



Color Processing in Grapheme-Color Synesthetes: An Attentional Blink ERP Study

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Background & Objectives

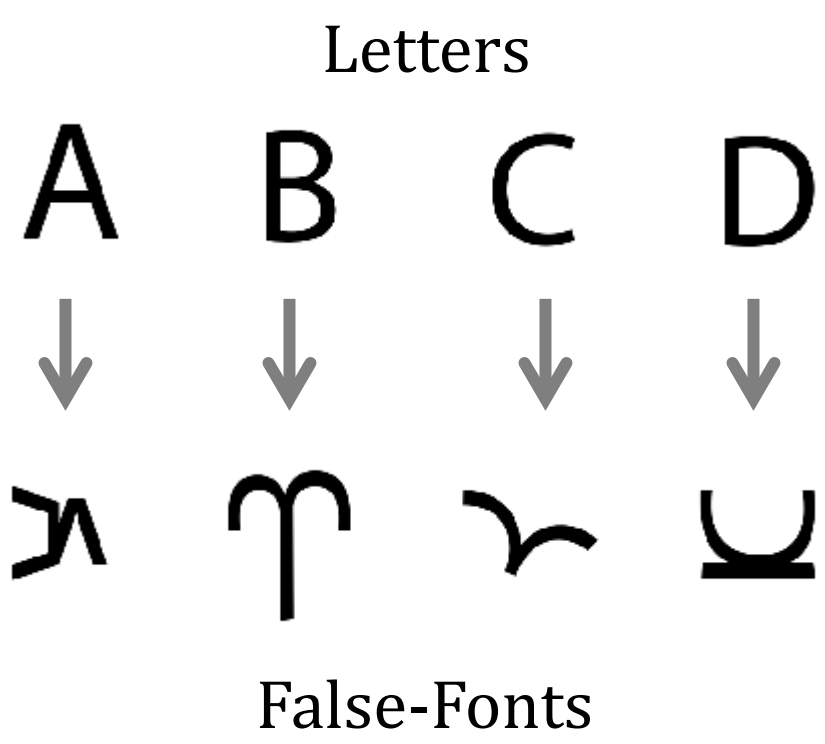
Main Question: Is awareness necessary for Synesthetic color perception?

- Grapheme-Color Synesthetes perceive color in achromatic letters..
- Previous studies have shown that some behavioral measures of synesthetic perception (congruency effects) disappear when color-inducing stimuli are masked [1].
- However, it is unclear whether neural correlates of synesthetic color perception are preserved when Synesthetes are unaware of the inducing stimuli.

ERPs elicited by achromatic letters and false-fonts during the attentional blink were compared in Synesthetes and matched controls.

Stimuli

- False-fonts were generated by rearranging the component parts of all 26 letters of the Roman alphabet.
- Synesthetes were pre-tested and false fonts that elicited color percepts were excluded from the study.



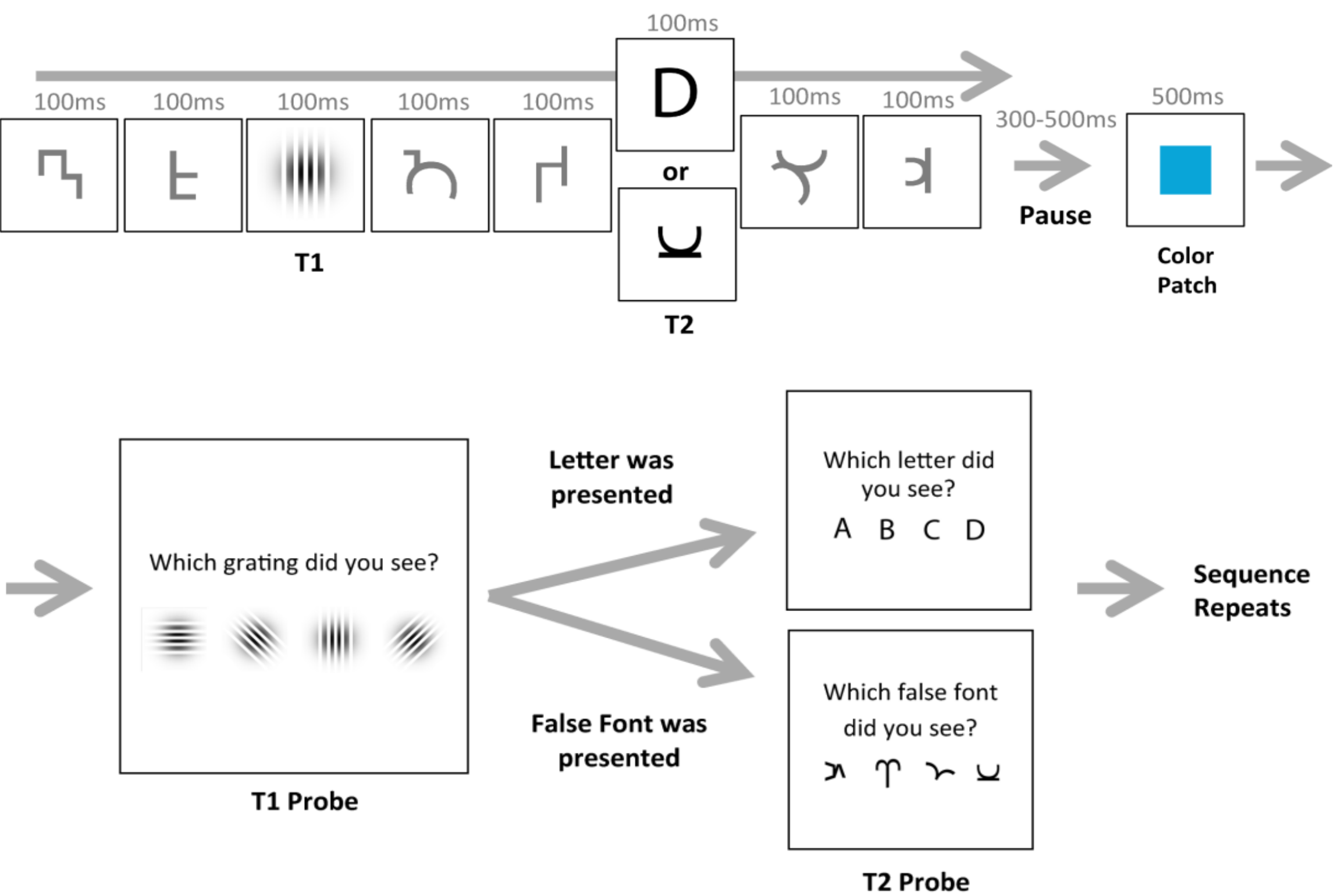
Synesthetes

Legend	
Letter Targets	
Synesthetic Associations	
False Font Targets	

Synesthete/Control #1	A E F K	False-Fonts
Synesthete/Control #2	D H R T	False-Fonts
Synesthete/Control #3	A D E S	False-Fonts
Synesthete/Control #4	C E K R	False-Fonts
Synesthete/Control #5	A F K T	False-Fonts
Synesthete/Control #6	A C G M	False-Fonts
Synesthete/Control #7	A H F S	False-Fonts
Synesthete/Control #8	A D E S	False-Fonts
Synesthete/Control #9	A D K Y	False-Fonts
Synesthete/Control #10	F H M U	False-Fonts

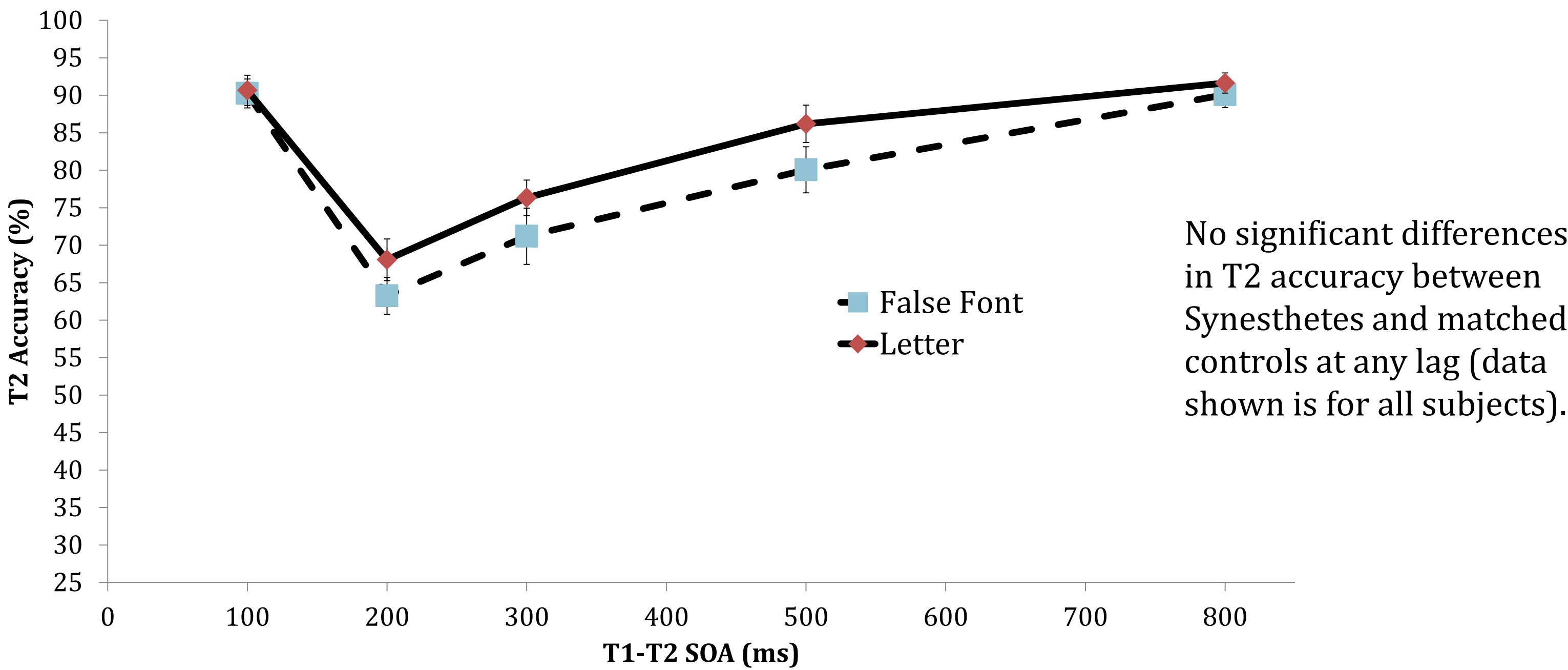
- Ten grapheme-color Synesthetes completed the Eagleman synesthesia battery [2].
- Ten control subjects were matched for age and biological sex

Methods

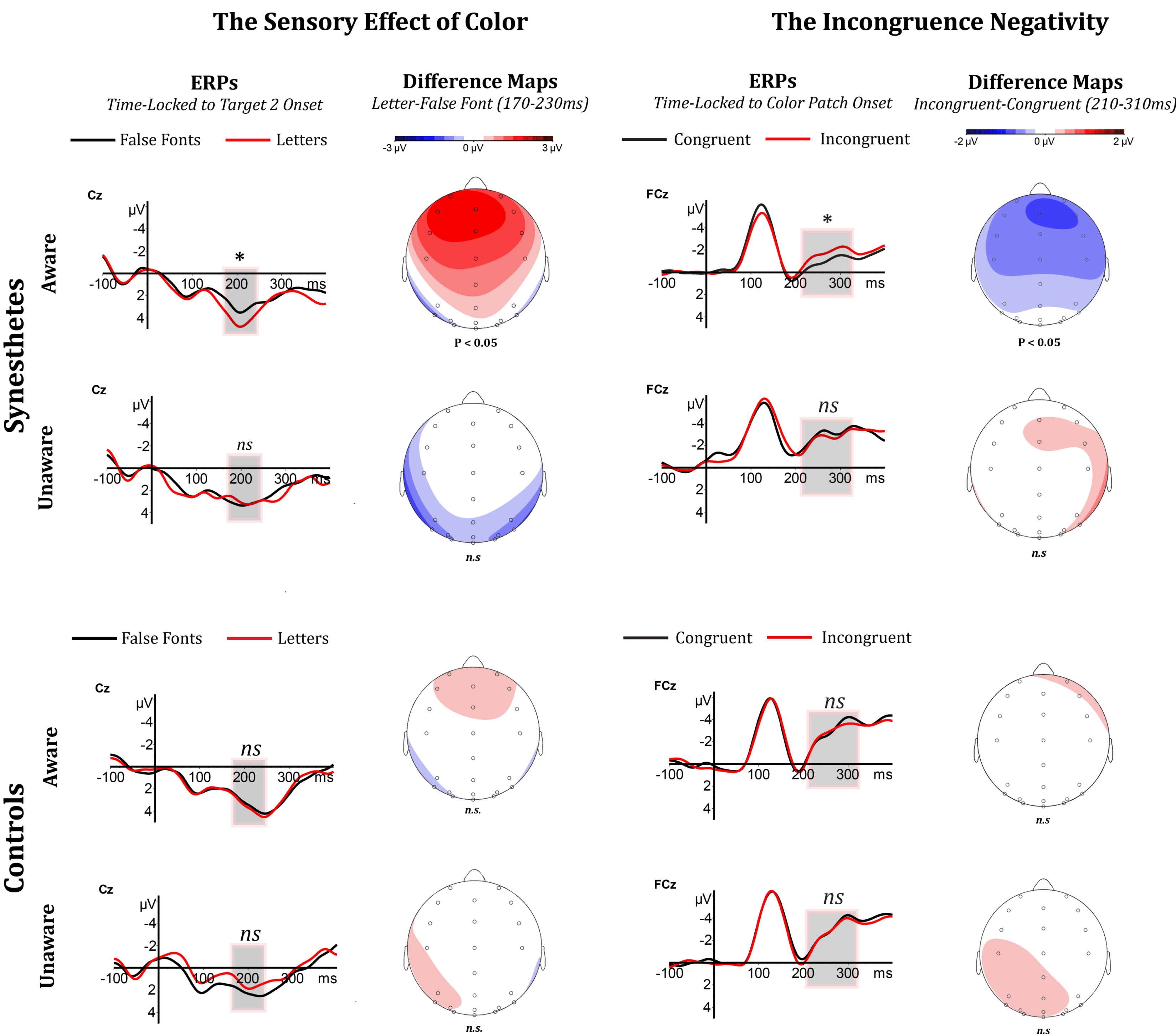


- On each trial, T2 was presented at one of 5 SOAs: Lag 1, 2, 3, 5, or 3.
- The color patch following the RSVP stream was congruent or incongruent with the color elicited by T2 for each Synesthete.

Results: Behavioral



Results: Event-Related Potentials



Summary & Conclusion

- Synesthetic color perception was uniquely indexed by 2 ERP components: the sensory effect of color & the incongruence negativity.
- Both ERP effects were absent for unseen stimuli during the attentional blink.

Synesthetic color perception appears to require attention and awareness.

- Future studies can use these ERP components as implicit markers of synesthetic color perception along with various paradigms to manipulate attention and awareness.

References

[1] Rich, Anina N., and Jason B. Mattingley. 2010. Out of sight, out of mind: The attentional blink can eliminate synaesthetic colours. *Cognition* 114:320–328.

[2] David M. Eagleman, Arielle D. Kagan, Stephanie S. Nelson, Deepak Sagaram, Anand K. Sarma. A standardized test battery for the study of Synesthesia. *Journal of Neuroscience Methods*, 2007 Jan 15;159(1):139-145..