Estimating the trial-by-trial timing of movement planning

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Neuroscience is slowly transitioning from a discipline that is primarily limited by the lack of available data to a field where interpretation is a central bottleneck. Concentrating on Bayesian approaches, my lab is constructing models and developing data analysis methods. We have recently focused on the problem that while we measure neural activities and movements, we can not directly observe when movement is planned. We have tackled this data analysis problem using a latent variable approach that estimates, trial-by-trial, the timing of planning relative to the timing of movement. This approach considerably improves spike train predictions. However, current datasets are still too small to ask many relevant questions about neural computation. I am thus collaborating with multiple teams on neurotechnology approaches include DNA recording, large scale electrical recording, and large scale X-ray tomography to produce the large datasets needed to test complex models.