Decoding Grapheme-Color Synesthesia using Multivariate Pattern Analysis

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Background

- Synesthesia is a condition in which stimulation of one sensory modality evokes experiences in a second, unstimulated modality.

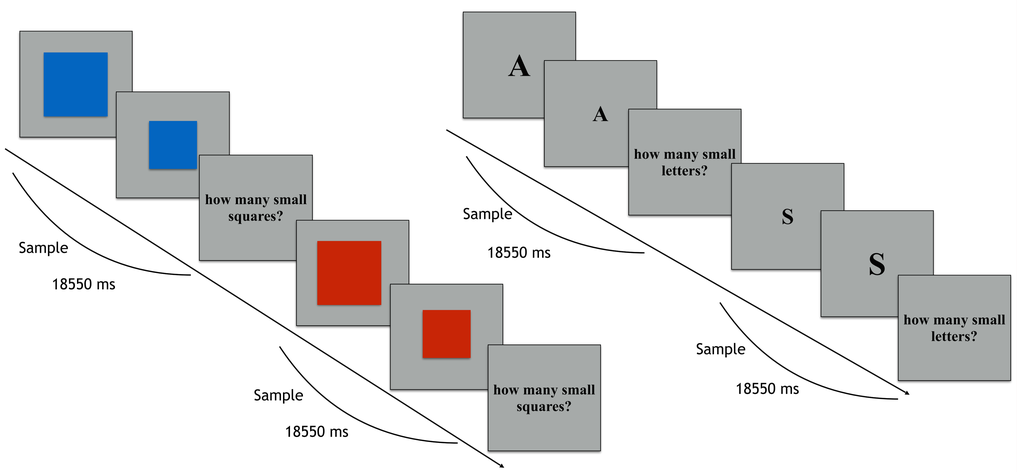
Grapheme-Color Synesthesia

SYNESTHESIA

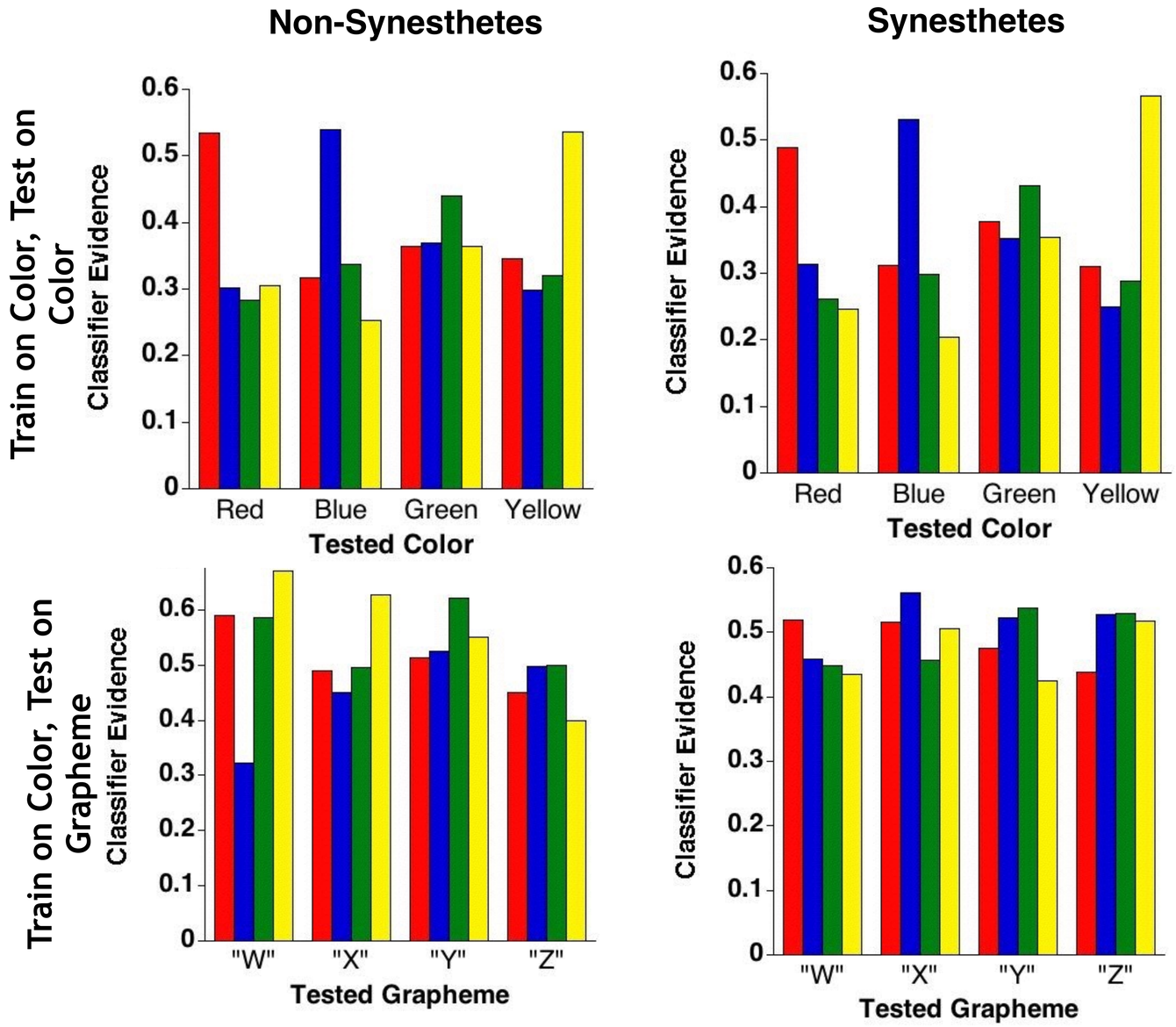
0123456789

- Is the subjective experience of synesthetic color generated by the same, or different, neural processes from those that support the perception of veridical color?

Experimental Design

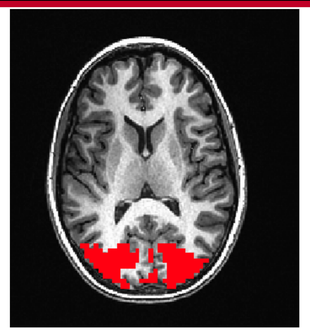


MVPA Results



Feature Selection

Top 2000 voxels responsive to color viewing:



Training Set

Red
Blue
Green
Yellow

Conclusions

- Cross-category decoding accuracy was **70%** of within-category decoding accuracy for synesthetes, vs. **28%** for non-synesthetes, suggesting that the synesthetic experience of color is, indeed, generated by the same mechanisms that support the visual perception of veridical color.
- Representational similarity analysis (RSA) will compare the “representational geometry” of synesthetically perceived color in V1, which codes color opponency, vs. V4, which codes perceptual color space.

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