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Brainwaves and Intentions: The Readiness Potential and Its Relation to Free Will

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Brainwaves and Intentions: The Readiness Potential and Its Relation to Free Will

Comments

Presented at the 2020 SURF Virtual Summer Research Conference.

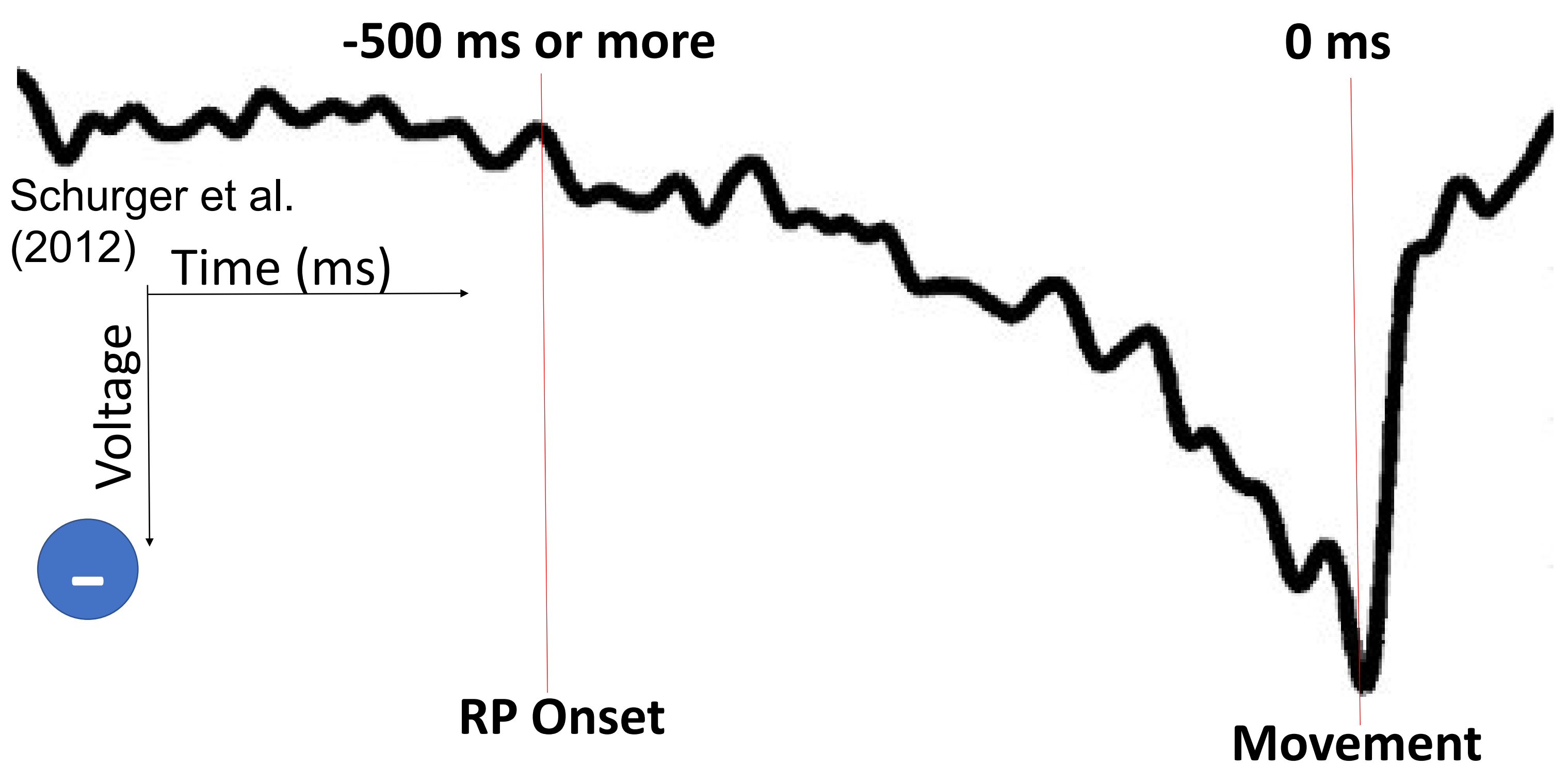
The readiness potential (RP) originally challenged free will since it was believed to represent an unconscious decision to move. Criticisms of the RP, specifically how the RP is visualized, refute the RP's claim against the existence of free will.

Brainwaves and intentions: the readiness potential and its relation to free will

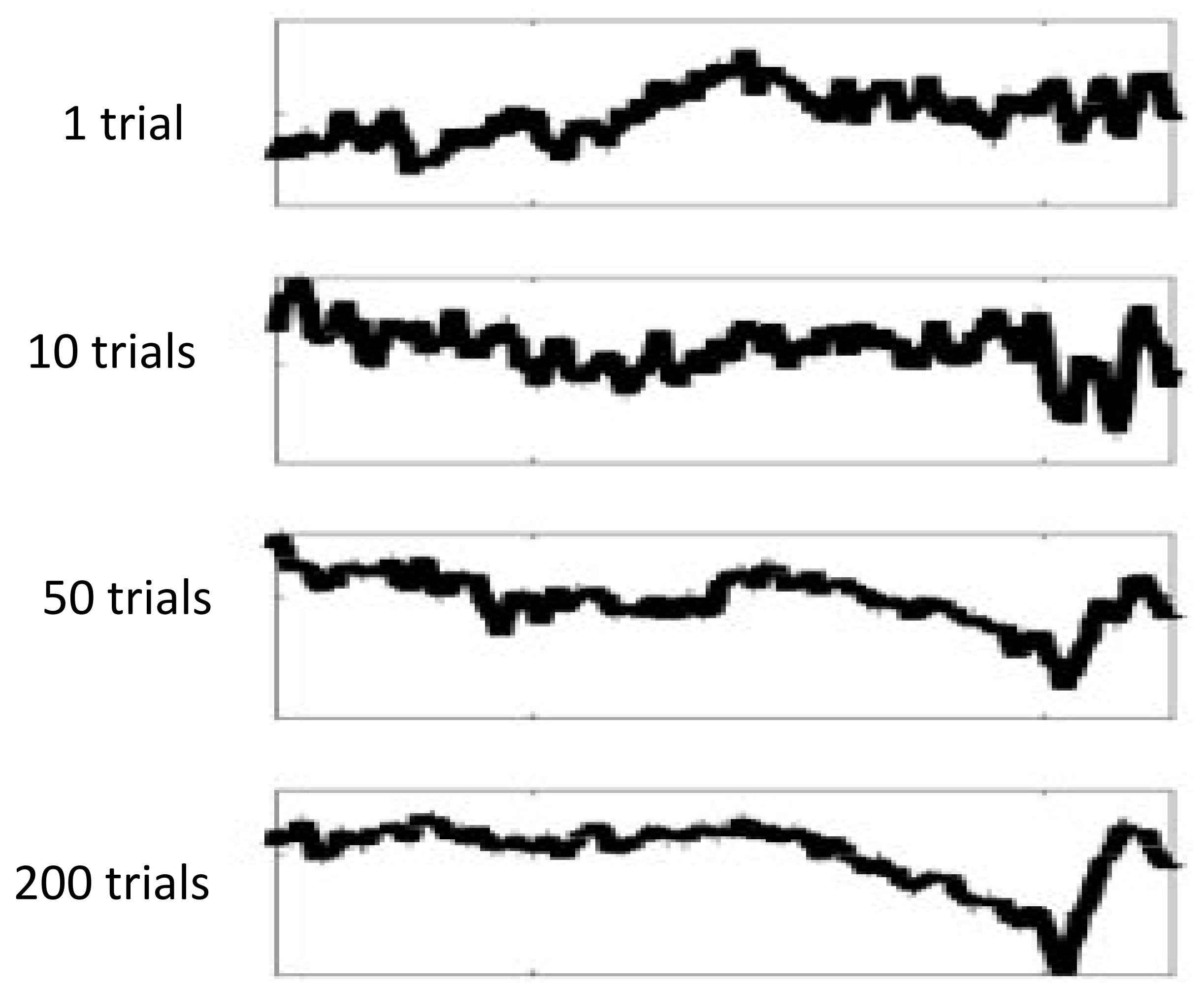
Joanna Pak, Aaron Schurger, Adina Roskies, Ben Hu

Background

- Kornhuber and Deecke (1965)



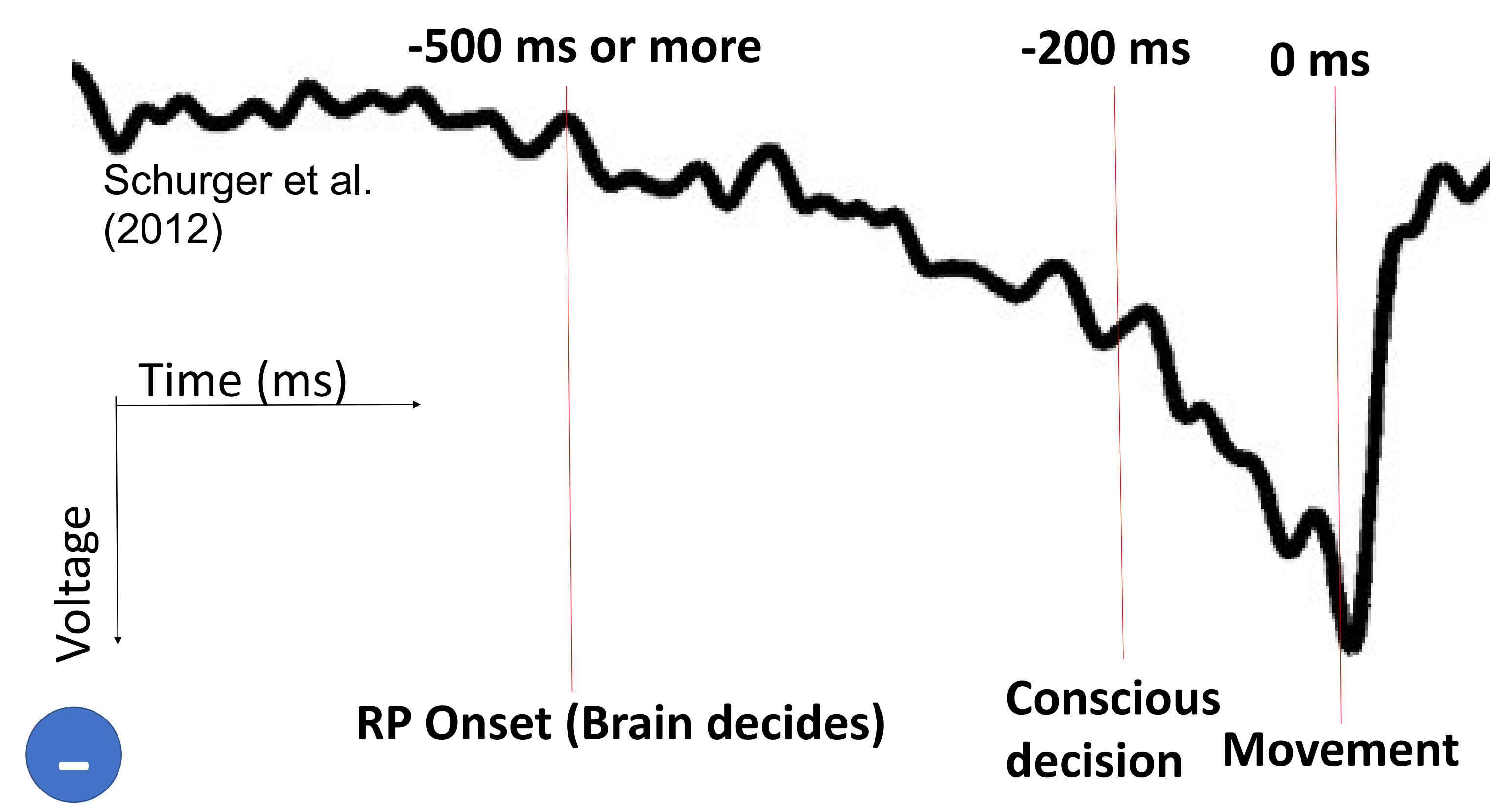
- Ways to measure RP
 - EEG (primary)
 - MEG
 - Single neuron
- Measurable in animals (primates, rodents, crayfish)
- Characteristics vary by individual
 - Some may present a weak RP (or none at all)
- Single trial RP analysis?
- Difficult to visualize RP without averaging



Models of the Readiness Potential

Classic Model

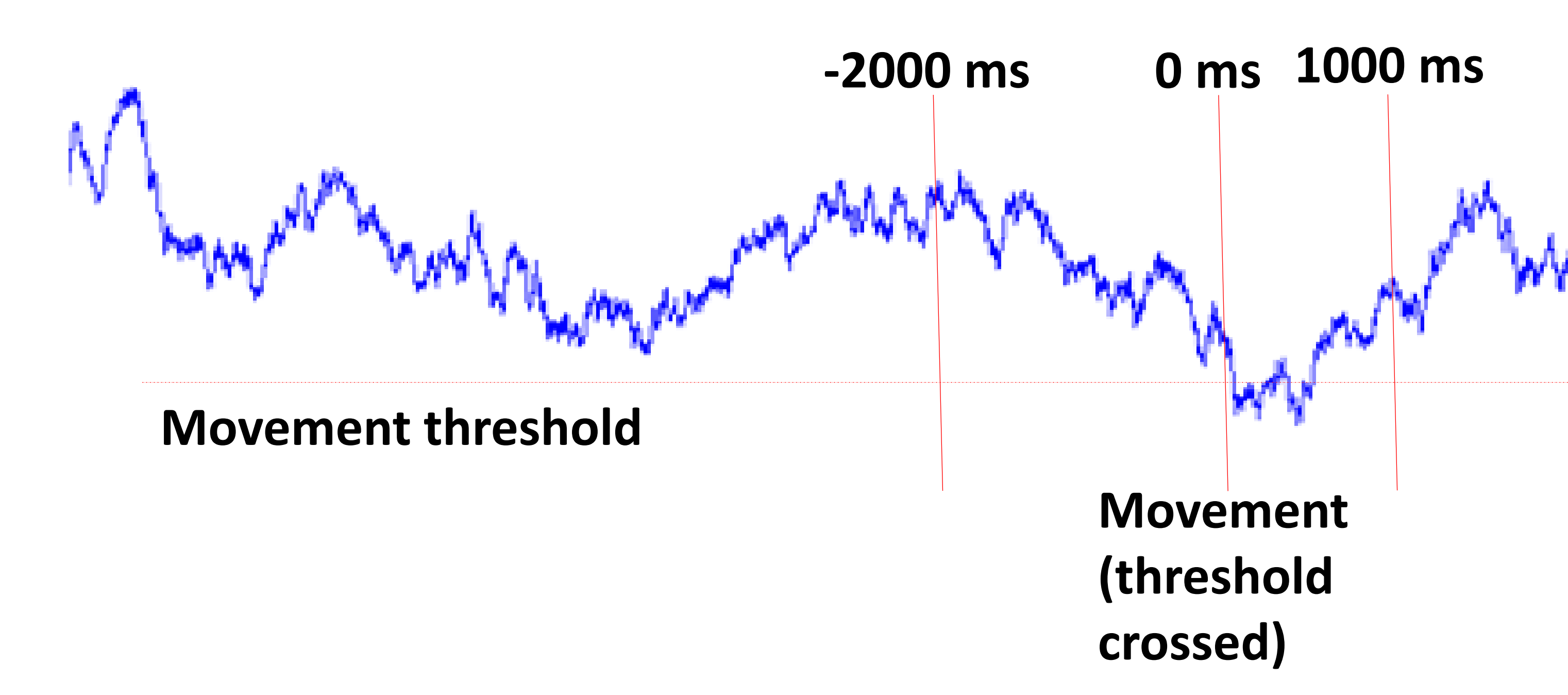
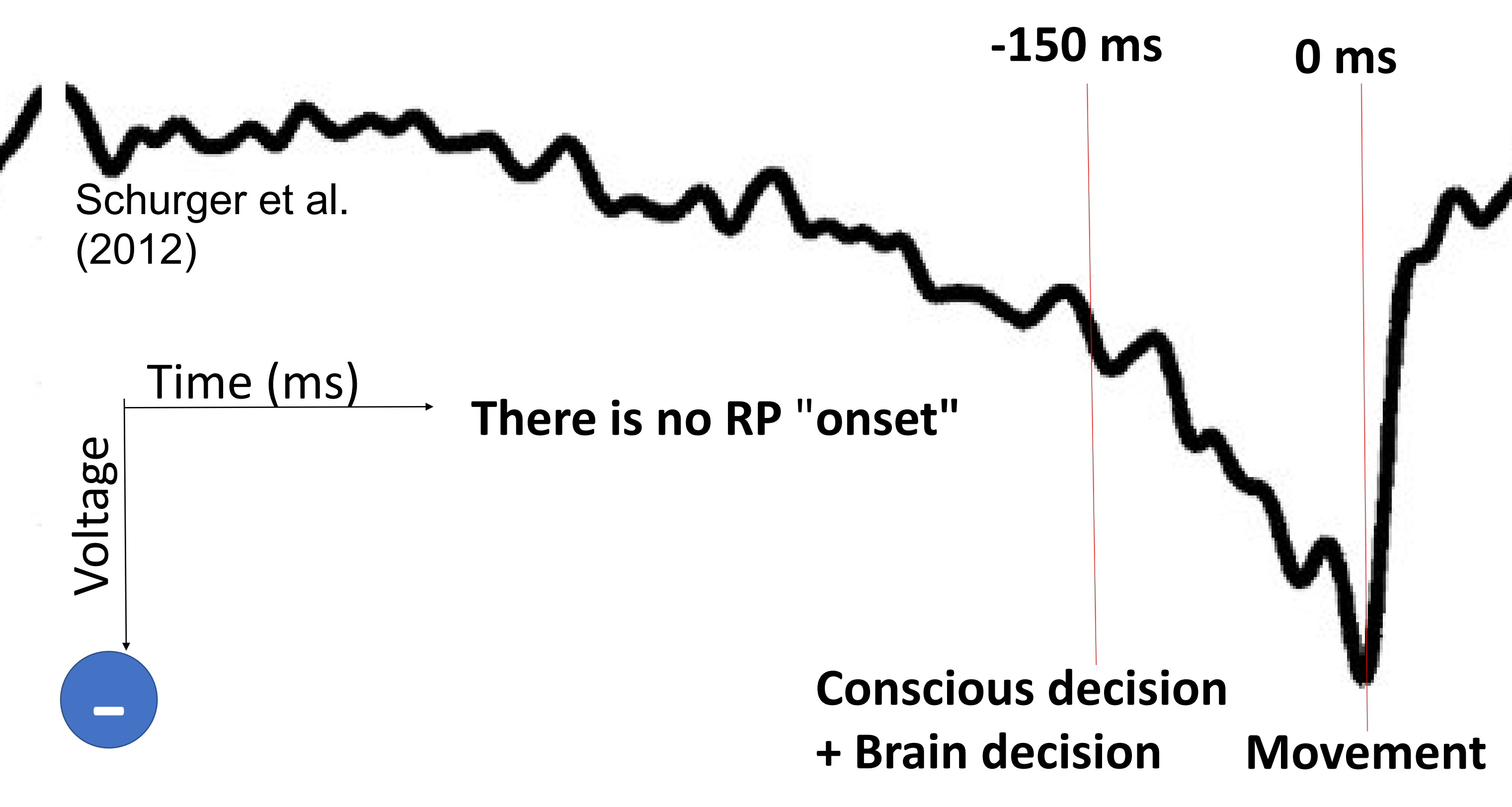
- Proposed by Libet (1983)



1. RP onset represents the **brain's decision to move**²
 2. RP exists as **measurable marker** of unconscious brain activity that causes spontaneous movements²
- Challenged the existence of conscious free will
 - Controversial in neuroscience and philosophy fields
 - Libet's paradox

Stochastic Accumulator Model

- Challenged the classic model



- RP is a product of noise and averaging (not a true predictor of movement)³
- RP onset does NOT represent the beginning of any process³
- RP may contribute to the conscious experience of decision making³
- **Solution:** holistic measurement of RP
 - Rain example


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References

(1) Kornhuber, H. H. & Deecke, L. Pflügers Arch. 284, 1-17 (1965). (2) Libet. Electroencephalography and clinical Neurophysiology. 56(4), 367-372 (1983). (3) Schurger, A. PANAS, 109(42), 1-10 (2012).