A hypothesis on the biological origins and social evolution of music and dance

With the indirect support of the National Natural Science Foundation of China, Prof. Wang Tianyan at the School of Life Sciences, Tsinghua University, proposed a hypothesis on the origins and evolution of music, dance, and speech from a biological and sociological perspective, which was published in *Frontiers in Neuroscience* (2015, 9: 30).

Music exists across human history and culture, but the origins of music and musical emotions are still an enigma. This paper suggests that every pitch interval between neighboring notes in music represents corresponding movement pattern 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. Accordingly, investigating the origins of music poses the question: why do humans appreciate rhythmic movements? It suggests that human appreciation of rhythmic movements and rhythmic events developed from the natural selection of organisms adapting to the internal and external rhythmic environments. 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 have a rhythm-related reward and emotion (RRRE) system. The RRRE system enables the appreciation of rhythmic movements and events, and is integral to the origination of music, dance and speech. The first type of rewards and emotions (rhythm-related rewards and emotions, RRREs) are evoked by music and dance, and have biological and social functions, which in turn, promote the evolution of music, dance and speech. These functions also evoke a second type of rewards and emotions, which named society-related rewards and emotions (SRREs). The neural circuits of RRREs and SRREs develop in species formation and personal growth, with congenital and acquired characteristics, respectively, namely music is the combination of nature and culture. This hypothesis provides probable selection pressures and outlines the evolution of music, dance, and speech.

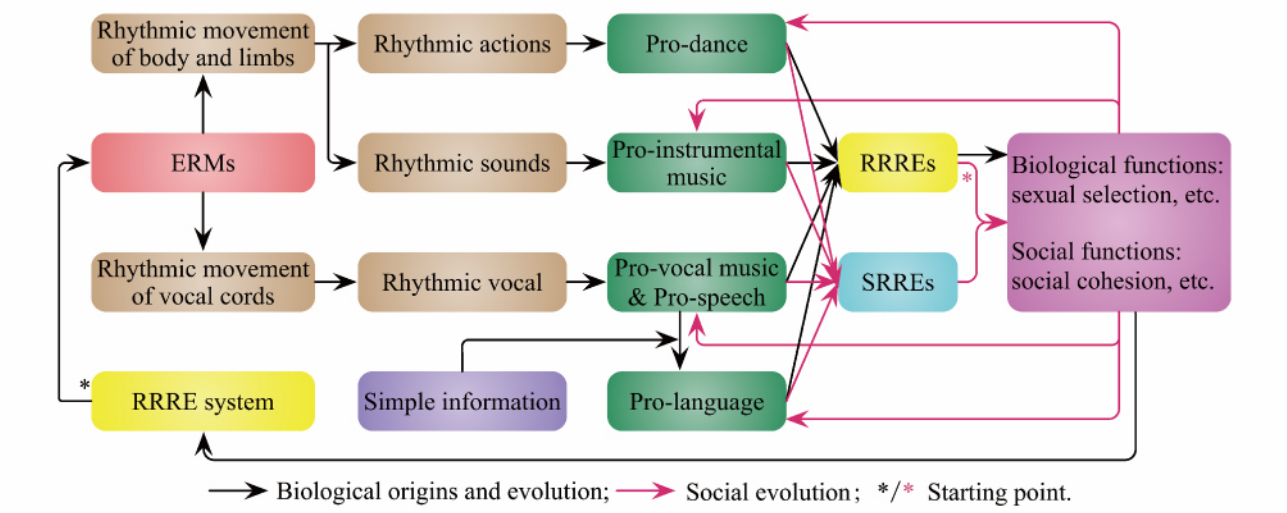

Figure The origins and evolution of pro-music, pro-dance, and pro-speech in nonhuman animals. The RRRE system makes animals produce entertainment rhythmic movements (ERMs) and leads to pro-music, pro-dance, pro-speech and pro-language. The RRREs evoked by them have biological and social functions. These functions are the results of their biological origins, as well as the driving force for their evolution. These functions also enable the development of SRREs.