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## **From noise to insight: the functional role of BOLD signal variability and aperiodic neural activity in metacontrol**

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# Propositions

## From Noise to Insight

### *The Functional Role of BOLD Signal Variability and Aperiodic Neural Activity in Metacontrol*

1. Contrary to traditional views of being ‘noise’, BOLD signal variability and aperiodic neural activity are important in understanding human cognitive functions.
2. The temporal variability of resting-state fMRI signals is associated with individual differences in metacontrol biases towards persistence or flexibility.
3. The aperiodic component of the EEG power spectrum reflects dynamic adjustments of metacontrol states between persistence and flexibility in response to different task demands.
4. Individuals can voluntarily increase the aperiodic activity of their brain to perform better in tasks requiring divergent thinking.
5. Alterations in BOLD variability and aperiodic neural activity have been linked to neurological and psychiatric conditions like epilepsy and schizophrenia, suggesting their importance in diagnosing and understanding various health conditions.
6. The neurophysiological origins of the aperiodic neural activity require further exploration.
7. Focusing on neural variability may significantly advance the field of cognitive neuroscience, providing a more in-depth understanding of the neural foundations of human cognition and behavior.
8. Research in cognitive neuroscience holds considerable potential for developing effective treatments for neurological disorders.
9. Psychology is important in understanding human behavior towards climate change, offering crucial insights for developing coping strategies and helping societal adaptation to its effects.
10. Artificial Intelligence (AI) has the potential to revolutionize society, but potential ethical risks should be carefully addressed to ensure its responsible use.