Parieto-occipital contributions to phenomenal consciousness

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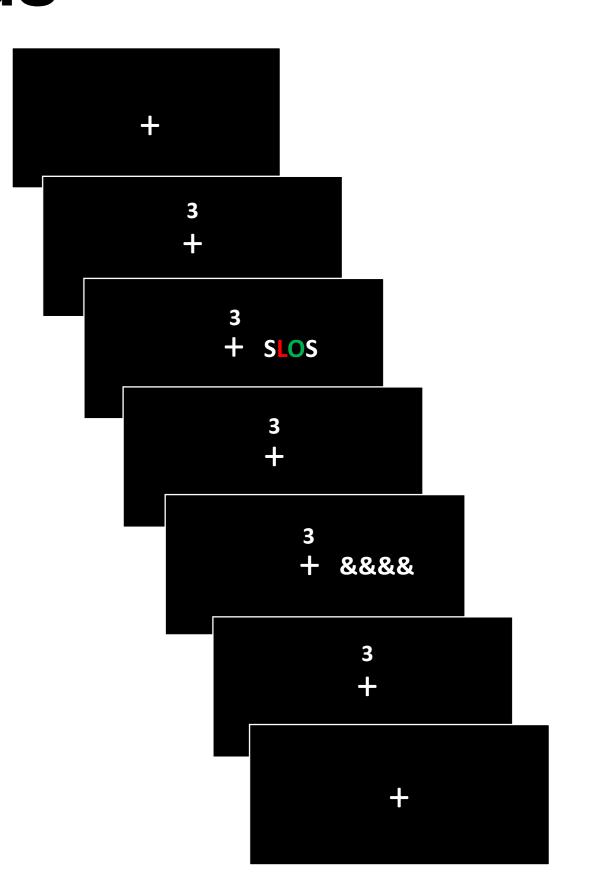


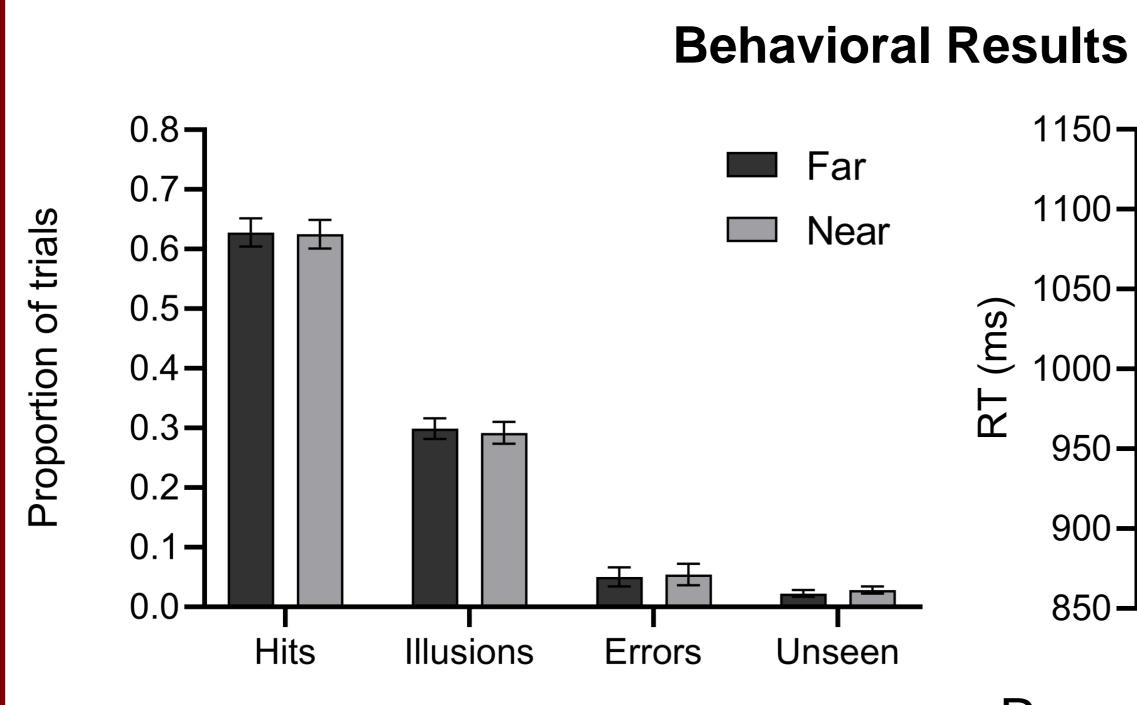
Introduction

- The feature integration theory (FIT) proposes a two-stage process in perception: identifying the different features of an object and integrating them¹.
- When integration fails, erroneous combinations of features can occur, leading to "illusory conjunctions".
- These illusions have been proposed as a mean to study **phenomenal consciousness**: the impression of perceiving much more information than what can be reported².
- Here, we employed a **dual-task paradigm** demonstrated to produce illusory conjunctions³, and used **functional MRI** to explore the brain activity associated with correct and illusory perception.

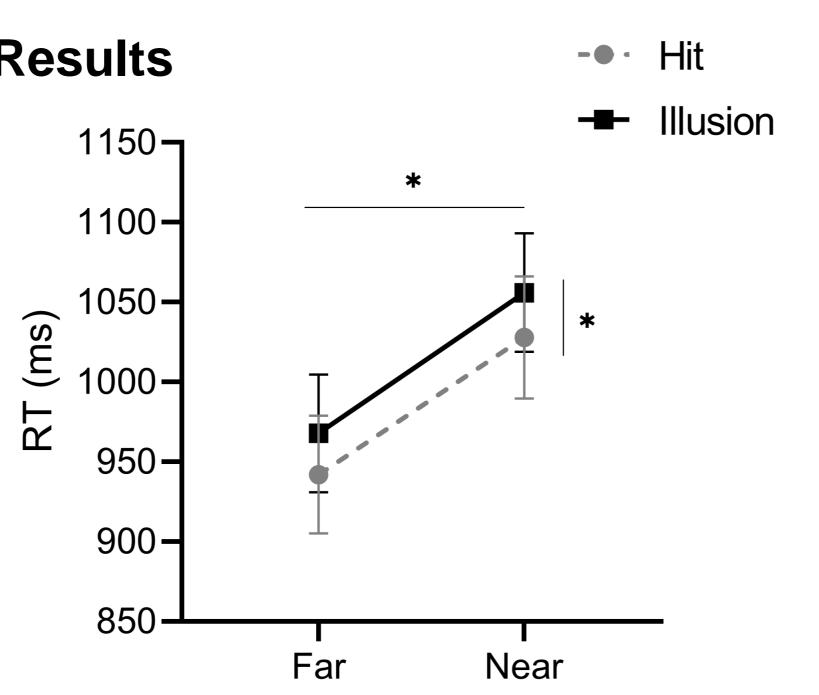
Methods

- task (larger or smaller than 5):
 Near (3,4,6,7) and Far (1,2,8,9) conditions. Peripheral task (report color of letter L):
 hit (correct response), illusion (report color of the letter O), error (report a non-presented color), unseen.
- Individual titration (size and eccentricity) to produce ~30% illusions.

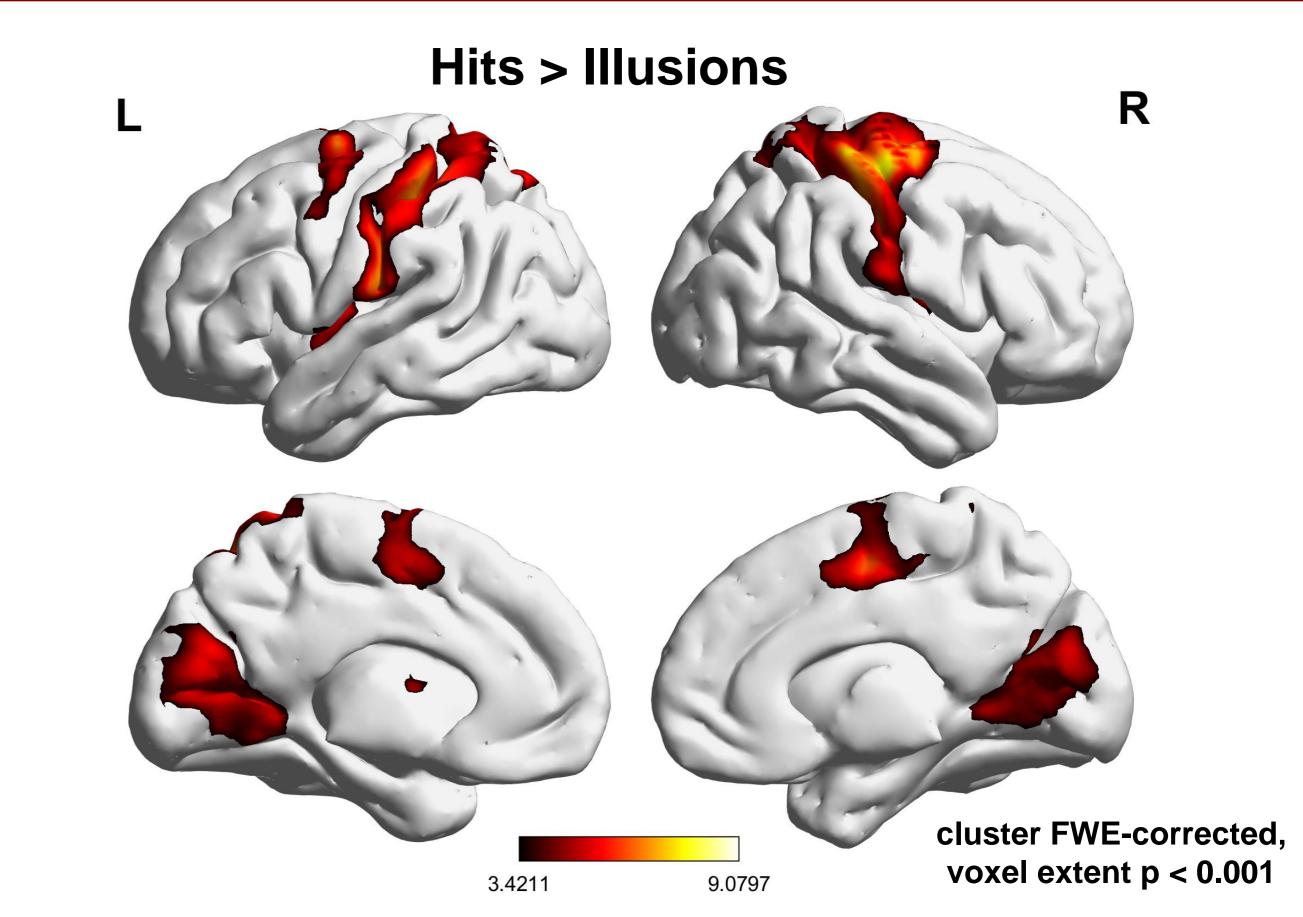




The central task did not modulate the proportion of hits, illusions, errors, or unseen responses (all ps > 0.48).



Responses to the central task were faster for Far as compared to Near conditions, and for hits than illusions (both ps < .001).



A set of parieto-occipital areas was more strongly engaged for correct responses than for illusory conjunctions.

Time Courses Left V1 Hit O.4 O.2 O.0 O.2 O.4 O.5 O.5 O.5 O.5 Time (sec.)

Visual sensory areas (V1-V2) were the only regions with increased BOLD responses for illusions as compared to hits at earlier time points.

Functional connectivity (FC) Functional connectivity (FC) Functional connectivity (FC) Whole-brain FC: Occipital regions functionally coupled with parietal lobe for hits but not for illusions. Hits Illusions Increased FC among FEF and parieto-occipital regions for hits vs. illusions.

Discussion

- Central task demands do not directly modulate the production of illusory conjunctions, although preparatory processes might affect performance in both tasks.
- The only region in the brain showing stronger engagement for illusions relative to hits was the visual cortex, suggesting that visual sensory areas might fail to interact with parietal and more anterior regions to integrate information needed for correct perception.
- This suggests that there is a primitive integration in visual areas that needs to be confirmed by parietal regions, as proposed by the Feature Confirmation Theory⁴.

References

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