







Vienna Doctoral School

HEINZ RICHNER, PhD GREAT TIT COMMUNICATION: THE INFORMATION CONTENT OF SOUNDS AND MUSICAL INTERVALS

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Darwin was fascinated by melodic performances of insects, fish, birds, mammals, and men. He considered the ability to produce musical notes without direct use the most mysterious endowment of mankind. Bird song is attributed to sexual selection, but it remains unknown how the expected relationship between melodic performance and phenotypic quality arises. Melodies consist of sequences of notes, and both Pythagoras and music theorists in the Middle Ages found that their tonal frequencies form simple ratios that correspond to small-integer proportions derived from the harmonic series. I analyzed the songs of the great tit (*Parus major*), a bird with a stereotyped song of typically two notes, and tested the prediction that the deviations of the intervals from small-integer frequency ratios based on the harmonic series are related to the quality of the singer. The finding provides a missing link between melodic precision and phenotypic quality of individuals, which is key for understanding the evolution of vocal melodic expression in animals, and elucidates pathways for the evolution of melodic expression in music.

Heinz Richner is an evolutionary biologist, known for pioneering experimental field studies on host-parasite coevolution. His group has discovered many principles and mechanisms of hostparasite interactions at the levels of physiology, behaviour, immunology, ecology, and genetics. For the published papers please see https://scholar.google.ch . Recently, inspired by the songs of birds, he made a link between parasitism and communication by studying the variation in the precision of musical intervals sung by great tit males in relation to phenotypic qualities. The findings raise interesting questions on the evolution of song, animal communication and music in general. Heinz Richner has been a professor at the University of Bern, Switzerland, and also a long-term member of the Research Council of the National Science Foundation. After his retirement he built up a collaboration with researchers from Vienna and other places in the world, to work on parasitism and conservation of endangered endemic bird species of the Galapagos.