Wired for Music: The Science of Human Musicality

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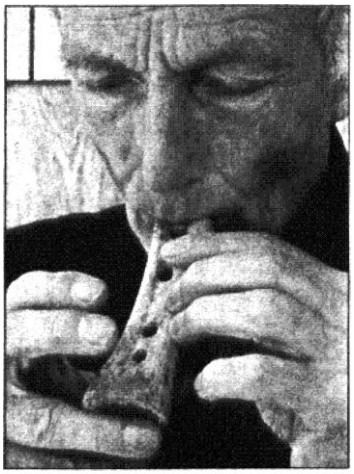
Article:

Music is at the very core of what it means to be a human being. To find music is to find human beings, and vice versa. Although some features of the natural soundscape (e.g., that which we call bird song or whale song) bear remarkable similarities to human music, nothing in any other species remotely compares to the richness, variety, and sheer amount of music that humans produce. Indeed, humans spend such an inordinate amount of time, money, and passion on music that it seems as if we are wired to be musical.

And so we are. Both anthropological and neurological research support the conclusion that, for human beings, music is not a happy accident but rather an adaptive behavior that has provided significant survival benefits for our species over time. Although we may vary in our musicality, no human is bereft of musical sensitivity. Criteria such as gender, age, race, or socioeconomic status cannot by themselves prohibit any person from a meaningful experience with music.

As old as humankind

Fifty thousand years ago, our ancestors were spending the time, energy, and creative brain power necessary to make and use musical instruments—a fact that says something important about the significance music has for our species.



Wild Music advisor Jelle Atema plays a replica of a Neanderthal bone flute. *Photo by Gabriele Gerlach*

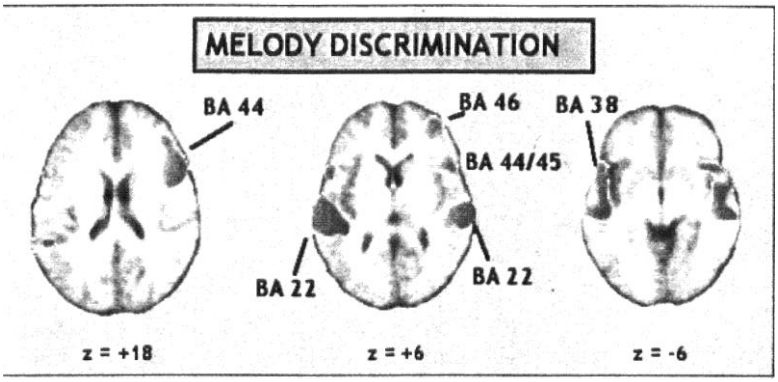
Although the evidence for ancient music is not as common as that for ancient art (instruments of reeds, wood, and hides being less enduring than cave paintings), there are still numerous indicators of early music. These include footprints in the floors of caves, indicating dance (hence music); wear patterns on bone and rock fragments, indicating usage as percussion instruments; and even some early instruments. One bone flute is thought to be around 53,000 years old.

There is corollary evidence, too—in the fact, for example, that the caves most acoustically suited for singing and chanting are precisely the ones that have the most paintings. Anthropologists tell us that the bow is as much a musical instrument as it is a weapon.

Humans thrive in communities, and those attributes that help to meld individuals into a cohesive unit provide an obvious survival value. Singing and dancing are two of the most powerful ways to create social unity, and every tribe or cultural group documented thus far identifies itself through particular songs and rituals.

Equally important for survival are the musical capacities in mothers and babies that allow them to share and express emotions during the infant's years of dependence and growth. Mothers share important information with their babies by a host of behaviors, including singing, rocking, and patting in a rhythmic fashion and speaking in a way (dubbed by some "motherese") that emphasizes pitch, timbre, rhythm, and dynamics. Infants, likewise, learn early on to modulate their voices to convey emotional states.

Memory is also of crucial importance to the survival of a society. Not only is memory of a technological nature important: When best to plant? Where best to find game? How best to start a fire? Equally vital are the things that make a society unique and special: Who are we? Where did we come from? What makes us better than our enemies who live on the other side of the river? Music is one of the most effective mnemonic devices. It enables preliterate societies to retain information—not just facts, but the feelings that accompany those facts as well. Poems, songs, and dances are primary vehicles for the transmission of a culture.



Researchers are still mapping locations of music perception in the human brain; areas marked are linked to song recognition. *Image courtesy Donald Hodges*

Based in the brain

The human brain is modularized—meaning that there are relatively separate neural networks for various cognitive domains (e.g., language, mathematics, music). Within the neural network for each domain are nodal points involved in particular facets of processing. In language, there are locally specialized regions for speaking, for understanding speech, for reading, for writing, and so on. The same is true for music, although neuroscientists are just now beginning to map musical pathways. Research shows that music activates regions of the human brain that are widely distributed, but locally specialized. These areas include front-back, top-bottom, and left-right pathways in the brain.

Active music training, particularly if it starts before the age of 7, leads to changes in areas of the brain dealing with auditory processing, motor control, and sensory integration. Many differences in brain structures and functions have been demonstrated in adult musicians, when compared to untrained subjects. It must be clearly stated that brain changes occur not only with music, but also with anything one spends time doing, such as playing sports. Nevertheless, there is compelling support for the effects of early childhood musical experiences.

Some have construed this to mean that "music makes you smarter," but there is limited evidence to believe that this is the case—at least not in the simplistic sense. Students who participate in band, chorus, or orchestra do typically have higher SAT scores than the average student, but this is more likely due to good time management

skills, parental support, and so on, than because music has made them smarter. Musical training undoubtedly makes people "musically smarter," but transfers into other domains are likely to be limited.

Although our brains come wired in such a way that we could learn any musical style, specific musical expression is culturally determined. As children we learn the musical language of our culture in the same way that we learn to speak English or Swahili or Mandarin Chinese. Of course, some of us are multimusical, just as some are multilingual, but much of what is expressed in music is culturally based. Without training, it can be difficult to understand the music of another culture.

Being fully human means to experience the infinite shadings that exist between the polar ends of emotional states. Our experience of these refined feelings is essentially nonverbal. Our vocabulary is limited in this area, and we often experience difficulty in telling one another exactly how we feel. Music is one of the most powerful outlets for expressing emotion, and emotional response is clearly at the core of music's meaning. Yet this topic, until recently, has not received much attention.

Neuroscientists are just beginning to identify brain sites involved in affective responses to music, and some physicians are already using affective responses to music in the practice of music medicine. Studying emotion is not easy, and progress is likely to be slow. But in time, there will be many applications and understandings of music as it relates to human health and well being.

A unique way of knowing

The basic, biological equipment of our species includes a musical brain that provides us with rich insights into the human condition and brings us great joy and beauty. Just as language, mathematics, and other intelligences provide unique ways of understanding, sharing, and expressing our inner and outer worlds, so too does music offer unique ways of knowing the world.

Music is not just an accidental byproduct, providing people with pleasant things to do in our leisure time. Music was critically important to our development as a species, and it continues to be at the core of what it means to be human.

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