



TRINITY COLLEGE
Institute of Neuroscience

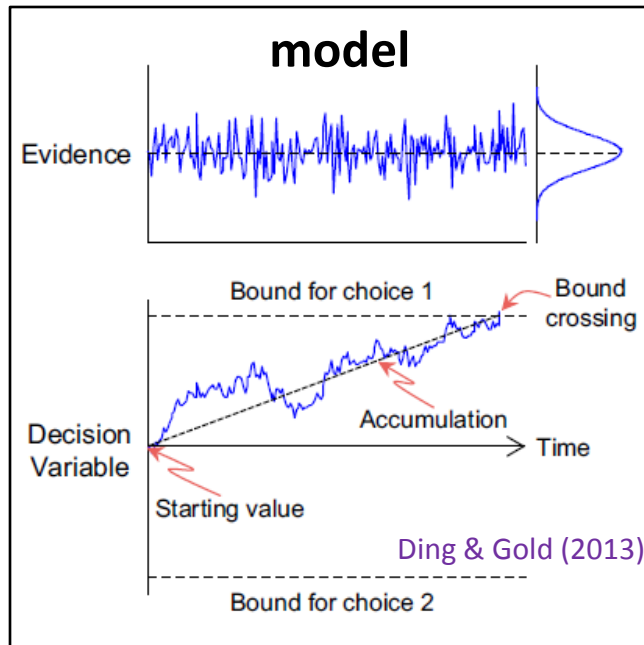
from molecules to mind



A window onto the basic elements of perceptual decision making in the human brain

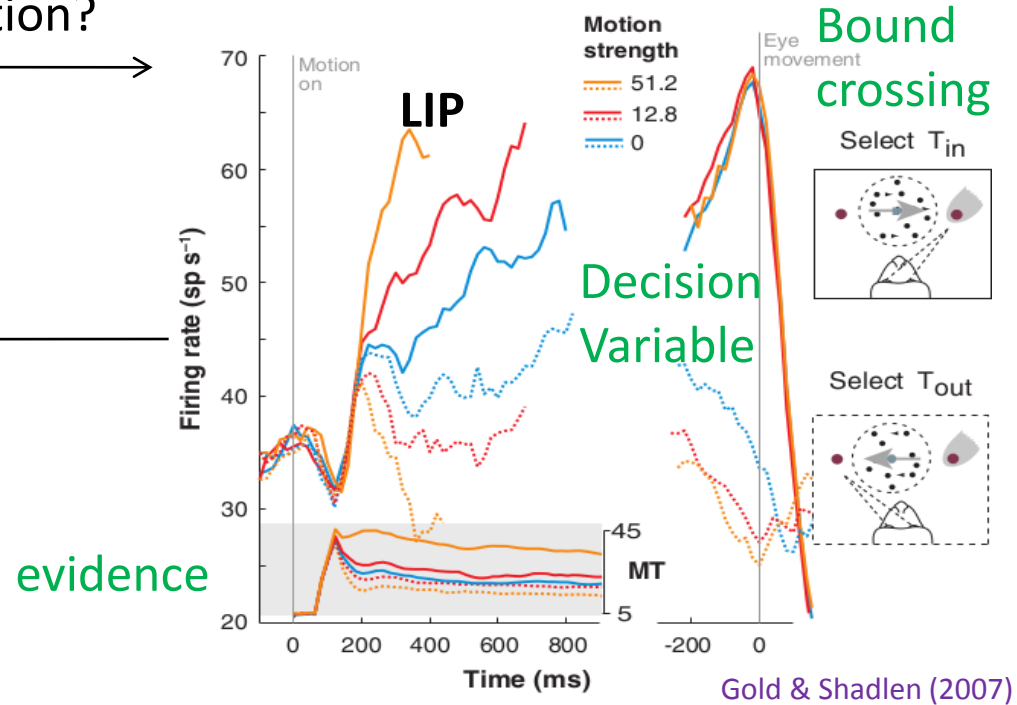
Redmond O'Connell

Models and observations



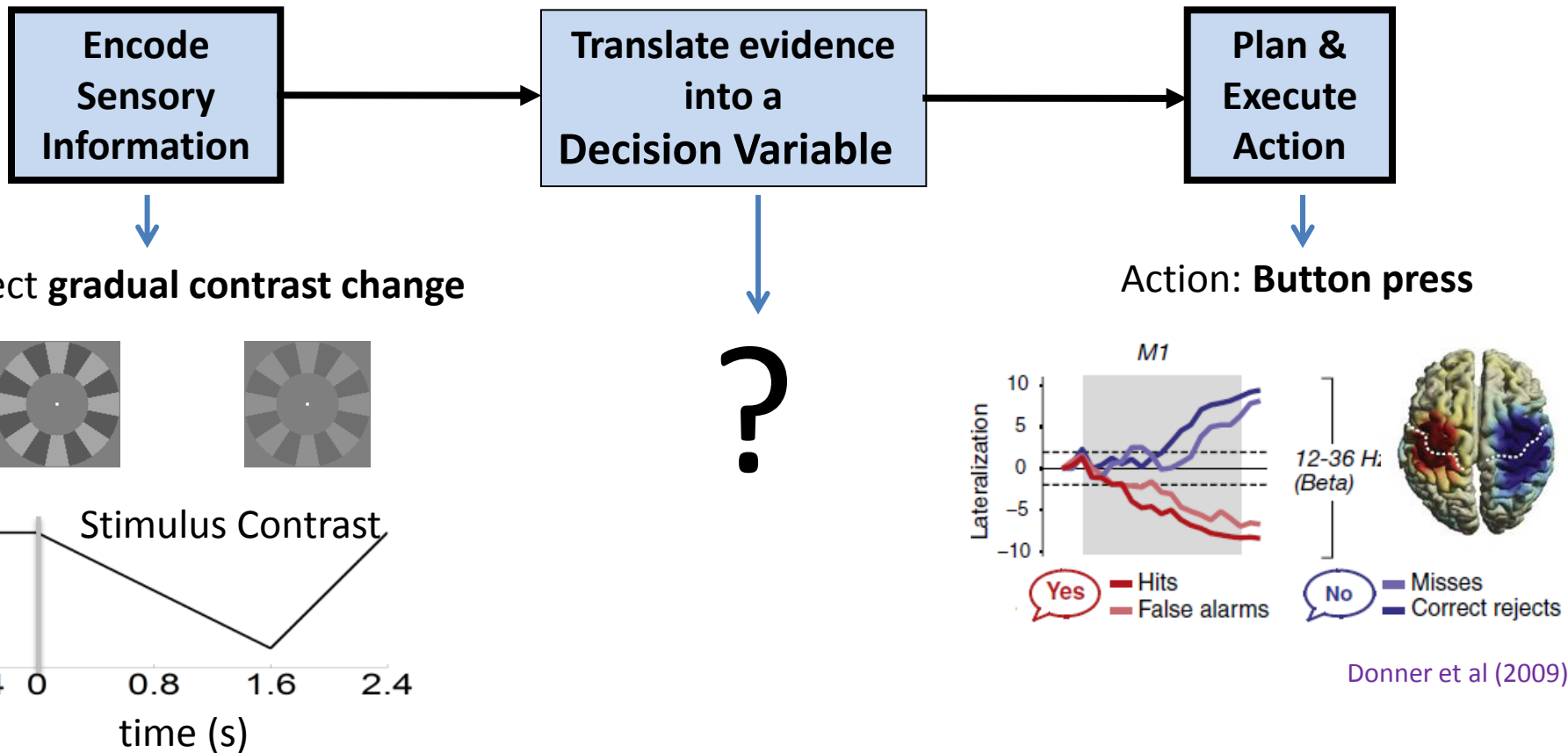
Validation?

Direct neurophysiological observation



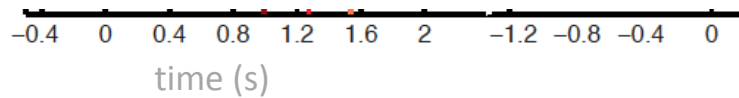
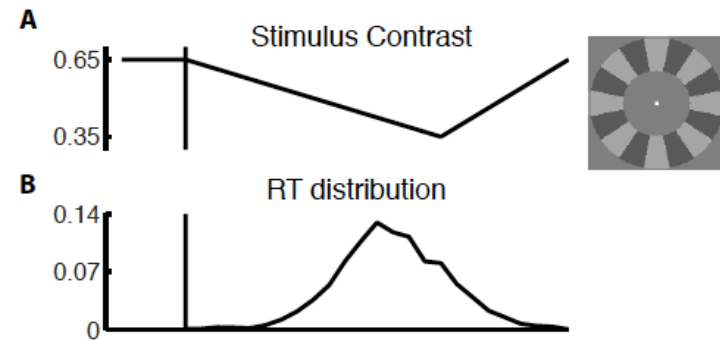
Can the component processes be directly observed in humans?

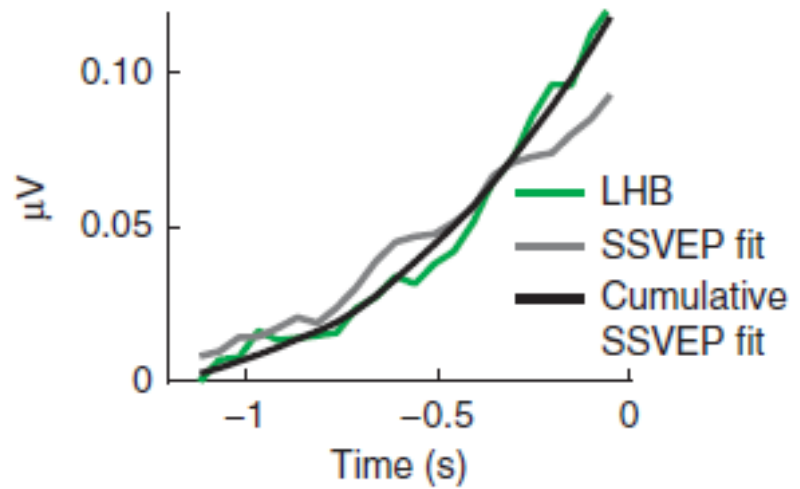
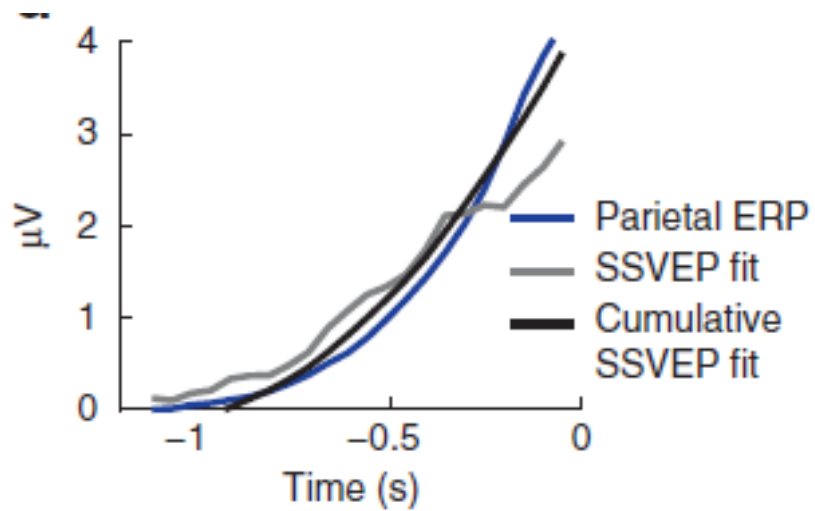
Simple Perceptual Decisions: 3 ~~stages~~ levels



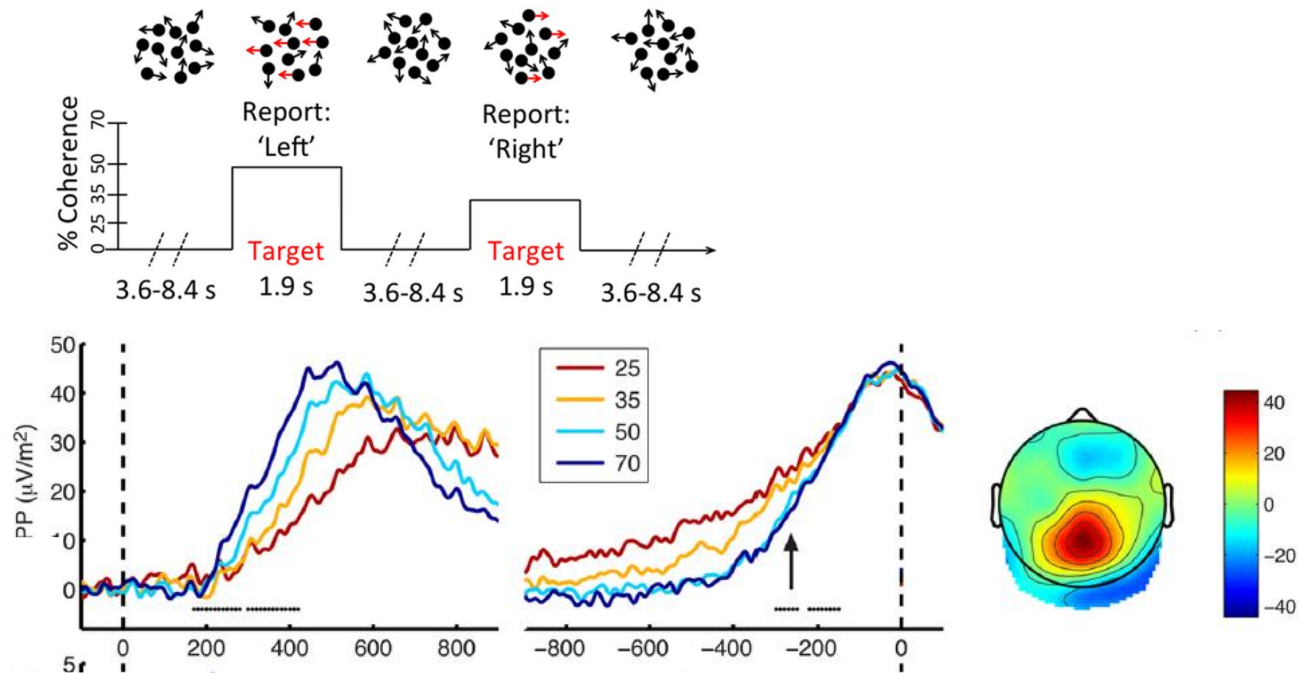
Donner et al (2009)

Distinct neural signatures of evidence encoding and accumulation



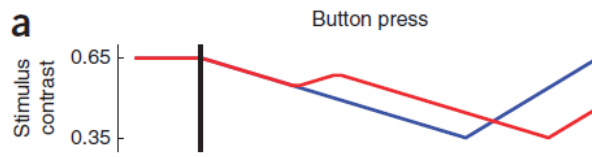


Evidence-dependent build-up

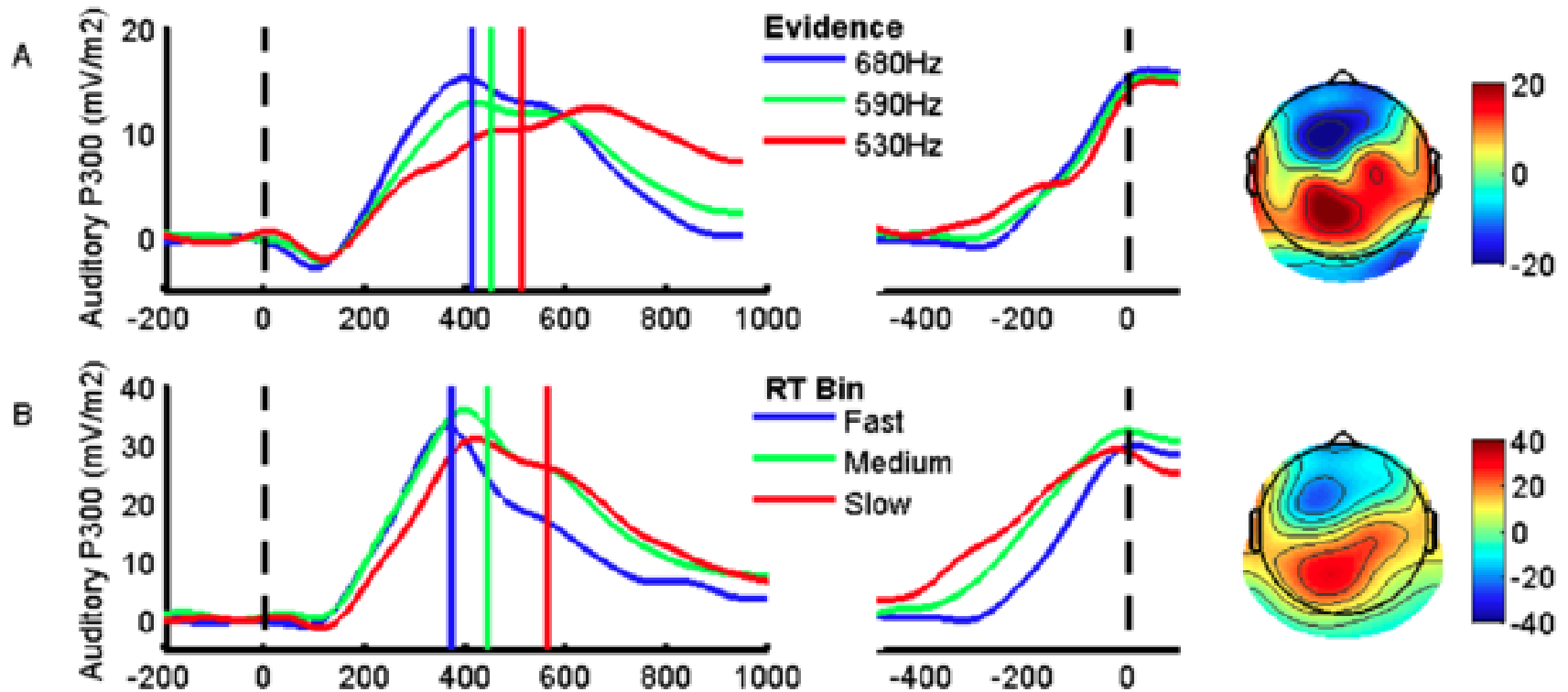




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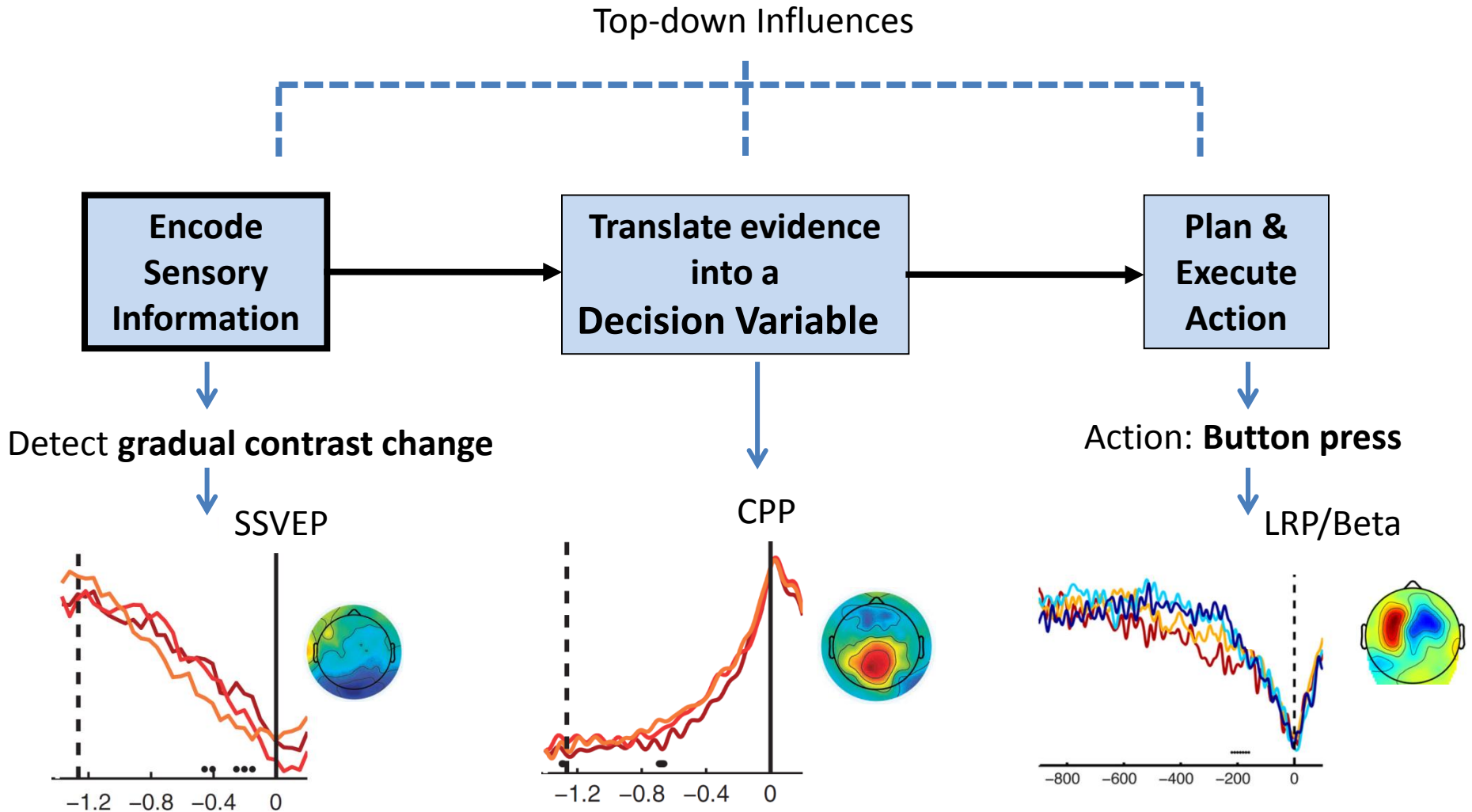


The P300 as a decision variable signal



Twomey, Murphy, Kelly & O'Connell (in prep)

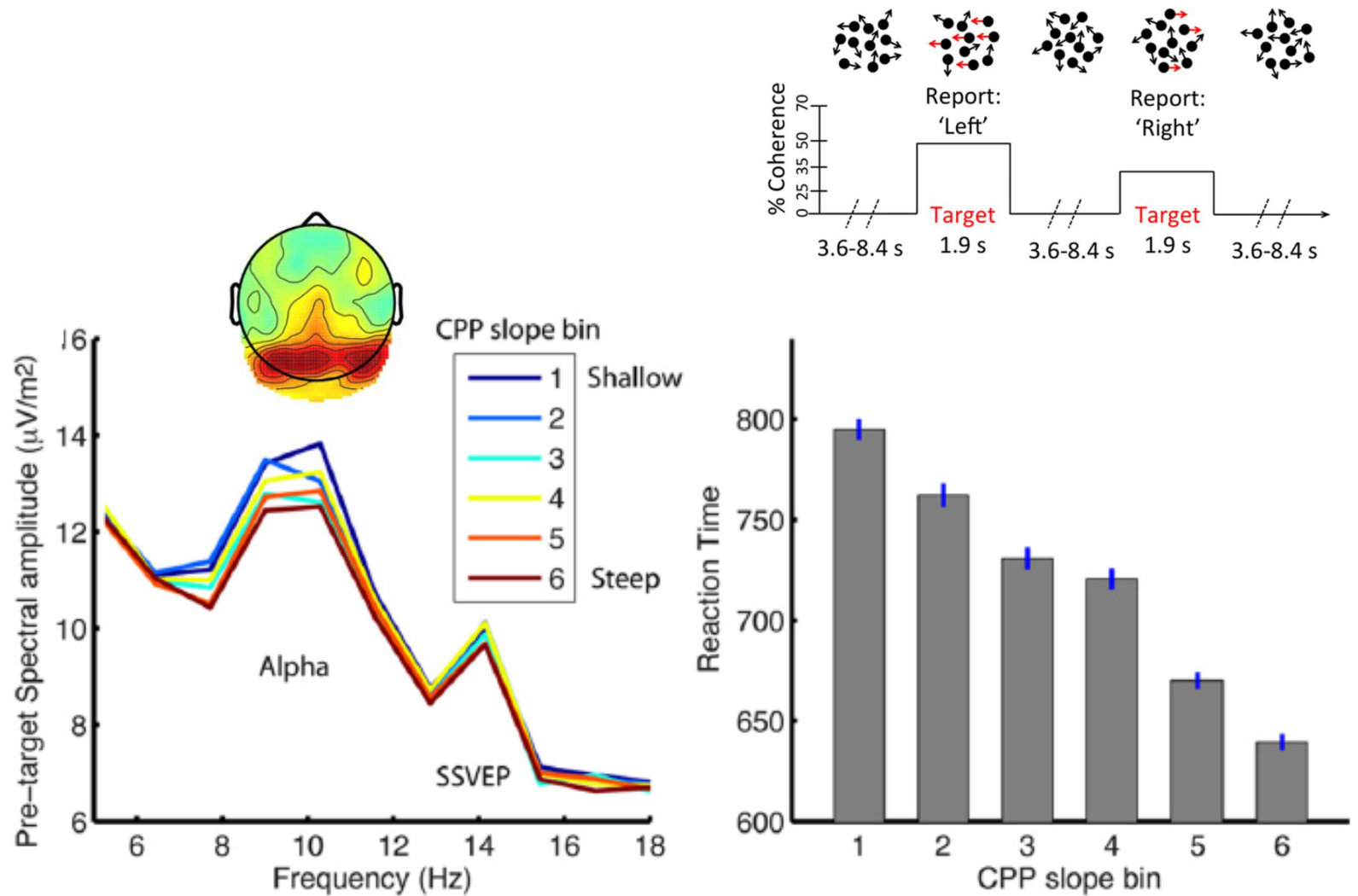
Simple Perceptual Decisions: 3 ~~stages~~ levels



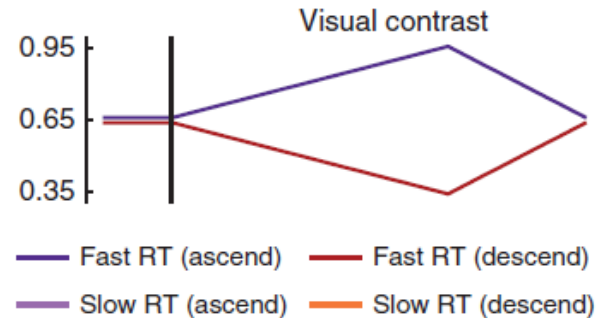
Decision Making Under Conditions of Temporal and Spatial Uncertainty



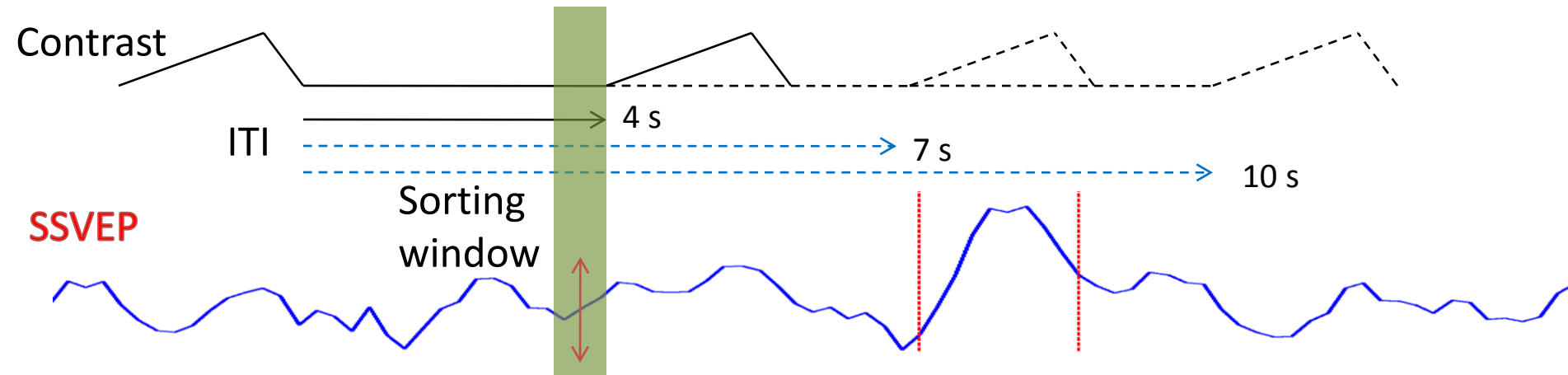
Temporal Uncertainty



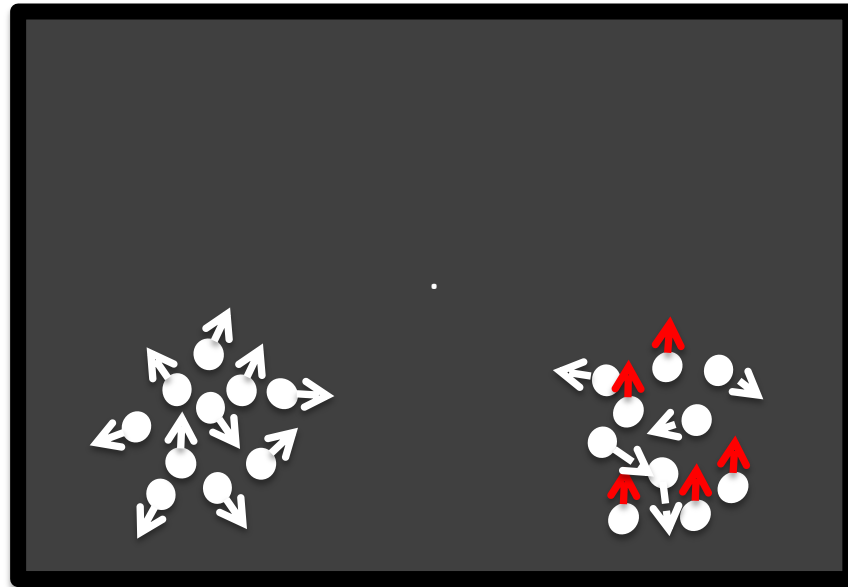
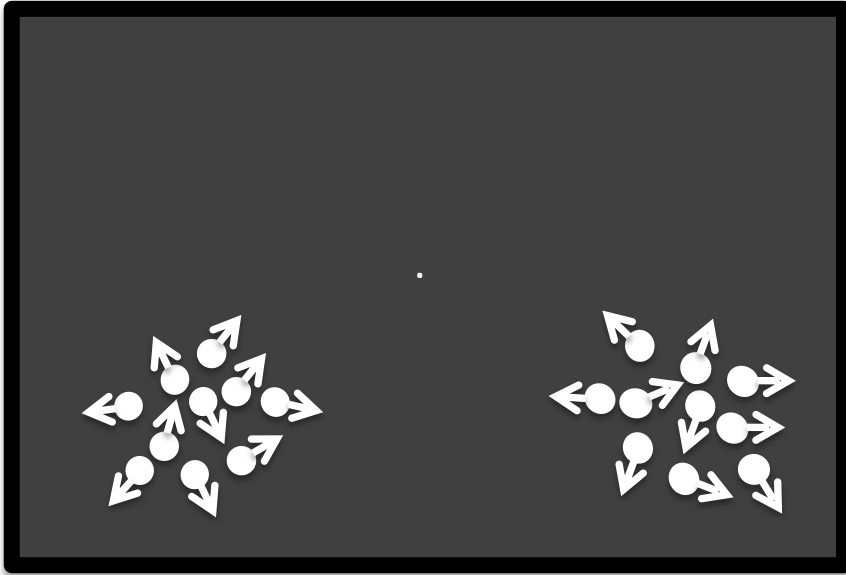
Temporal Uncertainty: Do we accumulate continuously when continuously monitoring for targets?



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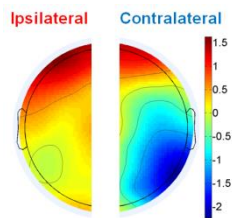
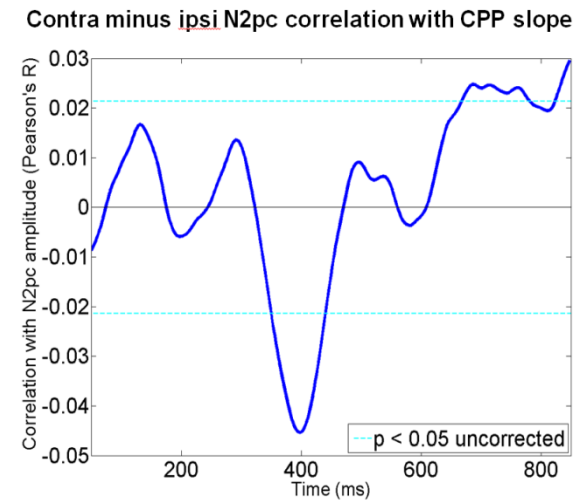
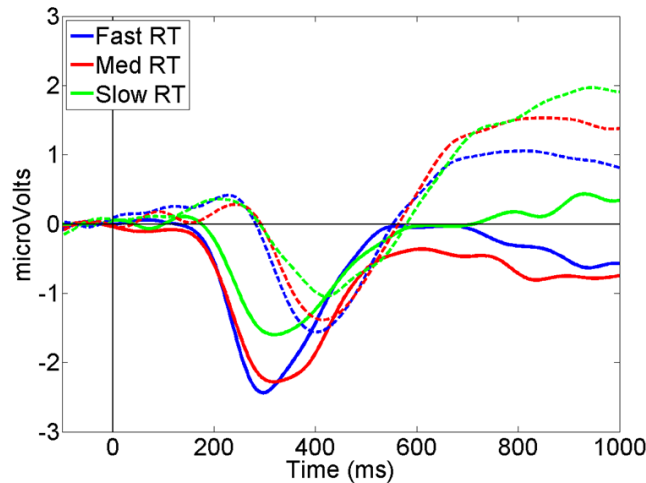
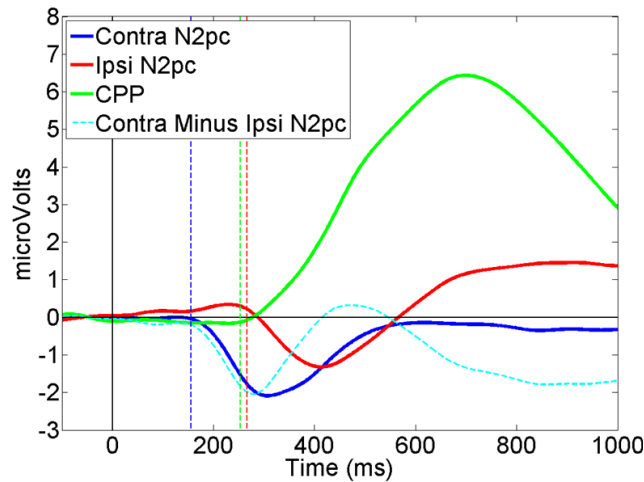
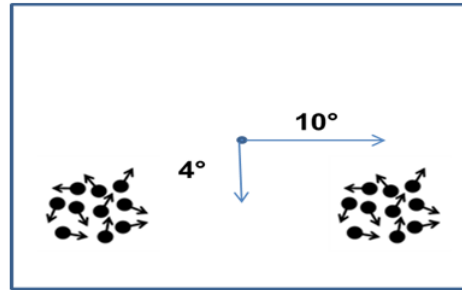


Temporal + spatial uncertainty



‘Click Left’

Spatial and Temporal Uncertainty : Evidence accumulation triggered by a sensory detection mechanism



Summary

- Distinct neural signatures of the key mechanisms underpinning perceptual decision making
- The P300 as a build-to-threshold decision variable signal
- Non-spatial attentional fluctuations impact on accumulation rate
- Spatial orienting at evidence onset has a transient impact on accumulation rate

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