The origins of rhythm: A cross-species approach

Andrea Ravignani, Dept. of Human Neurosciences, Sapienza University of Rome, IT

Who's got rhythm? And why are we such chatty animals? Human music and speech are peculiar behaviors from a biological perspective: Although extremely common in humans, at first sight they do not seem to confer any direct evolutionary advantage. Many hypotheses try to explain the origins of acoustic rhythm capacities, but few are empirically tested and compared. Because music and speech do not fossilize, and lacking a time machine, the comparative approach provides a powerful tool to tap into human cognitive history. Notably, behaviours that are homologous or analogous to human rhythm and speech can be found across a few animal species and developmental stages. Hence, investigating rhythm across species is not only interesting in itself, but it is crucial to unveil music-like and speech-like behaviours present in early hominids. In this talk, I will discuss the major hypotheses for the evolution of vocal rhythmicity in humans and other animals, which link acoustic rhythms to vocal learning (a precursor to speech), gait, breathing, or chorusing. I will suggest how integrating approaches from ethology, psychology, neuroscience, modeling, and physiology is needed to obtain a full picture. I will then zoom in on some crucial species which are key to test alternative hypotheses on rhythm origins, with particular attention to the rhythm-vocal learning link. I will show how three strands of research - partly neglected until now - can be particularly fruitful in shedding light on the evolution of rhythm and vocal learning. I will present rhythm data from marine mammals and primates, suggesting that rhythm research in non-human animals can also benefit from ecologically-relevant setups, combining strengths and knowledge from human cognitive neuroscience and behavioural ecology. Second, I will discuss the interplay between vocal anatomy, learning, and vocal development in harbour seal pups, arguing for their importance as model species for human speech origins. Finally, I will present human experiments where musical rhythm is created and evolves culturally due to cognitive and motoric biases, showing the importance of an interplay between biology and cultural transmission. These results suggest that many species may share one or more building blocks of human speech and music. They also add to a cross-disciplinary picture shown that, for each building block of human speech and music, there may be another species which also has it.