A Novel Hypothesis on Biological Origins of Music and Dance

Music exists across human history and human culture, but the origins of music is still an enigma. Since Darwin (1871), more and more scientists believe that music must be a biological adaptation. However, what's still under debate is which selection pressures are responsible for the origins and evolution of music and musical emotions.

Recently, WANG Tianyan at the Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences advocated a comprehensive hypothesis on the origins of music, dance and speech from a biological and sociological perspective. The author suggests the primary selection pressure for human musicality is the adaptation of organisms to ubiquitously and variously internal and external rhythmic movements and events. The hypothesis was published in Frontiers in Neuroscience (doi: 10.3389/fnins.2015.00030).

This hypothesis suggests that rhythmic pitches in music represent rhythmic movements through interpreting the Doppler effect of sound, which not only provides a possible explanation for the transposition invariance of music, but also integrates music and dance into a common form — rhythmic movements. Therefore, investigating the origins of music poses the question: why do humans appreciate rhythmic movements?

The author proposes that human appreciation of rhythmic movements and rhythmic events developed from the natural selection of organisms adapting to the internal and external rhythmic environments. Living environments such as water, air and trees, are rich in rhythmic movements produced through natural forces (wind and tide, etc.) and biological forces (animal activities). Thus both arboreal and aquatic animals have adapted in order to thrive in the flexible supports in which they live. The perception and production of, as well as synchronization with external and internal rhythms are so vital for an organism's survival and reproduction, that animals develop a rhythm-related reward and emotion (RRRE) system.

Human beings inherit and develop the RRRE system from their aquatic and arboreal ancestors. The RRRE system enables the appreciation of rhythmic movements and events, and is integral to the origination of music, dance and speech. As the synchronization of an organism to rhythmic events is even more pivotal to survival than food and sex to some extent, the reward evoked by rhythmic events is probably a primary reward, as with those evoked by food and sex. This may be the reason that music can evoke reward that is similarly evoked by food, sex and drugs.

Overall this hypothesis provides a probable selection pressure and outline for the evolution of music, dance and speech, and also reasonably explains most music phenomena investigated previously. It shall enlighten future research on music cognition and music therapy, also on the interdisciplinary research in music, dance and speech.

(Left) Jiahu bone flute, the oldest (7,700-9,000 years ago) playable musical instruments found at Jiahu early Neolithic site in China (ZHANG Juzhong et al., 1999. *Nature*). **(Right) Doppler effect integrates music and dance into a common form** — rhythmic movements (WANG Tianyan, 2015. *Front. Neurosci.*).