Department of Statistics

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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Unlocking Single-Trial Dynamics in Parietal Cortex During Decision-Making

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ABSTRACT

Neural firing rates in the macaque lateral intraparietal (LIP) cortex exhibit gradual "ramping" that is commonly believed to reflect the accumulation of sensory evidence during decision-making. However, ramping that appears in trial-averaged responses does not necessarily imply spike rate ramps on single trials; a ramping average could also arise from instantaneous steps that occur at different times on different trials. In this talk, I will describe an approach to this problem based on explicit statistical latent-dynamical models of spike trains. We analyzed LIP spike responses using spike train models with: (1) ramping "accumulation-to-bound" dynamics; and (2) discrete "stepping" or "switching" dynamics. Surprisingly, we found that roughly three quarters of choice-selective neurons in LIP are better explained by a model with stepping dynamics. We show that the stepping model provides an accurate description of LIP spike trains, allows for accurate decoding of decisions, and reveals latent structure that is hidden by conventional stimulus-aligned analyses.

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