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A non-human animal can drum a steady beat on a musical instrument

Aniruddh Patel, John Iversen

The Neurosciences Institute, San Diego, CA, USA

Background

Two universal features of human musical rhythm are the ability to voluntarily produce sound in a periodic fashion, e.g. by striking a musical instrument, and the ability to move in synchrony with a periodic beat. These abilities appear to be unique to humans and useful only for musical purposes. Do they therefore represent neural specializations shaped by natural selection for music? One way to address this question is to ask if non-human animals can acquire these abilities. If so, then it is unlikely that they represent cognitive adaptations for music-making. Here we focus on periodic sound production. Crucially, humans can make periodic sounds “on demand” rather than in constrained biological contexts, distinguishing them from animals that produce periodic sounds in stereotyped displays for mating, alarm calls, etc. (e.g. cricket chirping).

Aims

We sought to document whether a non-human animal could play a steady beat on a musical instrument in the absence of ongoing rhythmic cues from humans. We studied Asian elephants (*Elephas maximus*) in northern Thailand. These elephants have been trained to strike percussion instruments as part of their participation in the Thai Elephant Orchestra.

Method

We took video footage of a 13-year old female striking two bass drums in alternation with a mallet held in her trunk. Eleven drumming sequences (with no evidence of human rhythmic cueing) were recorded over four days. The mean and sd of the inter-beat-interval (IBI) was quantified for each sequence.

Results

The elephant’s drumming tempo was very stable across sequences, ranging from 33.4 to 36.1 beats per minute (mean = 34.9, sd = 0.9). Within each sequence the elephant maintained a very steady beat. Temporal variability, quantified as the coefficient of variation of IBI within each sequence, averaged 3.5%, which is lower than the variability found when humans tap at this tempo (typically 7%).

Conclusions

A non-human animal can play a percussion instrument in a periodic fashion, without temporal cues from humans, and with a highly stable tempo between and within sequences. Future work should examine whether animals, like humans, can play different tempi and can synchronize their playing to an auditory beat.

Key words: Evolution, Animals, Rhythm

apatel@nsi.edu

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