

Synesthetic Grapheme-Color Associations are Processed Early in Time and can Guide Attention During Visual Search



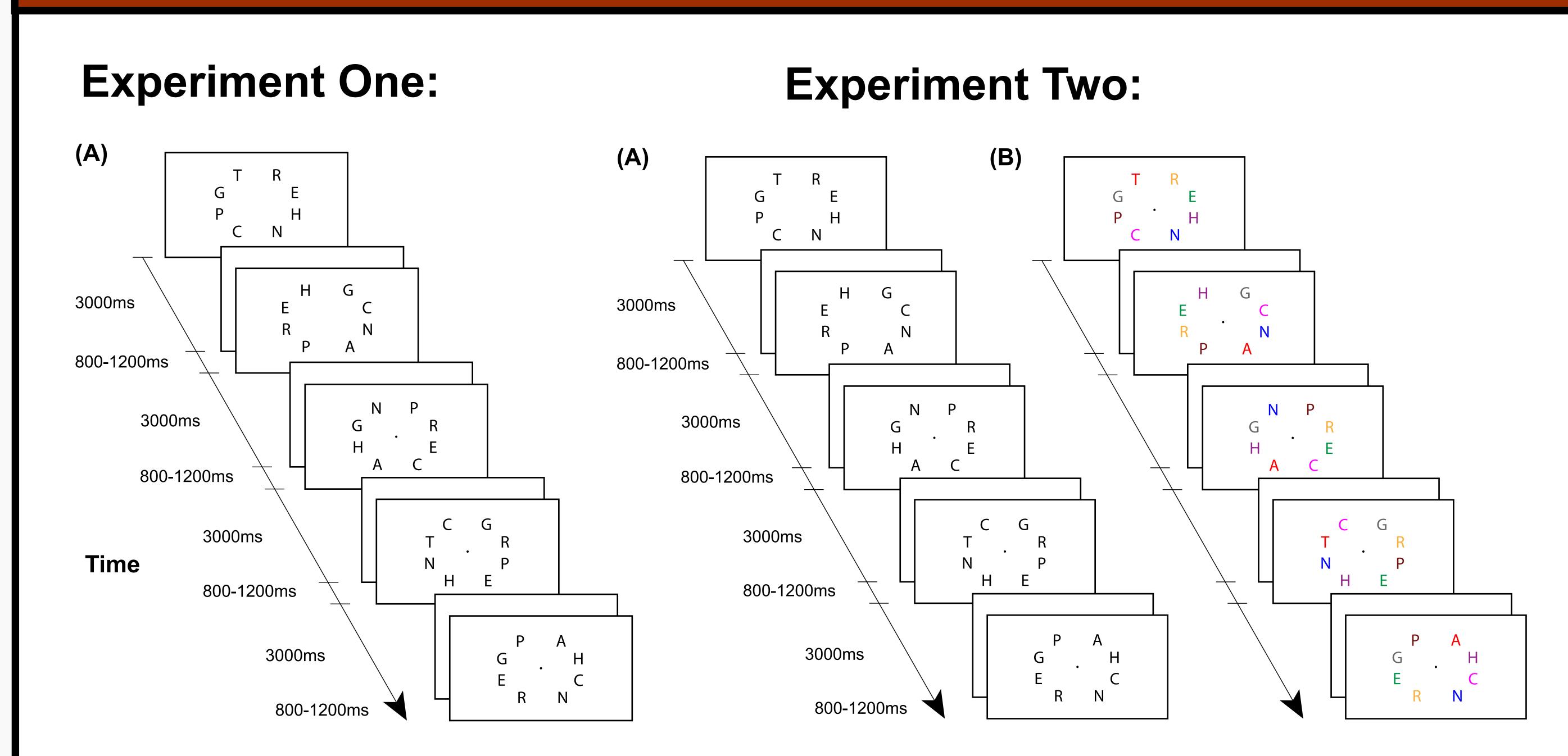
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Background

- Grapheme-color synesthesia is a neurological condition in which affected individuals experience a co-occuring perception of color when presented with grapheme (letter or number) stimuli. [1]
- Experiment one: synesthetes (n=12) and matched non-synesthetic controls (n=12) completed a visual search task with black grapheme stimuli.
- Experiment two: non-synesthetic controls (n=12) completed the same search task, but on different blocks, the grapheme stimuli were printed in black or printed in color to approximate synesthetic color perception.

Research Question: Can synesthetic color perception guide attention during visual search?

Methods

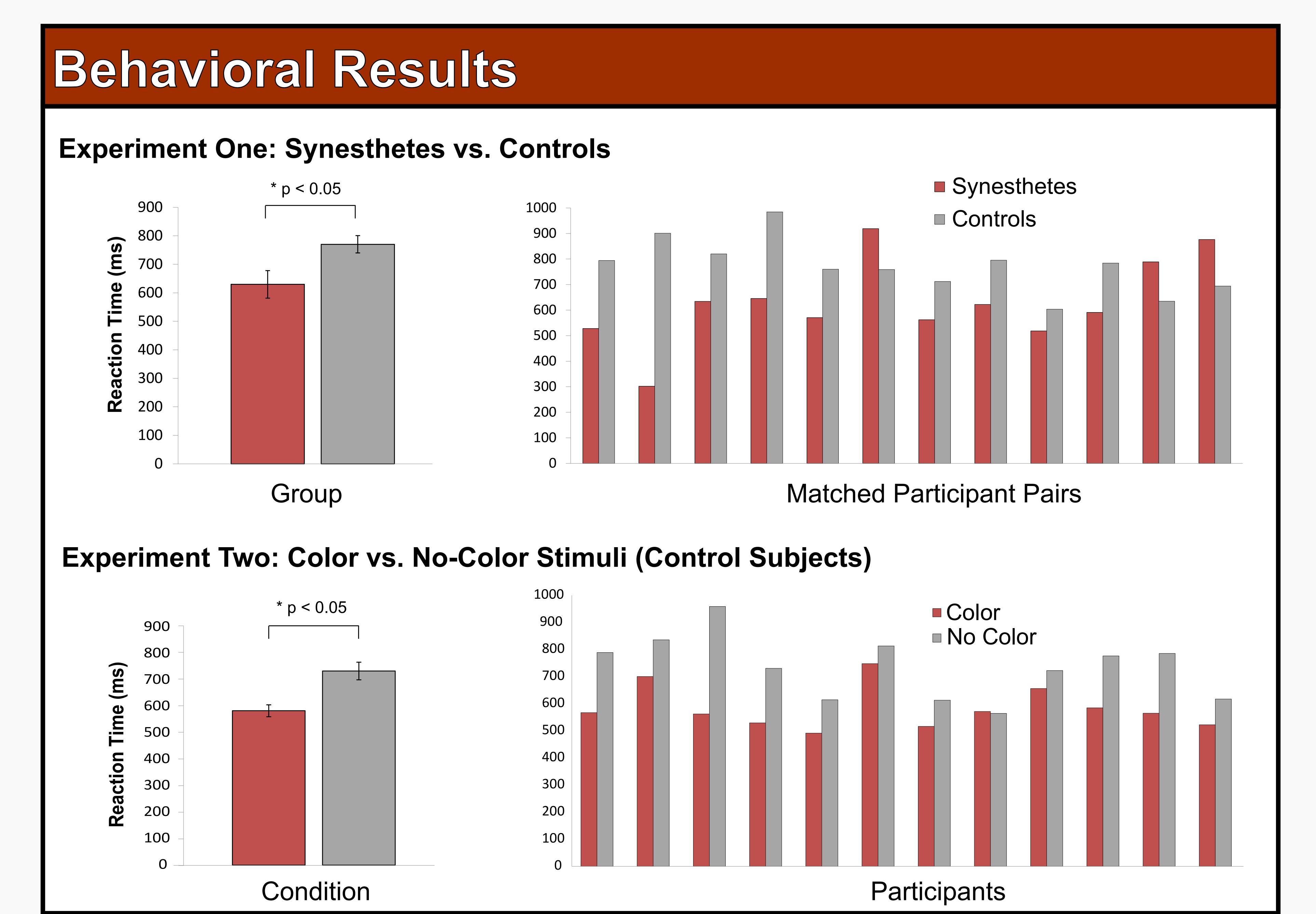


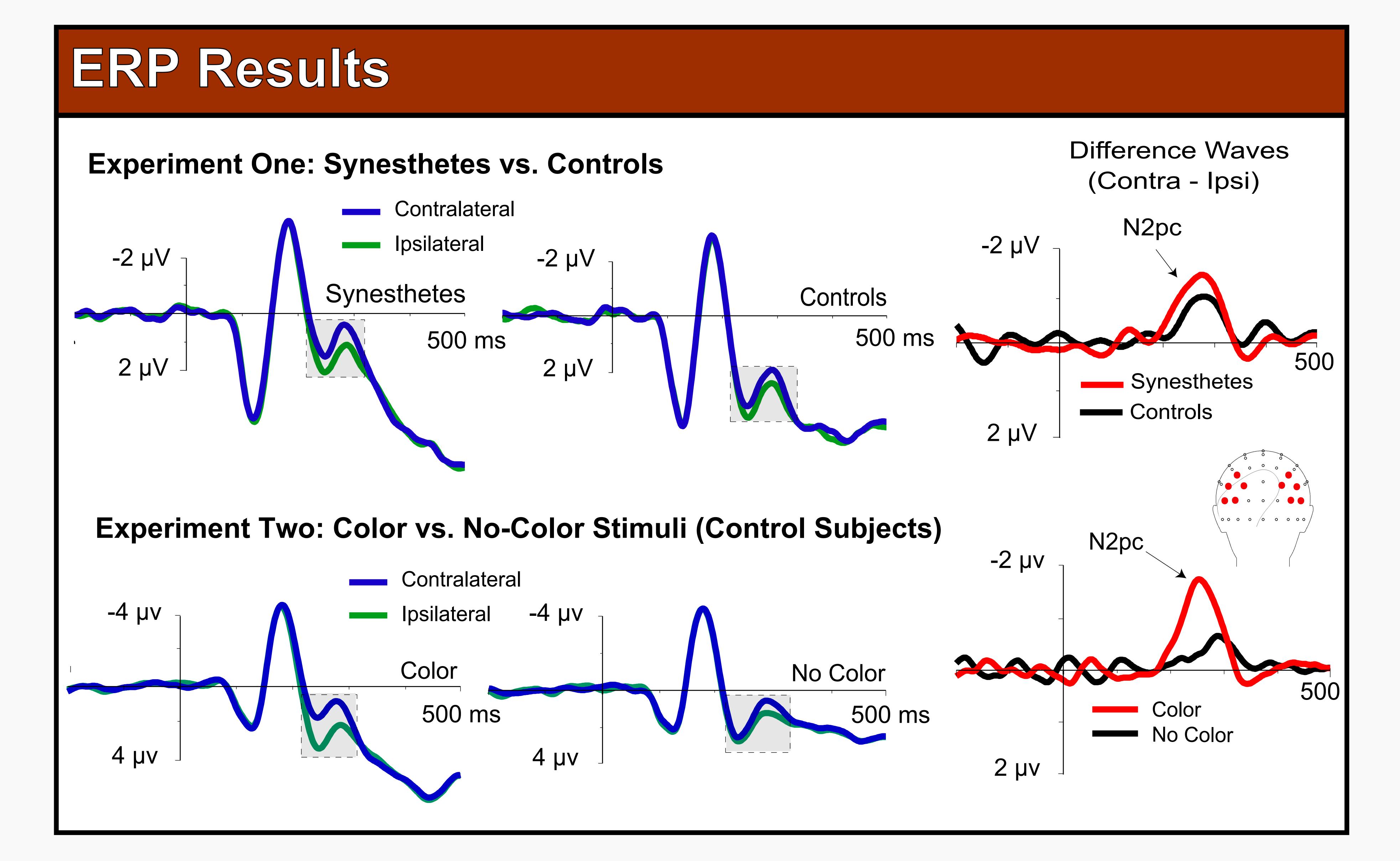
Experiment One:

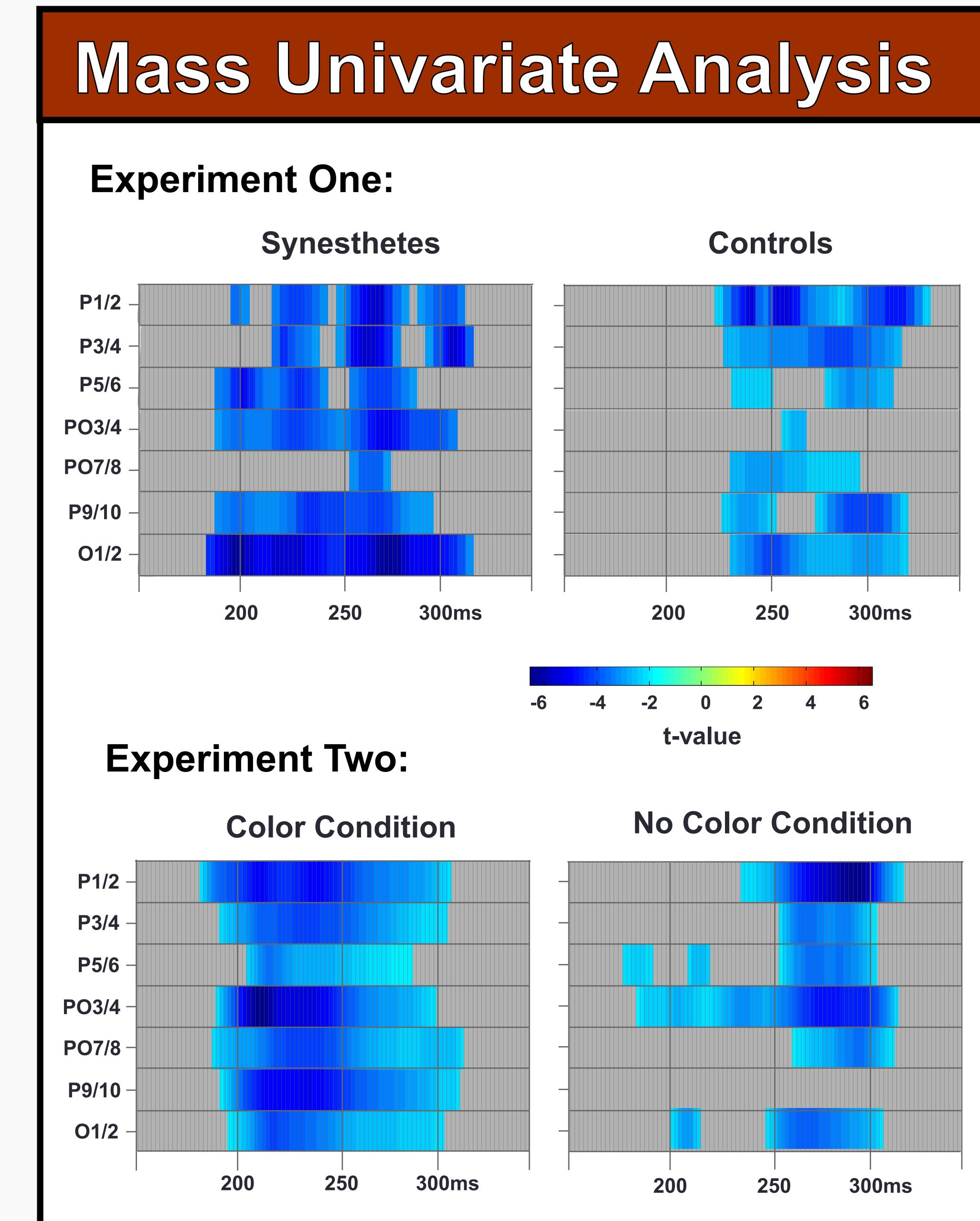
- All participants (n=24) completed the Eagleman Synesthesia Battery [1].
- Stimuli were then individually tailored such that each synesthete was presented a unique set of letters that elicited strong and consistent color associations.
- Two letters that elicited similar color associations (e.g. different shades of red) were selected as targets, while seven different letters, each of which elicited a distinct (non-target) color association, served as distracters.
- One of the two targets was present on each trial and the task was to find a target letter and report its identity.
- All letters were presented in black on a white background.

Experiment Two:

- Non-synesthetes (n=12) completed a visual search task using the same stimulus sets created for experiment one.
- On alternating blocks of trials, the letter stimuli were physically colored to match color associations reported by synesthetes in experiment one.







Conclusions

- Experiment one suggested a synesthetic advantage in visual search based on subjective color associations.
- Reaction times were faster, and the N2pc was earlier and larger in synesthetes vs. controls.
- Experiment two demonstrated a similar advantage in non-synethetes when the grapheme stimuli were printed in color (faster RTs, earlier and larger N2pc for color vs. no-color stimuli).
- These results suggest that subjective color associations may help guide visual search in synesthetes. The N2pc results in particular suggest that synesthetic color is processed early in time, prior to N2pc onset.

References

1. Carmichael, D. A., Down, M. P., Shillcock, R. C., Eagleman, D. M., & Simner, J. (2015). Validating a standardised test battery for synesthesia: Does the Synesthesia Battery reliably detect synesthesia? Consciousness and Cognition: An International Journal, 33, 375–385.