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From Social Contact to Social Cohesion—The 7 Cs

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Abstract

This article briefly reviews social functions of music. When playing music in a group, individuals have contact with other individuals, engage in social cognition, participate in co-pathy (the social function of empathy), communicate, coordinate their actions, and cooperate with each other, leading to increased social cohesion. Music making is special in that it can engage all of these social functions effortlessly and simultaneously. Engagement in these functions fulfills basic human needs and is of vital importance for the individual. The ability of music to increase social cohesion and strengthen interindividual attachments was probably an important function of music in human evolution.

Keywords

music therapy, creative arts therapy, music psychotherapy, rhythmicity

Evolutionary Roots

In 1914, Ernest Shackleton started an expedition aiming to cross the Antarctic via the South Pole. The expedition ship *Endurance*, however, became frozen fast in an ice floe and was crushed deep in the Weddell Sea. In 1916, the men tried to reach Paulet Island by foot, dragging their lifeboats behind them with ropes, through blistering winds, centimeter by centimeter (Figure 1). Only those things essential for survival could be carried with them, everything else had to be left behind with the wreck of the *Endurance*. The men carried in these lifeboats food (as well as tools for cooking, dishes, and the like), clothing and tents—and a banjo.

Figure 1. Ernest Shackleton and his men, after the loss of their ship *Endurance*, desperately trying to reach Paulet Island. Only those things essential for survival could be carried with them. The banjo was among these things.

Apparently, on several occasions, the suffering was so unbearable that some of the men would rather have died than went on. In these situations, making music (singing and playing) made them stick together and helped them to not give up. Shackleton later wrote that they took the banjo with them as "a mental tonic" and that the banjo "was carried all the way through with us, and landed on Elephant Island practically unharmed [!], and did much to keep the men cheerful." This little story illustrates 2 points that are relevant for the present article: first, that music indeed shows signs of design for attaining a goal such as a longer life and, second, that such design is related to social functions.

In the following, I often speak of "music making." This includes playing instruments, singing, and also dance. The concept of Western classical music, where music is usually made by the (very) few, and listened to (silently, preferably without moving) by the many with the aim to experience pleasure, is a rather recent cultural invention.[1] Thus, for most of human history (ie, since about 100 000 to 200 000 years ago), humans have most probably made music together in groups (singing, clapping, dancing, drumming, and whistling), as is the case in all "primitive" (preliterate) cultures that we know of. Thus, this kind of music is more relevant when thinking about

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evolutionary advantages of music. Clearly, humankind survived to the present, although no music by Mozart, Beethoven, or Brahms was available before about 250 years ago, and it is trivial to state in a Pinkerian way that a culturally very recent phenomenon was not important for the evolution of humankind. It is also interesting to note that those scholars who promote that humankind would have survived without music come from saturated Western cultures, without seeing that in cultures with very different needs and problems, music might have very different advantages. However, although I refer in the following often to *music making*, the social functions of music that are enumerated in this article probably play an important role for *music listening* as well, for example, due to the premotor simulation of movements (ie, without actually playing, singing, or dancing) or due to imagining other agents in the absence of face-to-face social interaction.

Social functions of music are not the only functions of music. Other functions include cognitive functions (see, eg, perceptual development function,[2] conformal motive,[3] or the use of music as transformative technology[4]), physical functions (such as motor skill development[2] and maintaining physical fitness[5]), and emotional functions (such as evoking pleasure, or mood regulation[6]). Note that the boundaries between these 4 fields are not strict (eg, social cognition is both a social and a cognitive function, and the motivation to engage in a function often consists of an emotional reward). The use of music to engage in such functions varies greatly between different cultures (cf Cross[1]), and these variations must be considered when discussing evolutionarily adaptive functions of music. Nevertheless, I dare to say that the social functions of music laid out here are universal in the sense that, although with different degrees, these functions played, and play, a role in musical behaviors in all cultures, past and present (one piece of empirical evidence is that in both Germany and India, ie, in an individualistic as well as in a collectivistic society, "social bonding" promoted through music was predictive of music preference[7]). I also presume that the cognitive, physical, and emotional functions of music are not universal. Thus, if a scholar concentrates on the latter functions of music only, she or he will (falsely) conclude that music played no role for human evolution.

Social Functions of Music

Music making is an activity involving several social functions. The ability, and the need, to engage in these social functions is part of what makes us human, and the emotional effects of engaging in these functions include experiences of reward, fun, joy, and happiness. Exclusion from engaging in these functions represents an emotional stressor, leads to depression, and has deleterious effects on health and life expectancy[8] (see also the phenomenon of "appression"[9]). Therefore, engaging in such social functions is important for the survival of the individual and the species. These functions can be categorized into 7 areas:

1. Contact. When individuals make music, they come into *contact* with each other. Being in contact with other individuals is a basic need of humans,[10] and social isolation is a major risk factor for morbidity as well as mortality.[8,11] As has been outlined elsewhere,[12] a plausible hypothesis is that social isolation results in the damage of the hippocampal formation and that, on the other hand, contact with other individuals promotes hippocampal integrity.

Crozier[13] noted that certain dances allow individuals to make physical contact in a socially acceptable manner (for social norms for audience and performer behavior see Davidson[14]). Even in the traditional Western classical music concert setting, being close to other listeners during the concert experience probably adds to the value of the music. In this regard, it is perhaps not so surprising that, despite the availability of high-quality recordings, people indeed "go to the trouble of attending concerts at all."[15]

2. Social cognition. Music automatically engages social cognition. During music listening, individuals automatically engage in the processes of mental state attribution ("mentalizing" or "adopting an intentional stance"), in an attempt to figure out the intentions, desires, and beliefs of the individuals who actually created the music (also often referred to as establishing a "theory of mind" [TOM]). A recent functional magnetic resonance imaging (fMRI) study[16] investigated whether listening to music would automatically engage a TOM network (typically comprising anterior frontomedian cortex, temporal poles, and the superior temporal sulcus). In that study, we presented nontonal music (from Arnold Schönberg and Anton Webern) to nonmusicians, either with the cue that it had been written by a composer or with the cue that it had been generated by a computer. Participants were not informed about the experimental manipulation, and the task was to rate after each excerpt how pleasant or unpleasant they found each piece to be. A post-imaging questionnaire revealed that during the composer condition, participants felt more strongly that intentions were expressed by the music (compared to the computer condition). Correspondingly, the fMRI data showed that during the composer condition (contrasted with the computer condition), there were strong increases in the Blood Oxygen Level Dependent (BOLD) signal in precisely the neuroanatomical network dedicated to mental state attribution, namely, the anterior medial frontal cortex (aMFC), the left and right superior temporal sulcus, and the left and right temporal poles. Notably, the brain activity in the aMFC correlated with the degree to which participants thought that an intention was expressed in the composed pieces of music. This study thus showed that listening to music automatically engages areas dedicated to social cognition

(ie, a network dedicated to mental state attribution in an attempt to understand the composer's intentions).

These processes are also required when making music together in a group, for example, when varying tempo and/or loudness, during improvisation, and so on. Interestingly, individuals with autistic spectrum disorder (ASD) seem to be surprisingly competent in social cognition in the musical domain.[17] This supports the notion that music therapy can aid the transfer of sociocognitive skills in the musical domain to nonmusical social contexts in individuals with ASD.

In contrast to the regenerative effects of social cognition in a social environment oriented toward the unconditional acceptance of each individual, thoughts of a performer in a concert situation about what listeners will think of the performer as a person if she or he makes a mistake can lead to worries and stage anxiety.

3. Co-pathy. Co-pathy refers to social function of empathy, including that interindividual empathic states become more homogeneous, thus decreasing conflicts and promoting cohesion of a group.[2] Thus, co-pathy refers to the phenomenon that emotional states of the individuals of a group are empathically affected in the sense that they occur when individuals perceive (eg, observe or hear) an emotion in the music and that this perception evokes feelings in the perceivers, which bear strong congruency with the feelings of the other individuals. With regard to positive emotions, for example, co-pathy can increase the well-being of individuals during music making or during listening to music (for a study showing an increase of positive mood due to music making in a group see Koelsch et al[18]). The term *co-pathy*, instead of *empathy*, is not only used here because co-pathy refers to the social function of empathy; empathy also has many different connotations, due to the various definitions of empathy provided by different researchers (for a review of the concept of empathy, see Singer and Lamm[19]). Co-pathy should be differentiated from (a) *mimicry* (a low-level perception–action mechanism of imitating another individual's emotional expression, eg, contraction of the musculus zygomaticus major when looking at a smiling face; for a study on electroencephalogram correlates of emotional mimicry during viewing facial expressions, see, eg, Achaibou et al[20]), and (b) *emotional contagion* (a short-term spread of a behavior that is presumably a precursor of co-pathy, eg, children laughing because other children laugh; Hatfield et al[21] assume that mimicry, in turn, is a precursor of contagion). Both mimicry and emotional contagion contribute to co-pathy. They may occur outside of awareness and do not require a self/other concept. By contrast, co-pathy requires self-awareness and self/other distinction, that is, the capability to make oneself aware that the affect may have been evoked by music made by others, although the actual source of one's emotion lies within oneself. Moreover, co-pathy should be differentiated from (c) sympathy, empathic concern, and compassion, which do not necessarily involve shared feelings (eg, feeling pity for a jealous person, without feeling jealous oneself; for details, see Singer and Lamm[19]).

   Note that co-pathy is also a means of the emotional identification of individuals "with particular subcultures, lifestyles, ethnic groups and social classes."[22]
4. Communication. Music involves *communication* (notably, for infants and young children, musical communication during parent–child singing of lullabies and play songs appears to be important for social and emotional regulation as well as for social, emotional, and cognitive development.[23,24] A number of neuroscientific and behavioral studies revealed considerable overlap of the neural substrates and cognitive mechanisms underlying the perception of music as well as of language, with regard to the processing of syntax[25-27] and with regard to the processing of meaning.[16,28-33] With regard to speech and music production, a study by Callan et al[34] also showed a strong overlap of the neural substrates of speaking and singing. Because music is a means of communication, active music therapy (in which patients make music) can be used to train skills of (nonverbal) communication.[35]

Merriam[36] described several communicative functions of music, such as *emotional expression*[37] (note that "music can convey group as well as individual emotions, as in political protest songs") and *symbolic representation* (which refers to the communication of extra-musical information, such as narratives in program music).

5. Coordination. Music making also involves *coordination* of actions. This requires individuals to synchronize to a beat and to keep a beat. The coordination of movements in a group of individuals appears to be associated with pleasure (eg, when dancing together), even in the absence of a shared goal (apart from deriving pleasure from concerted movements[2]). Interestingly, a study by Kirschner and Tomasello[38] reported that children as young as 2.5 years old synchronized more accurately to an external drum beat in a social situation (ie, when the drum beat was presented by a human play partner) compared with nonsocial situations (ie, when the drum beat was presented by a drumming machine or when the drum sounds were presented via a loudspeaker). This effect might have originated in part from the pleasure that emerges when humans coordinate their movements with each other.[39,40]

The capacity to synchronize movements to an external beat appears to be uniquely human among primates, although other mammals (such as seals) and some song birds (such as cockatoos) might also possess this capacity. A current hypothesis[4] is

that this capacity is related to the capacity of vocal learning, which might depend (in mammals) on a direct neuronal connection between the motor cortex and the nucleus ambiguus. The nucleus ambiguus is located in the brain stem and contains motor neurons innervating the larynx (the motor cortex also directly projects to brain stem nuclei innervating the tongue, jaw, palate, and lips[41]).

Performing identical movements among group members gives rise to individual representations of identity. Moreover, conformity of movements might enforce "conformity to social norms,"[36] and thus "continuity and stability of culture,"[36] including passing on cultural norms from one generation to the next.

6. Cooperation. A convincing musical performance by multiple players is only possible if it also involves *cooperation* between players. Cooperation involves a shared goal, and engaging in cooperative behavior is an important potential source of pleasure. For example, Rilling et al[42] reported an association between cooperative behavior and activation of a reward network including the nucleus accumbens. Cooperation between individuals increases interindividual trust and increases the likelihood of future cooperation between these individuals (reviewed in van Veelen et al[43]). Notably, when boiled down to the essentials as in the Prisoner's Dilemma game, computational models of evolution show that natural selection favors cooperative strategies (such as Tit-for-Tat, or Generous Tit-for-Tat[44]) because "selfish replicators forgo some of their reproductive potential to help one another."[45] Therefore, Nowak[45] postulated to add "natural cooperation" as "a third fundamental principle of evolution beside mutation and natural selection." It is worth noting that only humans have the capability to communicate about coordinated activities in order to cooperatively achieve a joint goal.[46]
7. Social Cohesion. As an effect, music leads to increased *social cohesion* of a group.[47] A wealth of studies showed that humans have a "need to belong," and a strong motivation to form and maintain enduring interpersonal attachments.[48] Meeting this need increases health and life expectancy.[8] Social cohesion also strengthens the confidence in reciprocal care (see also the "caregiver hypothesis"[23,49]) and the confidence that opportunities to engage with others in the mentioned social functions will also emerge in the future.

Although it should be clearly noted that music can also be used to manipulate other individuals, and to support nonsocial behavior,[50] music is still special in that it can engage all of the enumerated social functions at the same time (similar, eg, to cooperative forms of play). This is presumably one explanation for the emotional power of music. Therefore, music does serve the goal of fulfilling social needs (the human need to be in contact with others, to belong, to communicate, etc). In this regard, music-evoked emotions are related to survival functions and to functions that are of vital importance for the individual (for a discussion on the role of other factors, such as sexual selection, for the evolution of music, see Huron[2] and Fitch[49]).

As has been described elsewhere,[12] engaging in social functions during music making evokes activity of neural *reward pathways*, and it has been suggested that activity of these reward pathways is subjectively experienced as *fun*.[12] In addition to experiences of fun, music making can also evoke attachment-related emotions (due to the engagement in the mentioned social functions), such as love, joy, and happiness. These emotions presumably involve activity of the hippocampal formation.[12] In this regard, music can not only be fun, it can also make people happy (engagement in social functions is not the only principle that can give rise to emotions while listening to music or making music; for systematic overviews, see Juslin and Västfjäll[51] and Koelsch[5]). The evocation of such positive emotions with music, including evocation of activity of reward pathways and hippocampal activity bears the potential for therapeutic applications with regard to disorders such as depression and anxiety disorders, posttraumatic stress disorder, Parkinson disease, and schizophrenia. The positive effects of music on health and well-being[52] are also signs of music's design for attaining a goal such as a longer life.

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