

# Attention to graphemes in grapheme-color synesthesia

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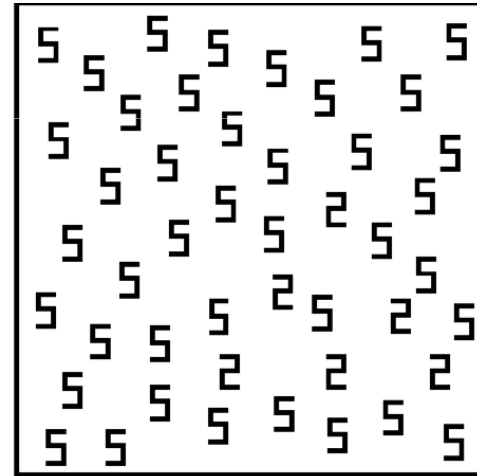
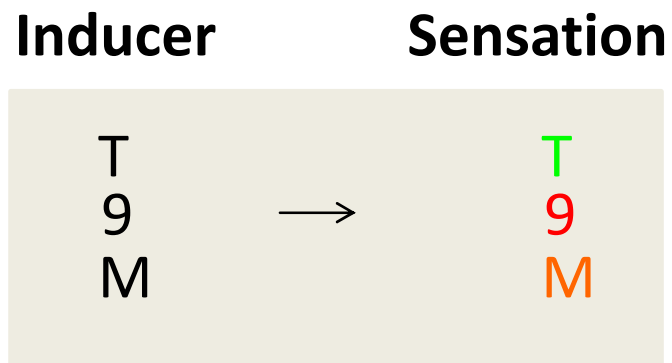
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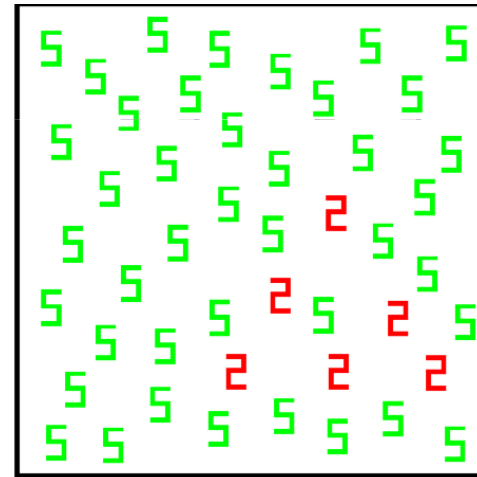
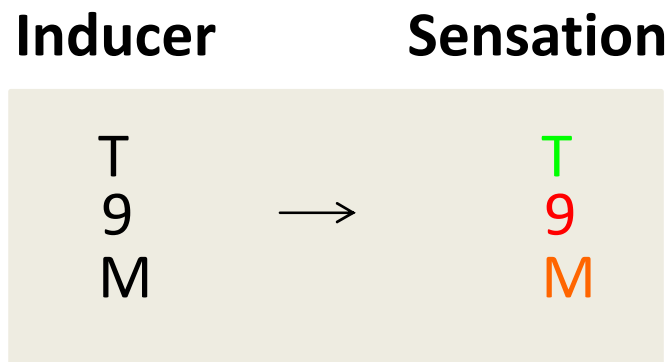
Grapheme-color synesthetes perceive objectively achromatic graphemes as colored.

Inducer		Sensation
T	→	T
9		9
M		M

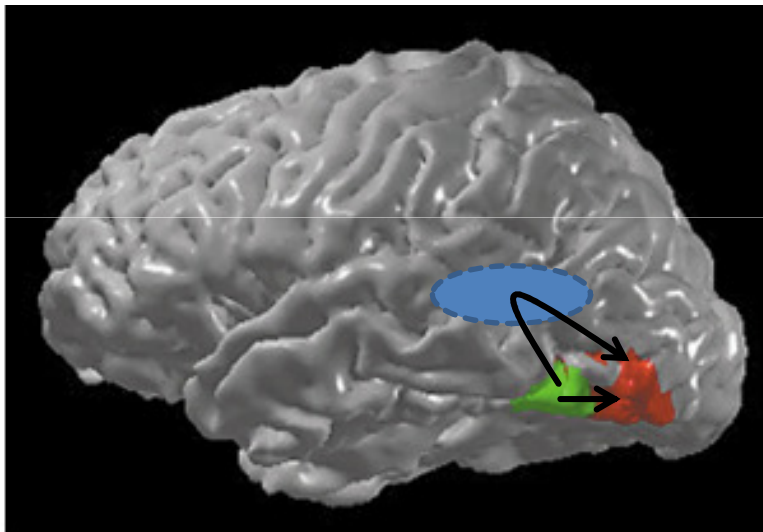
Synesthesia is a ,real' perceptual phenomenon.



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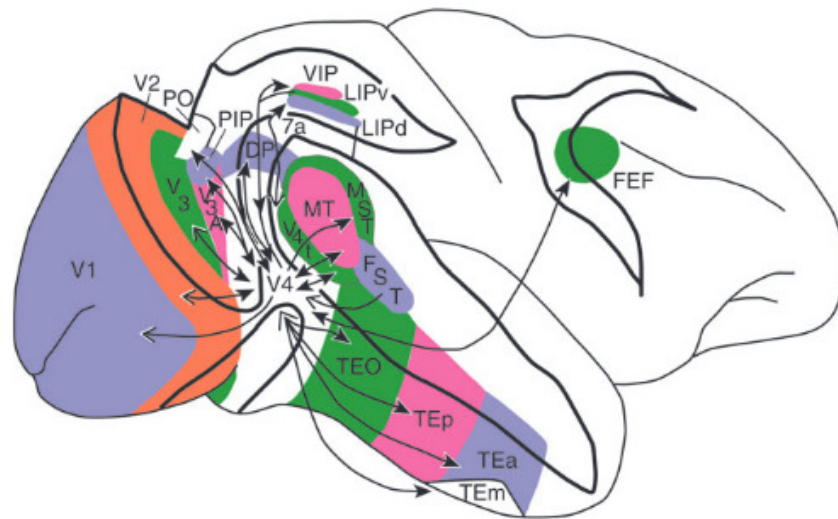
Prevailing hypotheses agree that synesthetic perception relies on ventral visual path processing (VWFA, V4).



- green: Visual Word Form Area
- red: V4
- blue: STS

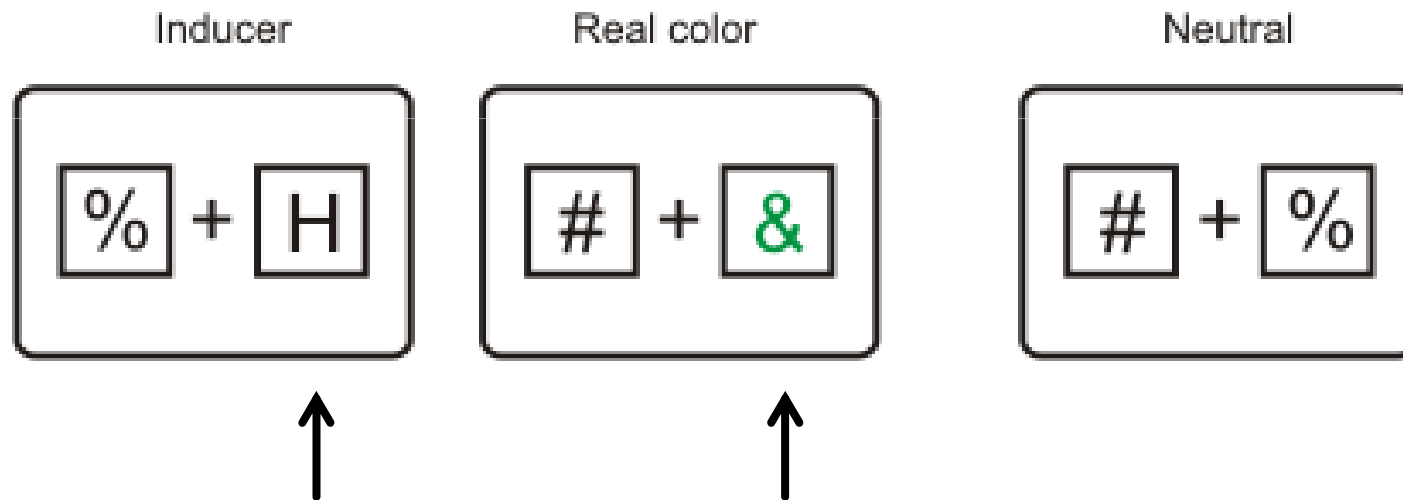
- VWFA → V4:  
increased cross-wiring  
(Hubbard et al., 2011)
- VWFA → STS → V4:  
disinhibited feedback  
(Grossenbacher & Lovelace,  
2001; cf. Volberg et al.,  
2013)

V4 is part of the ventral visual path, but also has extensive bidirectional projections into / from dorsal path structures.

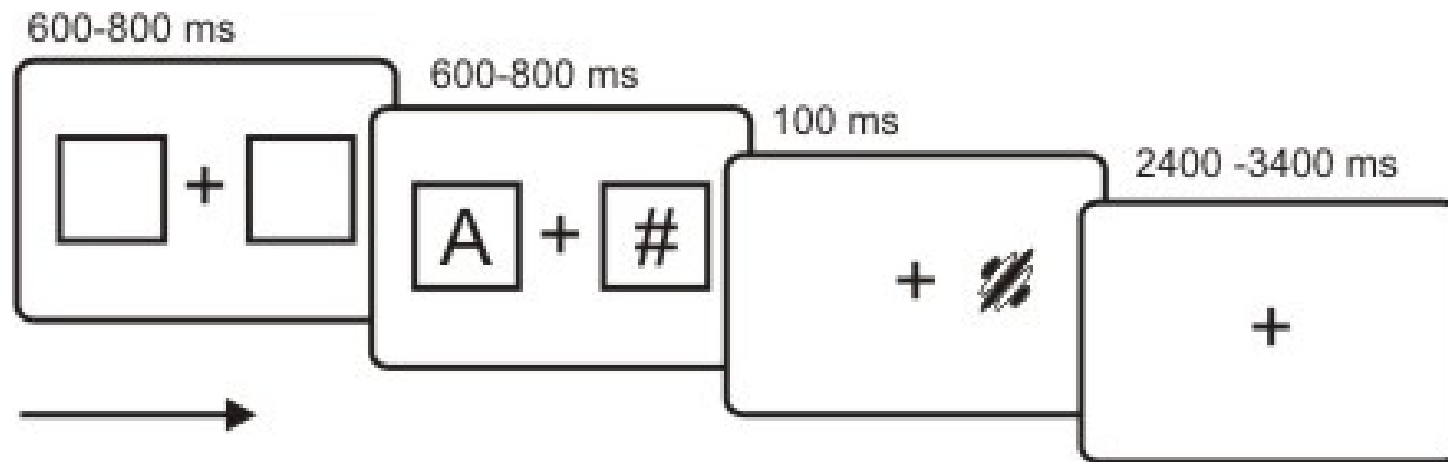


- ventral visual path („what“)
- dorsal visual path („where“)
- Aim: To investigate the role of the dorsal visual path for grapheme color synesthesia

Inducers or real-colored non-inducers were presented in the left or in the right visual hemifield (LVF/RVF).



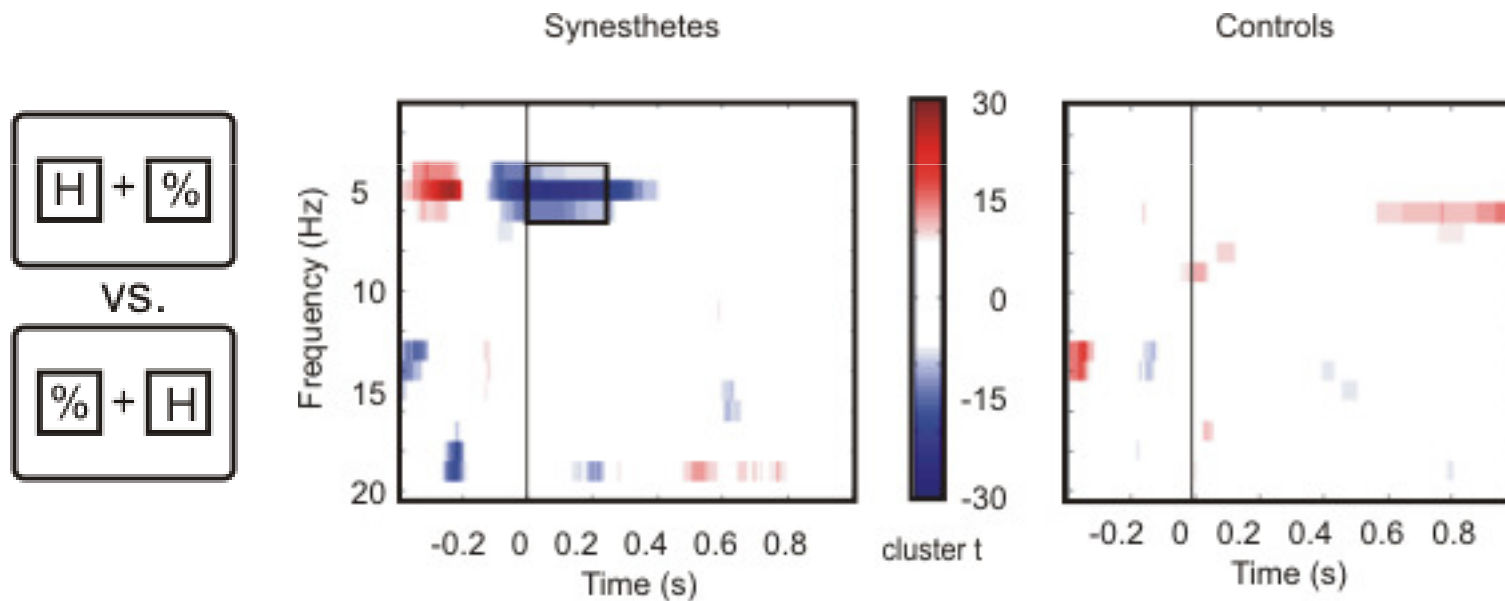
Twelve synesthetes and matched controls (10f/2m) were examined in an EEG study.



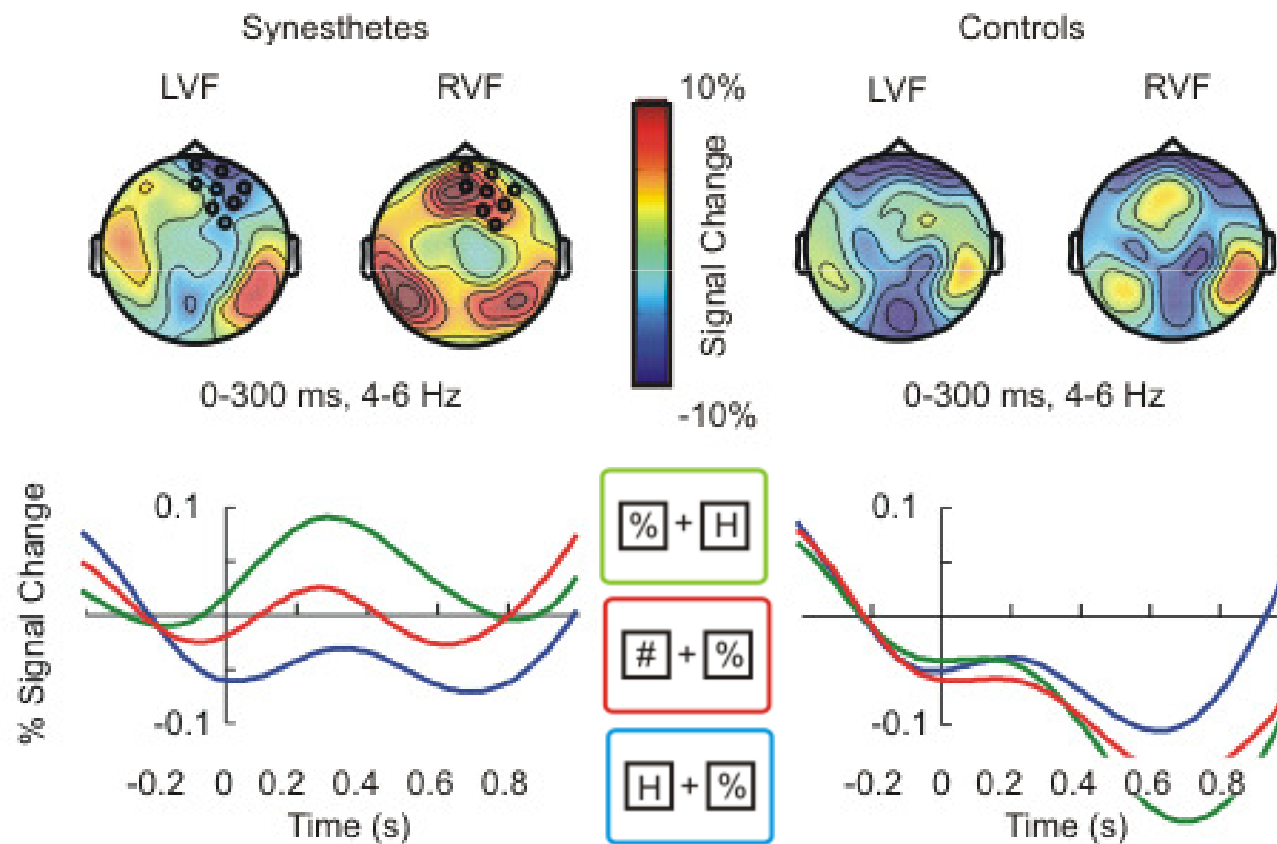
- Orientation judgement task



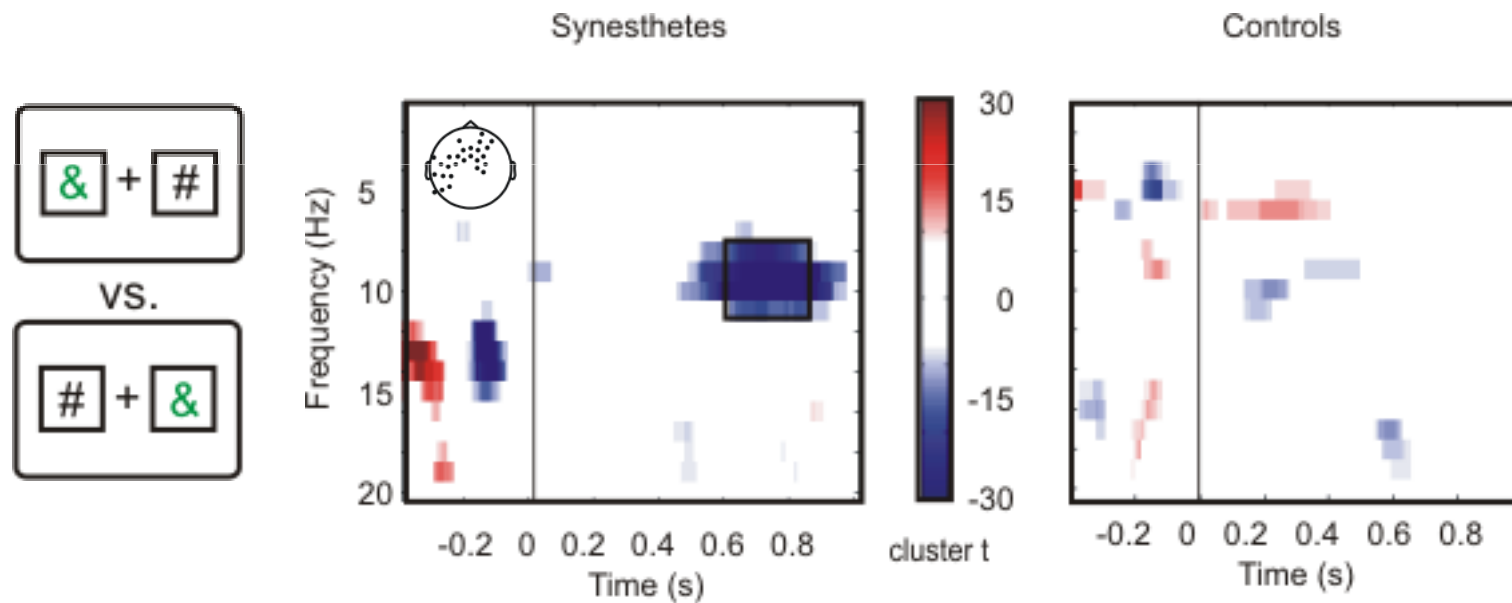
In synesthetes, but not in controls, the oscillatory brain response to inducers depended on the side of presentation (LVF / RVF).



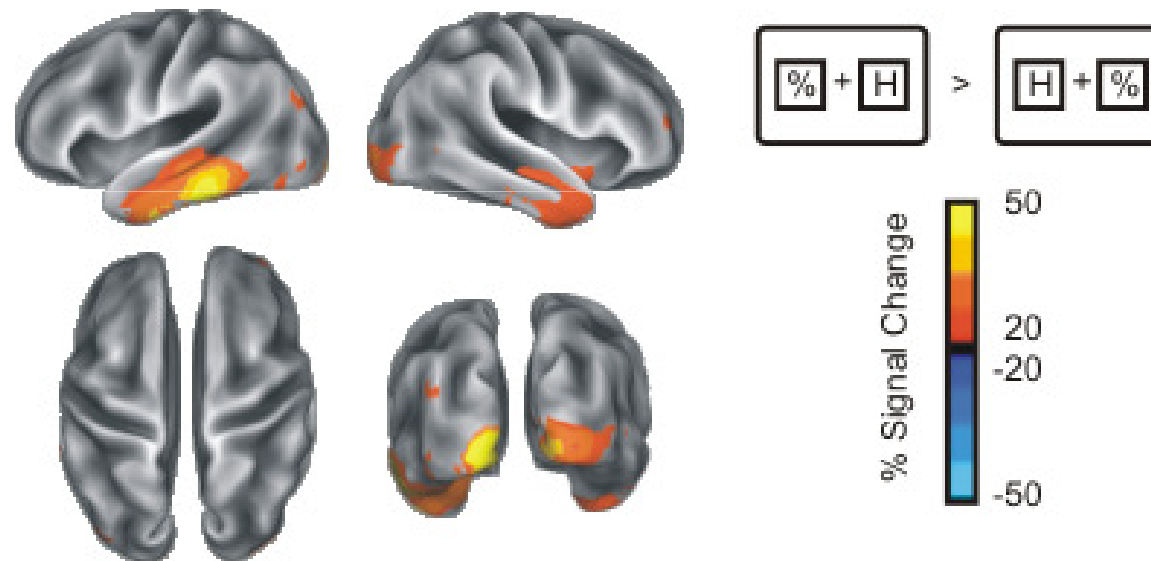
Inducers in the RVF (compared to the LVF) produced larger theta power in frontal and left temporal electrodes.



Real-colored graphemes in the LVF and RVF produced power differences at a later time point and within higher frequencies.



Sources for the theta power difference in RVF/LVF inducers were located in left inferior temporal and primary visual areas.



4-6 Hz, 0-300 ms

## Summary

- The aim was to explore dorsal path contributions to inducer processing in grapheme-color synesthesia.
- Inducers and real-colored non-inducers were presented to the LVF or RVF.
- In synesthetes, RVF compared to LVF inducers produced an early (0 - 300 ms) theta power increase within left inferior temporal and primary visual sources. Such differences did not occur in controls or for real-colored stimuli.
- Inducers are preferentially selected over non-inducers, but selection seems to rely mainly on ventral path activity within VWFA.

Volberg et al. (2013), J Cog Neurosci.

