nanoSeminar Series 2022

Institute for Materials Science

Prof. Shu-Chen Li

Technische Universität Dresden, Professur für Entwicklungspsychologie

Reward modulates the association between sensory noise and brain activity during perceptual decision-making

Thursday, May 19th 2022
13:00 – 14:00

Normal: Seminar Room 115, Hallwachsstr. 3 (HAL)
Pandemic version: https://tinyurl.com/nanoSeminar-GA

Perceptual decisions entail the accumulation of evidence until a decision criterion is reached. The amount of noise in this process is inversely related to the behavioral performance of the decision-maker. Hence, reducing the amount of perceived noise could improve performance in perceptual decisions. In this study, we investigated whether providing monetary reward for correct responses in a perceptual decision-making task would enhance performance based on prior research linking noise reduction to the administration of reward. To this end, thirty-one healthy young adults carried out an incentivized dot tracking task (iDT) during recording of functional magnetic resonance imaging (fMRI). Behavioral responses were fitted to a Bayesian version of the drift-diffusion model that, among other parameters, also includes an estimate of sensory noise. Fifty percent of the trials were incentivized to compare rewarded with unrewarded trials regarding behavior, brain responses and estimates of model parameters. In order to establish a link between the noise parameter and fMRI activity, we correlated percent signal change (PSC) values from nucleus accumbens and caudate nucleus with noise levels in rewarded and unrewarded trials respectively. Although reward did not affect behavioral performance and model parameters, the fMRI analyses showed notable differences in nucleus accumbens, caudate nucleus and rostral anterior cingulate cortex in rewarded relative to unrewarded trials. Furthermore, higher PSC within nucleus accumbens was significantly associated with lower sensory noise levels, which was specific to rewarded trials. This work is consistent with previous findings on reward modulation of brain responses and marks a first step towards elucidating the effects of reward-induced noise suppression during perceptual decision-making.

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Shu-Chen Li received his PhD from the University of Oklahoma (USA) in 1994 and was a postdoctoral fellow at McGill University (Canada) until 1995. She then worked at the Max Planck Institute for Human Development (MPIB) in Berlin until August 2012, including as project manager of the "Neuromodulation of Lifespan Cognition" project. Since September 2012, Shu-Chen has headed the Chair of Developmental Psychology and Lifespan Neuroscience at the Technical University of Dresden. Since 2019 she has been a member of the spokesperson team for the Excellence Cluster CeTI.

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