

# Pre-stimulus phase, power, and connectivity patterns predict phosphene perception and cortical information flow

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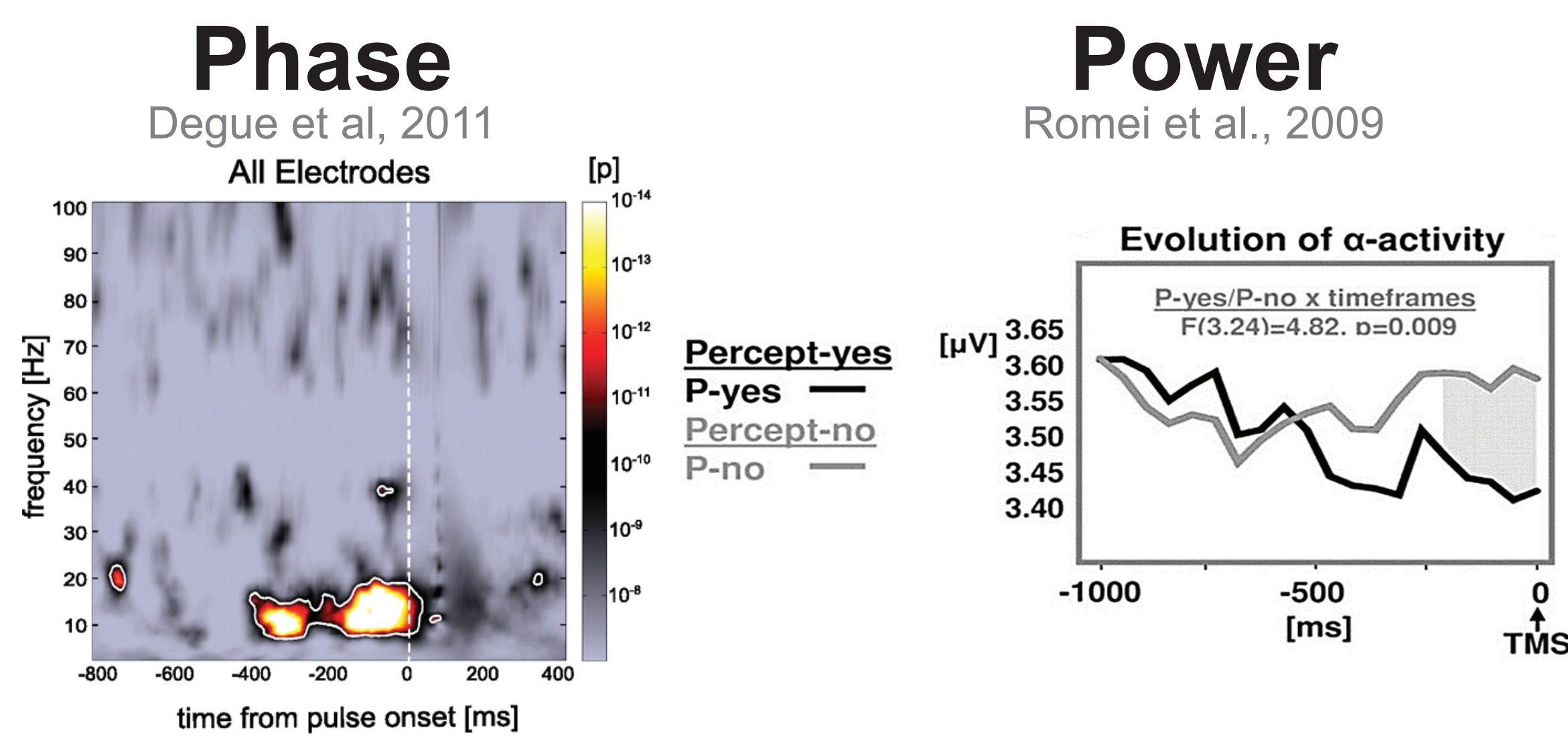
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## Introduction

Near-threshold stimulation affords investigation of the pre- and post-stimulus neural dynamics associated with awareness. Previous research has shown that pre-stimulus, low-frequency oscillations (5-13 Hz) predict awareness, visuo-cortical BOLD response and phosphenes resulting from occipital TMS.



Several groups have recently reported phosphenes from stimulation of posterior parietal cortex.

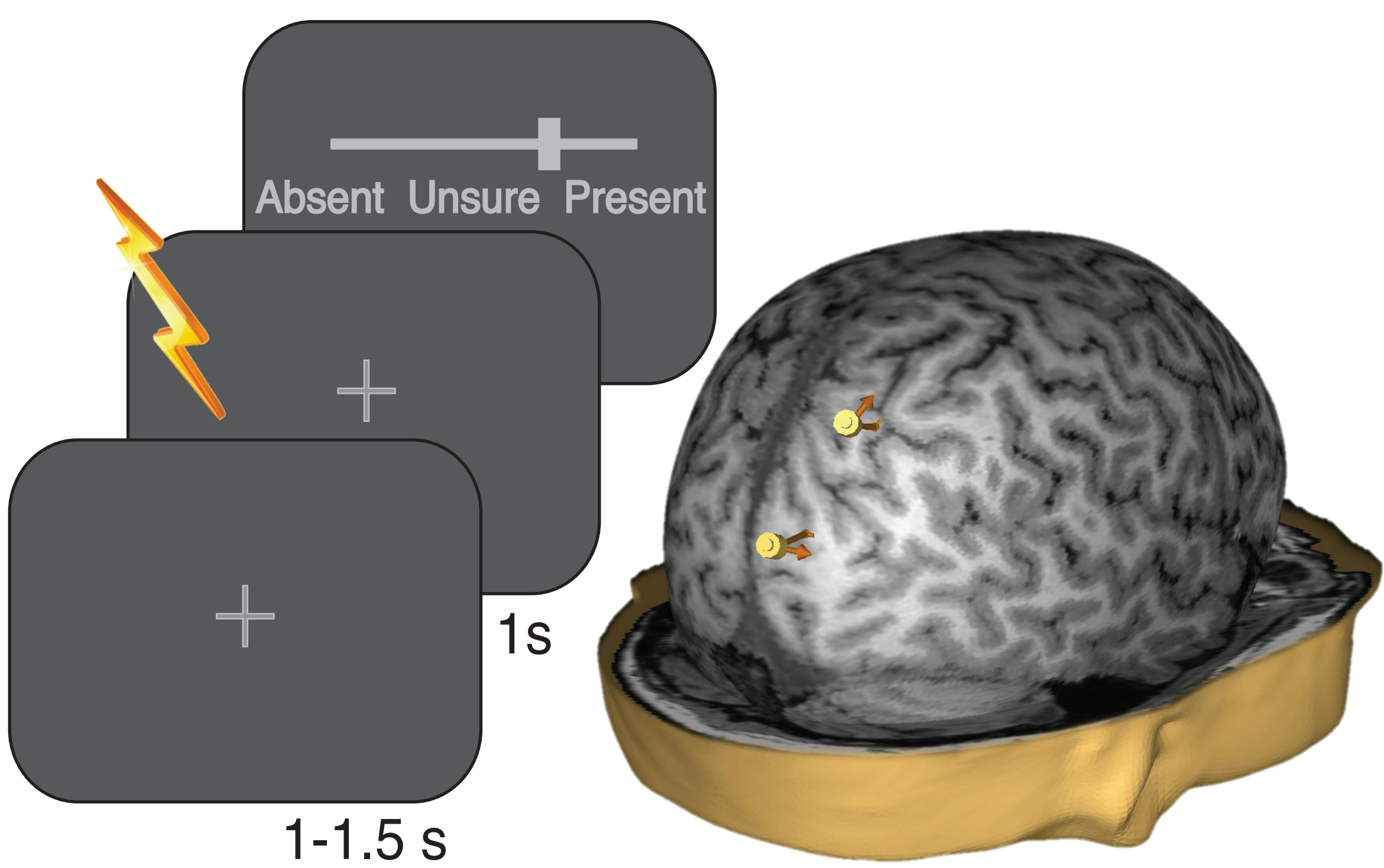
Do 5-13 Hz oscillations relate to excitability of regions beyond visual cortex?

Might pre-stimulus oscillatory connectivity also play a role in subsequent processing?

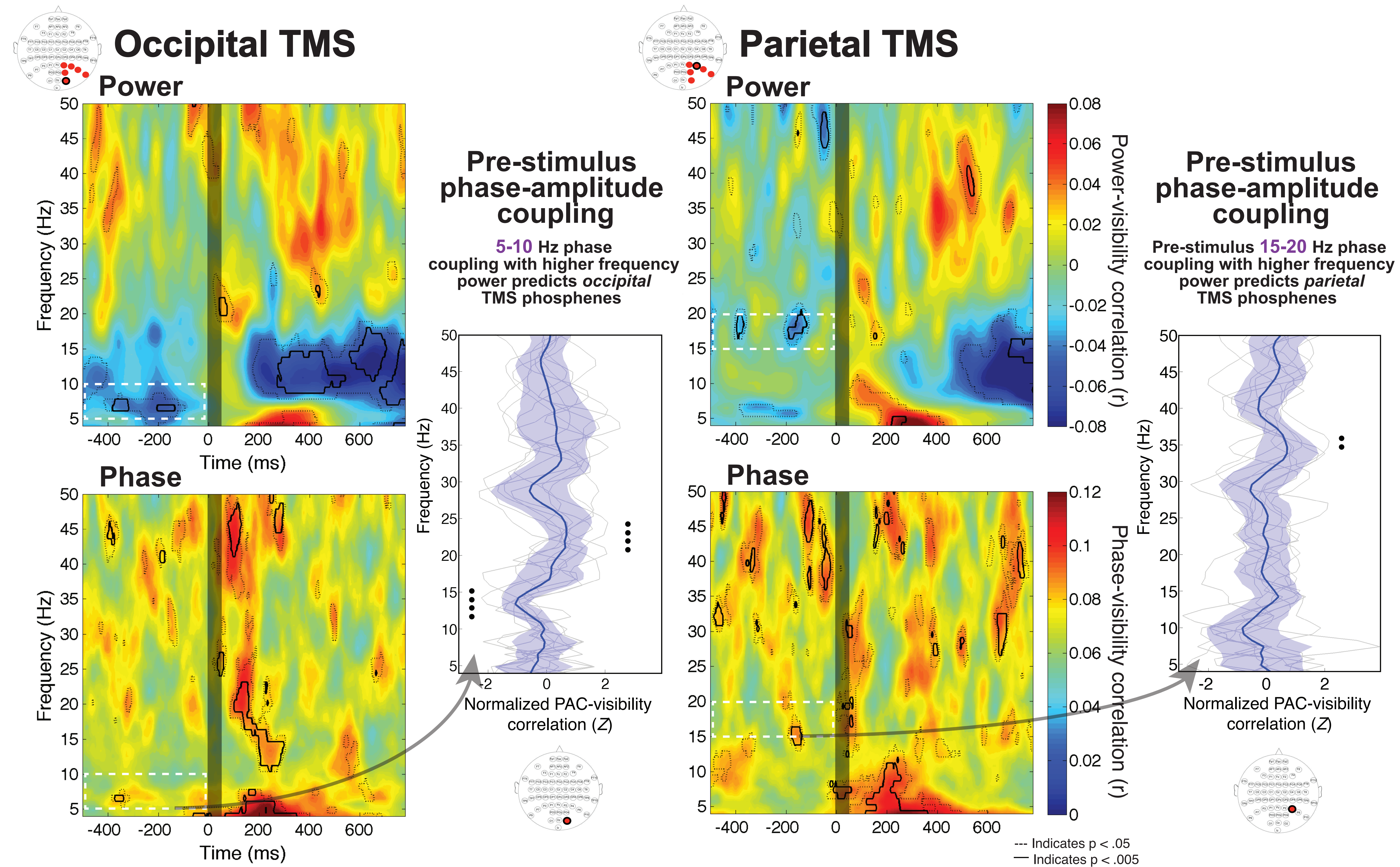
What are the neural correlates of occipital and parietal phosphene perception?

## Task and Methods

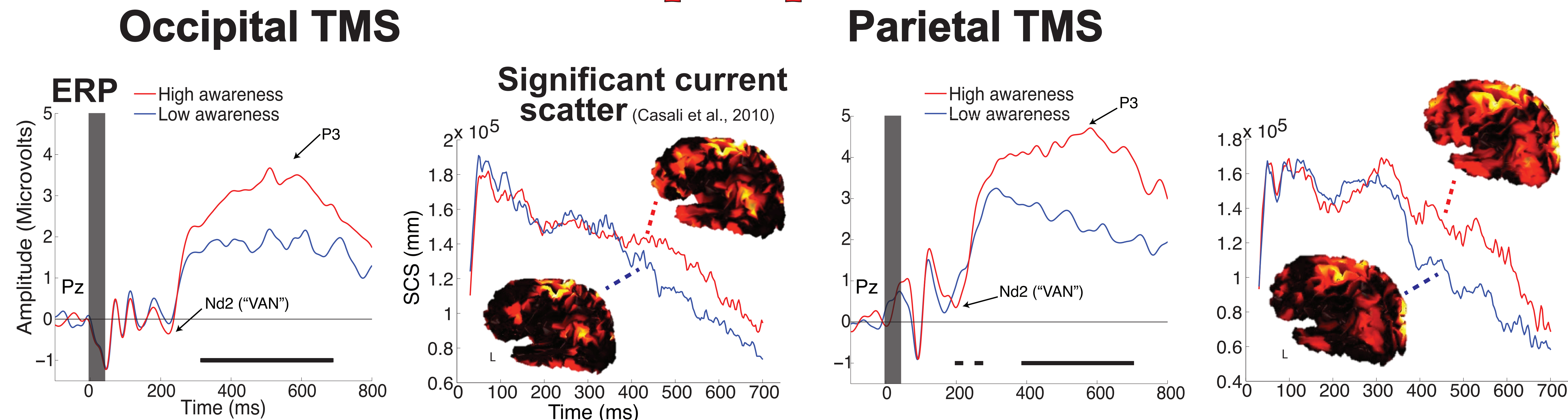
Participants (n=10) underwent occipital and parietal TMS while EEG from 60 channels was recorded. Stimulation intensity was individually thresholded to approximately 50% phosphene detection. Participants then rated their perception on a 100-point, sliding scale.



## Results: Pre- and post-stimulus oscillatory dynamics



## TMS-evoked correlates of phosphene awareness



## Discussion

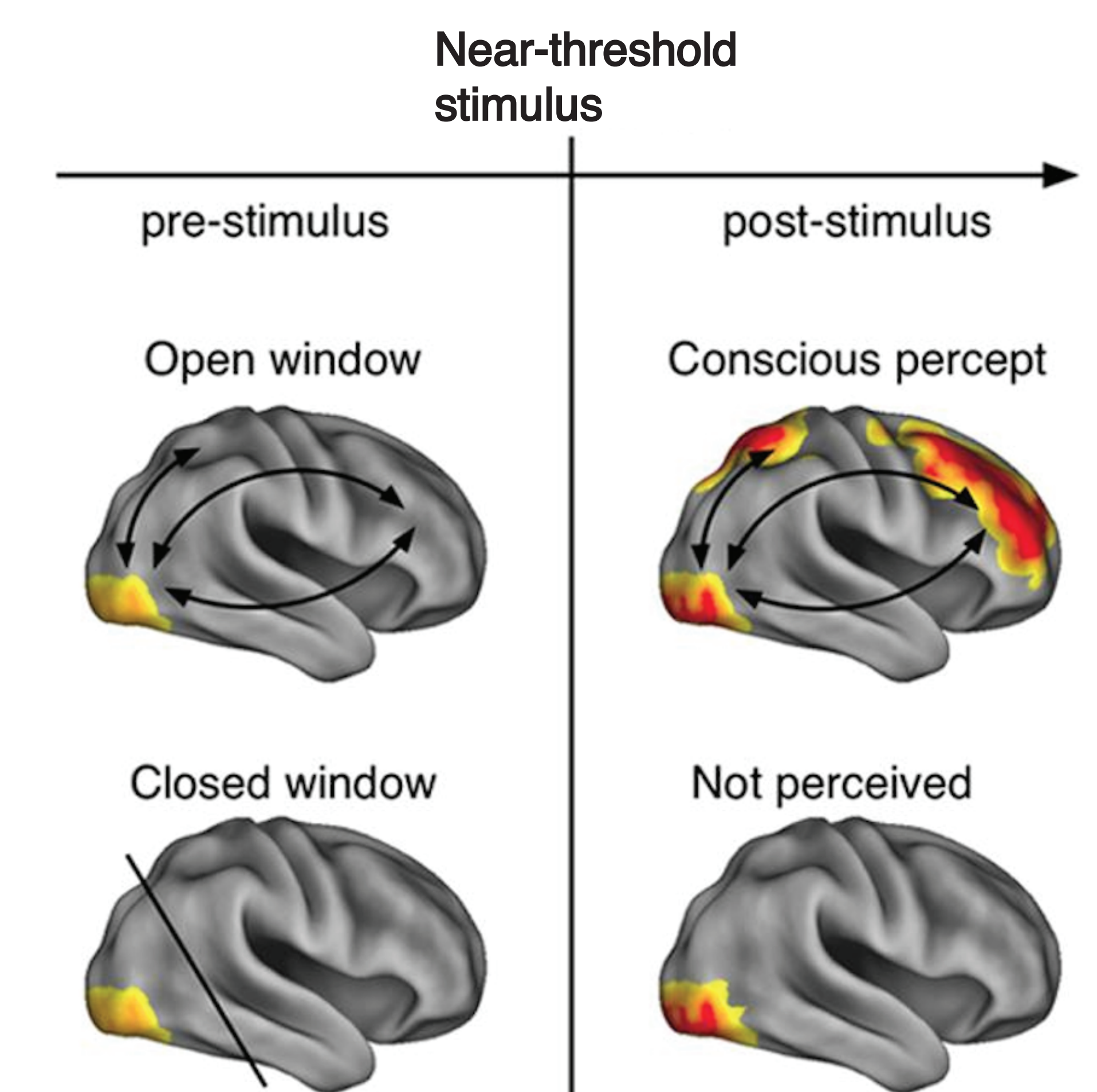
Phosphenes induced by occipital and parietal TMS are reflected in larger amplitude ERPs, greater effective connectivity, and decreased alpha- and increased low gamma-band power.

Consistent with prior work, pre-stimulus low-frequency (5-10 Hz) phase and power predict phosphenes following occipital TMS.

Higher frequency pre-stimulus oscillations (15-20 Hz) predict parietal TMS phosphenes, suggesting cortical excitability may fluctuate at different frequencies for different cortical areas.

This is the first report that pre-stimulus PAC predicts phosphene perception, suggesting that lower-frequency phase may coordinate local connectivity patterns relevant to subsequent visual awareness.

### Windows to Consciousness Framework



Rahnau et al., 2014

### References

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