

Centroparietal activity mirrors the decision variable when tracking biased and time-varying sensory evidence

T Carmen Kohl, Laure Spieser, Bettina Forster, Sven Bestmann, Kielan Yarrow (2020)

<https://www.sciencedirect.com/science/article/pii/S0010028520300505>

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Research Question

Does the CPP (Centroparietal Positivity, an ERP component) represent evidence accumulation in perceptual decision making?

Hypothesis

- Perceptual decision making has been successfully explained by sequential sampling models (e.g. Diffusion models) which assume in order to make a decision, we accumulate sensory evidence over time until a decision threshold is reached.
- The CPP has shown several key properties of the decision variable (i.e. the decision-related accumulation profile).
- If we model perceptual decision making behavior with IRA (Independent Race Accumulator) and LCA (Leaky Competing Accumulator) models, being more neurphysiologically plausible than simple Diffusion model, does the CPP still reflect the expected effects, especially in time-varying evidence and in probabilistic decision biases?

Experiment

2 experiments in random dot motion paradigm:

- 1) Non-stationary evidence: Interrupting stimulus representation for 200 ms
- 2) Probabilistic decision bias: Presenting predictive directional cues

Novelty

Going beyond simple comparison of neural signal and model predictions (limited to summary measures like average slope) by evaluating point-by-point correspondence.

Result

- The CPP was sensitive to two manipulations above and the CPP waveform resembled the modelled accumulation in important ways.
- The CPP probably reflects the accumulation of evidence and remains a highly plausible correlate of the decision variable.

To read more about neural substrates of decision variable:

ARTICLES

**nature
neuroscience**

A supramodal accumulation-to-bound signal that determines perceptual decisions in humans

Redmond G O'Connell¹, Paul M Dockree¹ & Simon P Kelly²

<https://www.nature.com/articles/nn.3248>

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Behavioral/Cognitive

Internal and External Influences on the Rate of Sensory Evidence Accumulation in the Human Brain

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<https://www.jneurosci.org/content/33/50/19434>