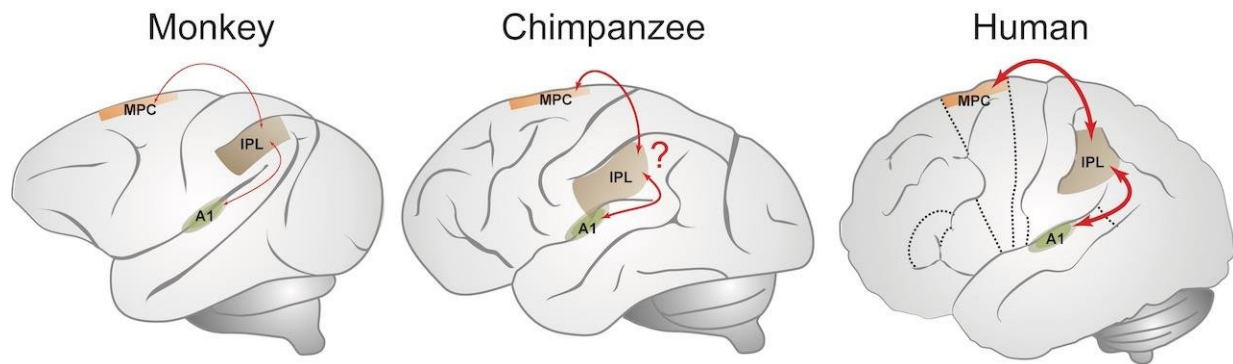


Rhesus monkeys sense isochrony in rhythm, but not the beat

July 16 2018



The gradual audiomotor evolution (GAE) hypothesis. The GAE hypothesis suggests connections between medial premotor cortex (MPC), inferior parietal lobe (IPL), and primary auditory area (A1) to be stronger in humans as compared to other primates (marked with red lines), suggesting beat-based timing to have gradually evolved. Line thickness indicates the hypothesized connection strength. Credit: Universiteit van Amsterdam (UVA)

Although monkeys seem to notice regularity in rhythmic sounds, they are not able to detect the actual beat. This is the finding of a new study by researchers from the University of Amsterdam (UvA) and the National Autonomous University of Mexico (UNAM). The study, published on 16 July in the journal *Frontiers in Neuroscience*, lends further evidence to the hypothesis that beat perception is omnipresent in humans but only gradually developed in primates.

Even a cursory glance at the animal kingdom shows that most animals exhibit some sort of rhythmic behaviour, like walking, flying, crawling or swimming. Based on this behaviour, it wouldn't be outlandish to think that the perception and enjoyment of rhythm might be shared by most animals, and not only humans. While recent experimental research is finding some support for this view, studies also show that there are certain aspects of rhythm cognition that are indeed species-specific, such as the capacity to perceive a regular pulse (beat) in a varying rhythm and consequently being able to synchronise or dance to it.

A rhythmic sequence

Building on their earlier research, the researchers investigated whether [rhesus monkeys](#) (*Macaca mulatta*) are able to perceive beat through a so-called auditory oddball paradigm, an experiment in which sequences of repetitive sounds are infrequently interrupted by a deviant sound. "Most existing animal studies on beat-based timing and [rhythmic entrainment](#) have used behavioural methods to probe the presence of beat perception, such as tapping tasks or measuring head bobs," says Henkjan Honing, professor of Music Cognition at the UvA and lead author. "However, even if certain species do not show a physical ability to synchronise their movements to a regular beat, this doesn't automatically mean they are incapable of perceiving it."

For their study, the researchers instead used electroencephalography (EEG) to measure neural correlates of rhythm cognition, including beat perception. The researchers presented two rhesus [monkeys](#) with a rhythmic sequence in two versions: an isochronous version that was acoustically accented in such a way that it could induce a duple metre (like a march), and a jittered version using the same acoustically accented sequence but presented in a randomly timed fashion so as to disable beat induction.

No evidence of beat perception

The results showed that monkeys are sensitive to the isochrony of the stimulus, but not its metrical structure. This so-called mismatch negativity (MMN) was influenced by the isochrony of the stimulus, resulting in a larger MMN in the isochronous as opposed to the jittered condition. However, the MMN for both monkeys revealed no interaction between metrical position and isochrony. Honing: "Even though the monkey brain appears to be sensitive to the isochrony of the stimulus, we couldn't find any evidence in support of beat perception."

The findings further strengthen the gradual audiomotor evolution (GAE) hypothesis (Merchant & Honing 2014), which suggests 'beat [perception](#)' to be gradually developed in primates, peaking in humans but present only with limited properties in other non-human primates. The GAE is an alternative to the well-known 'vocal learning hypothesis,' which suggests that only species who can mimic sounds share the ability for beat induction.

More information: Henkjan Honing et al. Rhesus Monkeys (*Macaca mulatta*) Sense Isochrony in Rhythm, but Not the Beat: Additional Support for the Gradual Audiomotor Evolution Hypothesis, *Frontiers in Neuroscience* (2018). [DOI: 10.3389/fnins.2018.00475](https://doi.org/10.3389/fnins.2018.00475)

Provided by University of Amsterdam

Citation: Rhesus monkeys sense isochrony in rhythm, but not the beat (2018, July 16) retrieved 10 April 2024 from <https://medicalxpress.com/news/2018-07-rhesus-monkeys-isochrony-rhythm.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private

study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.