 November 1872)) with Charles R. Darwin, who was the first to advance the hypothesis of the adaptive character of music (Charles R. Darwin, *The descent of man, and selection in relation to sex* (London, John Murray, 1871), vol. 2, 336–337). However, given that the notions of both biological evolution and of adaptation itself were understood very differently at that time, this discussion was full of terminological and ontological misunderstandings.

[46] John Blacking, *How Musical Is Man?* (Seattle, 1973; cit. from 6th printing, 2000), 7.

[47] Juan G. Roederer, 'The Search for a Survival Value of Music', *Music Perception* 1/3 (1984), 350–356.

[48] Anthony Storr, *Music and the Mind* (New York, 1992), 3–23.

[49] Bryan G. Levman, 'The Genesis of Music and Language', *Ethnomusicology* 36/2 (1992), 147–170.

[50] Ibid., 164.

[51] The lack of evolutionary advantage connected with the cultivation of music was indicated before Steven Pinker by other scholars. See John D. Barrow, *The Artful Universe: The Cosmic Source of Human Creativity* (1995; Oxford, 1996), 194–198; Dan Sperber, *Explaining Culture: A Naturalistic Approach* (Oxford, 1996), 141–142.

technology',[52] and so – like all technology – an invention, constituting a by-product[53] of the evolution of other human adaptive abilities[54]. However, this viewpoint did not dominate in the music literature for long, since with the growing use in research into human musicality of the increasingly popular interdisciplinary approach and of such research methods as functional brain imaging, evidence began to appear which induced many scholars[55] to polemicise with Steven Pinker's views. New hypotheses seeking to explain the adaptational value of music were put forward, and a number of old views suggesting music's adaptivity were given new interpretations and justifications.

Among these works, one finds arguments originating from various areas of research, including those accentuating the adaptive role of musical abilities in contacts between a mother and her infant child,[56] indicating the sequentiality of the development of musical skills as an indicator of adaptivity,[57] suggesting a link between heredity and specific rare cognitive dysfunctions appearing in amusias, Williams syndrome and Asperger syndrome. Particularly crucial evidence of the adaptivity of music would appear to be here ob-

---

[52] Steven Pinker, *How the Mind Works* (London, 1998), 528.

[53] For a distinction between by-products of adaptations and arrangements of adaptations, see Dutton, *The Art Instinct. Beauty*, 90–99.

[54] Among these, Pinker enumerates six of our mental faculties linked to such phenomena as language, auditory scene analysis, emotional calls, habitat selection, motor control and something else, 'something that explains how the whole is more than the sum of the parts' (Pinker, *How the Mind Works*, 534–538).

[55] Patricia M. Gray, Bernie Krause, Jelle Atema, Roger Payne, Carol Krumhansl and Luis Baptista, 'The Music of Nature and the Nature of Music', *Science* 291 (2001), 52–54; Mark J. Tramo, 'Music of the Hemispheres', *Science* 291 (2001), 54–56; Isabelle Peretz, 'The Biological Foundations of Music', in *Language, Brain, and Cognitive Development*, ed. Emmanuel Dupoux (London, 2001), 435–445; Ian Cross, 'Music and Evolution: Consequences and Causes', *Contemporary Music Review* 22/3 (2003), 79–89; Björn Merker, 'Is There a Biology of Music, and Why Does It Matter?', in *Proceedings of the 5th Triennial European Society for the Cognitive Sciences of Music Conference*, eds. Reinhard Kopiez, Andreas C. Lehmann et al. (Hanover, 2003), 402–405.

[56] Hanus Papousek, 'Musicality in Infancy Research: Biological and Cultural Origins of Early Musicality', in *Musical Beginnings*, eds. Irene Deliège and John Sloboda (Oxford, 1996), 37–55; Ellen Dissanayake, 'Antecedents of the Temporal Arts in Early Mother-infant Interaction', in *The Origins of Music*, eds. Nils L. Wallin, Björn Merker et al. (London, 2000), 389–410; Ellen Dissanayake, 'If Music Is the Food of Love, What about Survival and Reproductive Success?', *Musicae Scientiae* Special issue (2008), 169–195; E. Dissanayake, 'Root, Leaf, Blossom, or Bole: Concerning the Origin and Adaptive Function of Music', in *Communicative Musicality*, eds. Stephen Malloch and Colwyn Trevarthen (Oxford, 2009), 17–30.

[57] Sandra E. Trehub, 'Human Processing Predispositions and Musical Universals', in *The Origins of Music*, eds. Nils L. Wallin, Björn Merker et al. (London, 2000), 427–448; Sandra E. Trehub, 'The Developmental Origins of Musicality', *Nature Neuroscience* 6/7 (2003), 669–673.

servations of congenital amusia,[58] testifying the role of the hereditary factor in the development of this disorder,[59] and the assertion of the occurrence of the structural neural correlates of this amusia[60]. A number of observations made as part of interspecies comparative research also appear to support the thesis of the convergent evolution of quasi-musical abilities,[61] thereby increasing the likelihood of the natural character of music.

New arguments supporting old hypotheses have also appeared in the debate on the naturalness of music. Besides another turn towards the views of Darwin, where the main role in the evolution of musical abilities is played by the mechanism of sexual selection,[62] renewed interest began to be shown particularly in theories[63] linking the adaptive quality of music with groupism,[64] providing often new detailed explanations as to where this quality should be sought. One of these explanations is the scenario in which an evolutionary advantage was supposedly given to persons possessing musical abilities by the transmission of information regarding the stability and cohe-

[58] See e.g. Isabelle Peretz, Julie Ayotte, Robert J. Zatorre, Jacques Mehler, Pierre Ahad, Virginia B. Penhune and Benoît Jutras, 'Congenital Amusia: a Disorder of Fine-grained Pitch Discrimination', *Neuron* 33 (2002), 185–191; Julie Ayotte, Isabelle Peretz and Krista Hyde, 'Congenital Amusia. A Group Study of Adults Afflicted with a Music-specific Disorder', *Brain* 125 (2002), 238–251; Isabelle Peretz, 'Brain Specialization for Music: New Evidence from Congenital Amusia', in *The Biological Foundations of Music* (*Annals of the New York Academy of Sciences* 930), eds. Robert J. Zatorre and Isabelle Peretz (New York, 2001), 153–165.

[59] Isabelle Peretz, Stéphanie Cummings and Marie-Pierre Dube, 'The Genetics of Congenital Amusia (Tone Deafness): A Family-Aggregation Study', *The American Journal of Human Genetics* 81 (2007), 582–588.

[60] Krista L. Hyde, Robert J. Zatorre, Timothy D. Griffiths, Jason P. Lerch and Isabelle Peretz, 'Morphometry of the Amusic Brain: a Two-site Study', *Brain* 129 (2006), 2562–2570.

[61] Marc D. Hauser and Josh McDermott, 'The Evolution of the Music Faculty: a Comparative Perspective', *Nature Neuroscience* 6 (2003/7), 663–668; W. Tecumseh Fitch, 'The Evolution of Music in Comparative Perspective', in *The Neurosciences and Music II: From Perception to Performance* (*Annals of the New York Academy of Sciences* 1060), eds. Giuliano Avanzini, Luisa Lopez et al. (New York, 2005), 29–49.

[62] Geoffrey Miller, 'Evolution of Human Music through Sexual Selection', in *The Origins of Music*, eds. Nils L. Wallin, Björn Merker et al. (London, 2000), 329–360.

[63] See e.g. Matt Ridley, *The Origins of Virtue: Human Instincts and the Evolution of Cooperation* (London, 1997), trans. Małgorzata Koraszewska as *O pochodzeniu cnoty* (Poznań, 2000), 213–214; William L. Benzon, *Beethoven's Anvil. Music in Mind and Culture* (New York, 2001), 190–191 (Benzon admits, however, to certain doubts regarding the adaptive value of music (ibid., 292 footnote 24)); Jaak Panksepp and Colwyn Trevarthen, 'The Neuroscience of Emotion in Music', in *Communicative Musicality*, eds. S. Malloch and C. Trevarthen (Oxford, 2009), 105–146, at 108.

[64] The notion of 'groupism' refers to such behaviour in which individuals cooperate to promote their own interests (Ridley, *O pochodzeniu cnoty*, 211).

sion of a group through musical activity.[65] A separate, although seemingly related, argumentation can be found in views pointing to the possibility of the occurrence of the mechanism of group selection.[66] Although in this case, too, the significant role of music in the creation and maintaining of social bonds is emphasised, the difference lies in that the process of evolution would have also occurred – in the opinion of the advocates of group selection[67] – on the level of the group. Another new hypothesis was that of 'vocal grooming',[68] in which it is postulated that, as a result of an environmental factor,[69] grooming, which served to establish and maintain social bonds, was replaced by vocal activity. Among the hypotheses in favour of the naturalness of music, there have also appeared those which point to a possible multifactorial cause of the selection of musical abilities.[70] In spite of the substantial popularity in recent times of 'naturalistic' stances,[71] a serious polemic with such stances, including in the cognitive sciences, linguistics, the cognitive psychology of music and the neurosciences, has been taken up by the neurobiologist Aniruddh Patel,

[65] Edward H. Hagen and Gregory A. Bryant, 'Music and Dance as a Coalition Signaling System', *Human Nature* 14/1 (2003), 21–51.

[66] I. Cross and I. Morley, 'The Evolution of Music: Theories, Definitions and the Nature of Evidence', at 62–63.

[67] There is a general skepticism among contemporary scholars about 'group selection' and selection at other high levels (see e.g. Dawkins, *The Extended Phenotype* 5–6; Wallenstein, *The Pleasure Instinct*, 98).

[68] Robin Dunbar, *Grooming, Gossip and the Evolution of Language* (New York, 1997). Although Dunbar's hypothesis concerns the emergence of natural language, among the first stages in this process he points to the evolution of the 'musical' features of language, which according to Steven Mithen is a convincing argument in favour of the thesis of such a genesis of music and its adaptive function that is the consolidation of social groups. See Steven Mithen, *The Singing Neanderthals. The Origin of Music, Language, Mind, and Body* (Cambridge, 2006), 136.

[69] This environmental factor was the change of settlement from wooded terrain to savannah by the early representatives of the *Homo* family, which consequently led to the augmentation of social groups. Grooming, observed still today among representatives of non-human primates, serving to maintain social bonds, required a large investment of time, due to the increasingly large number of individuals, and made it impossible to perform other actions. Hence the possibility that singing took over the function of grooming (Mithen, *The Singing Neanderthals*, 132–136).

[70] Steven Brown, 'The "Musilanguage" Model of Music Evolution', in *The Origins of Music*, eds. Nils L. Wallin, Björn Merker et al. (London, 2000), 271–300; S. Mithen, *The Singing Neanderthals*; G. Wallenstein, *The Pleasure Instinct*, 175–176.

[71] Still present in academic discourse are also extreme views, the authors of which accept the naturalness of neither music nor language (see Jean Molino, 'Toward an Evolutionary Theory of Music and Language', in *The Origins of Music*, eds. Nils L. Wallin, Björn Merker et al. (London, 2000), 165–176).

who holds that music is a technology, yet – in contrast to the views of Pinker – one so crucial that it transforms the lives of individuals and groups.[72]

Without entering into a discussion with the detailed arguments set out by each of the sides in this polemic – a discussion which, given the expansive and diverse ways in which the camps substantiate their views and the areas of knowledge raised, would require a separate study – we must content ourselves with stating that a solution to this question remains in the realm of hypothesis. However, aware of the significance and the fundamental character of this question, it is worth examining the possible consequences of accepting the veracity of one or another of the positions. I have in mind here above all the consequences affecting both the methodology and the scientific identity of musicology – a discipline focused mainly on the study of music.

One of the basic consequences of accepting the hypothesis of the adaptivity of music is the assertion that every healthy person is born with a set of inherited predispositions which in favourable environmental circumstances enable the development of specifically musical skills. In other words, there exist musical abilities common to our species irrespective of the musical culture in which a particular person grows up and develops. Of course, this does not mean that specific musical abilities develop in all people in the same way or that all people possess identical musical abilities. Firstly, when speaking about musical abilities we have in mind a set of potential cognitive functions which are characterised by individual variability, just like all other phenotypical features of organisms. This is one of the factors which explain why we observe a differentiation of musical abilities within a population, from the scant to what we usually call musical talent and, in extreme cases, genius. Secondly, the crucial role of the environmental factor in the development of every individual trait means that different individual experiences, together with the above-mentioned differentiation of inherited predispositions, also translate in a crucial way into differences in musical skills among participants in a given musical culture.[73] A separate problem here, of course, is the operational relationship among these factors. Thirdly, and lastly, different musical cultures make use of those general human musical predispositions in different ways, preferring some and diminishing the significance of others. This is directly reflected in the variety of musics encountered around the world, giving rise, for example, to the dominance in a particular music of the rhythmic element over the melodic and a particular care taken over the organisation of

[72] Aniruddh D. Patel, *Music, Language, and the Brain* (Oxford and New York, 2008), 401.

[73] Of course, some features of a given culture, such as the specialisation of social functions characteristic of civilised communities, the effect of which is to isolate the profession of musician, also cause an increase in the diversification of the development of musical skill in a given population.

musical time, etc. However, the existence of those musical abilities which are common to *Homo sapiens* means that all people are capable of participating in the musical activity characteristic of a given culture. Yet if music were only a cultural invention, the acknowledgement of given skills as musical would depend on cultural choice. In an extreme case, there could exist music-free cultures, or cultures where that which would be to some degree similar to the musics known to us would be deprived of certain elements, such as intervallic structure, and the participants in that culture would not possess certain skills, such as the recognition of intervallic relations. Of course, these consequences are linked to such domains as music psychology, and in particular to intercultural research and the question of the kind and range of the applicability of tests of musical ability, as well as ethnomusicology and music anthropology. The questions of the research subject of these disciplines and the curbing of Europocentrism in research into the music of non-European cultures remain current today.

Another consequence of the adaptivity of music is the existence of certain common, inherent and timeless[74] properties to all music: musical universals.[75] Their presence would be a result of the functioning of certain innate cognitive strategies linked to the processing of specific elements of music. The occurrence of musical scales with more or less precise discrete categories of musical pitch, often given as an example of a musical universal,[76] would have its cause in the principles of the functioning of the innate cerebral module analysing intervallic relations[77]. The existence of musical universals would allow us to determine objectivised criteria and statements which would enable us to encompass phenomena often intuitively termed music within a single domain. These criteria and statements would constitute a sort of scientific foundation for all musicological reflection: that which is orientated towards the explanation of historical musical changes occurring within a given musical tradition and also that which attempts to indicate the characteristics of the music of various cultures. If, however, music was an invention, then we

[74] This timelessness is confined, of course, to the time of the existence of the biological species of man.

[75] Piotr Podlipniak, *Uniwersalia muzyczne* [Musical universals] (Poznań, 2007).

[76] See e.g. Simha Arom, 'Prolegomena to a Biomusicology', in *The Origins of Music*, eds. Nils L. Wallin, Björn Merker et al. (London, 2000), 27–29, at 28; Bruno Nettl, 'An Ethnomusicologist Contemplates Universals in Musical Sound and Musical Culture', in *The Origins of Music*, 463–472, at 468; John Sloboda, *The Musical Mind: The Cognitive Psychology of Music* (Oxford, 1985), trans. Andrzej Białkowski, Ewa Klimas-Kuchtowa and Adam Urban as *Umysł muzyczny. Poznawcza psychologia muzyki* (Warsaw, 2002), 310; B. Nettl, *The Study of Ethnomusicology. Thirty-one Issues and Concepts* (Urbana–Chicago, 2005), 45–46; Mithen, *The Singing Neanderthals*, 52.

[77] Isabelle Peretz and Max Coltheart, 'Modularity of Music Processing', *Nature Neuroscience* 6 (2003), 688–691.

would not be able to speak of any timeless determinants of musicality, and every definition of music would necessarily have its range of application limited to a particular historical-cultural area.

Another important effect of the veracity of the evolutionary scenario of the forming of man's musical abilities would be the acceptance of the thesis of the separability of the notions of music as a universal phenomenon from music as art. Although in the clear majority of cases music as universally understood is at once also a phenomenon which we are able to regard as art in its broad definition, there do exist cases where it seems essential to apply that separability. For example, it is impossible to deny that a social rendition of 'for he's a jolly good fellow' possesses the features of musicality. But can activity of this sort be considered a manifestation of art? We encounter the opposite situation when within the cultural tradition of the West we ascribe the name 'music' to works[78] in which it would be hard to find features of music as universally understood. There is no question, however, that products of this kind, although practised mainly in elite academic environments within Western culture and not popular among the majority of people,[79] are among those phenomena which not only do we want to call art, but which meet some of its basic criteria, such as a clear separation from everyday life, an impracticality, an effect on imagination, and so on.[80] If, however, it turned out that music is not an adaptation, then we would have to agree to a relative definition, which would allow us to treat music as everything which is considered as such by the participants of a given culture. Consequences of this kind also have their methodological repercussions. The hypothetical adaptivity of music arouses hope in the already forgotten postulate of finding universal methods for studying some features of music, both structural and expressive. The possibility of musicality's common origins with natural language, referred to many times here, and also the awareness of the adaptivity of language encourage us to seek research methods similar to those which, at least in respect to some aspects, are used in linguistic research, and thereby also sanction a rapprochement of musicology to linguistics. These possibilities are discernible in at least two areas: the search for generative models, and research from the field of phonology, in particular that connected with the suprasegmental or-

[78] The starkest and presumably most extreme example of this kind of work is John Cage's composition *4'33"*, but there are many other compositions which break entirely with traditional musical language, such as Dieter Schnebel's *Maulwerke für Artikulationsorgane und Reproduktionsgeräte*, in which a key constructive role is played by the sounds of chewing.

[79] Daniel J. Levitin, *This Is Your Brain on Music* (New York, 2006), 257.

[80] See Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (New York, 2002) trans. Agnieszka Nowak as *Tabula rasa. Spory o naturę ludzką* (Gdańsk, 2005), 576–577.

ganisation of speech and music. Of course, if we were to treat music as an invention, then all methods for studying musical phenomena would have to be always dependent on the kind of music studied. The veracity of the thesis of the nonadaptive origins of music also brings musicology closer to descriptive-historical disciplines such as art history. Whilst both scenarios do induce scholars to introduce interdisciplinary studies into musicology, in both these cases a dominant role would be played by its various forms, although of course none of the options precludes the application of all kinds of interdisciplinary studies. Indispensable for music understood as adaptation would seem to be an interdisciplinariness based on the reductional structure of knowledge accepted in the natural sciences. Music as invention leaves more room for multi-disciplinary contextual studies, admitting of a multitude of possible and equiponderous interpretations of the influence and interdependence of cultural information. Of course, irrespective of which among the views presented here prove to be correct, present-day knowledge of the limitations governing human cognition precludes a return to naive faith in complete freedom in the shaping of cultural information. This knowledge forces us to incorporate in reflection on music the achievements of research in the natural sciences wherever the state of research allows and makes us aware of the arbitrariness of the division into human and natural sciences.

Translated by John Comber