## UKE Paper of the Month March 2026

# Rhythmic sampling of multiple decision alternatives in the human brain

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**ABSTRACT:**

Humans and other animals navigate decisions by sequentially attending to (sampling) subsets of the available information. The internal dynamics of the selective sampling of decision-relevant information remain unknown. Here we use magnetoencephalography recordings and neural decoding to track the spontaneous dynamics of the locus and strength of covert attention as human participants performed a three-alternative perceptual choice task. The strength of covert attention fluctuated rhythmically around 11 Hz. A shift of attention from one alternative to another tends to occur at the trough of this oscillation, presumably enabling comparisons. These shifts further reset the attentional oscillation. By contrast, at the peak of the oscillation, attention tends to increase the focus on the currently sampled alternative, presumably deepening processing of that alternative. We propose intrinsic attentional oscillations as a core mechanism governing the flexible sampling of decision alternatives.

**STATEMENT:**

*Our work shows for the first time how intrinsic covert attention allocation and information sampling is dynamically guided during decision-making. Despite our own perception, attentional processing isn't stable but oscillates. Deepened processing of decision alternatives and comparing between them is multiplexed within short 0.1 second cycles of rhythmic attention. It thus challenges extant decision-making models that assume the stable accumulation of evidence over time. We further established novel methodology to dynamically track the covert focus of attention non-invasively, applying neuronal decoding in temporally precise electrophysiology recordings, here magnetoencephalography. Our work enables a peek behind the curtain of covert neuronal processing. This new approach can thus help understand attentional processes in healthy cognition as well as attention deficits in patients with neurological or psychiatric disorders.*

**BACKGROUND:**

This work was performed at the Department of Neurophysiology and Pathophysiology in the Center of Experimental Medicine. The department focuses on the analysis of dynamic cortical and sub-cortical neuronal activity in healthy participants and patients suffering from neuronal and psychiatric diseases. This work is part of the postdoctoral work of Marcus Siems and Yinan Cao as well as the PhD thesis of Maryam Tohidi-Moghaddam in the group of Konstantinos Tsetsos. The data was collected at the MEG facility at the UKE (N45). The work was funded as part of the ERC starting grant INFOSAMPLE (ERC-2018-StG-802905, K.T.) and by the BMBF (01GQ1907, T.H.D.).