

Linking the time course of visual feature coding to behaviour



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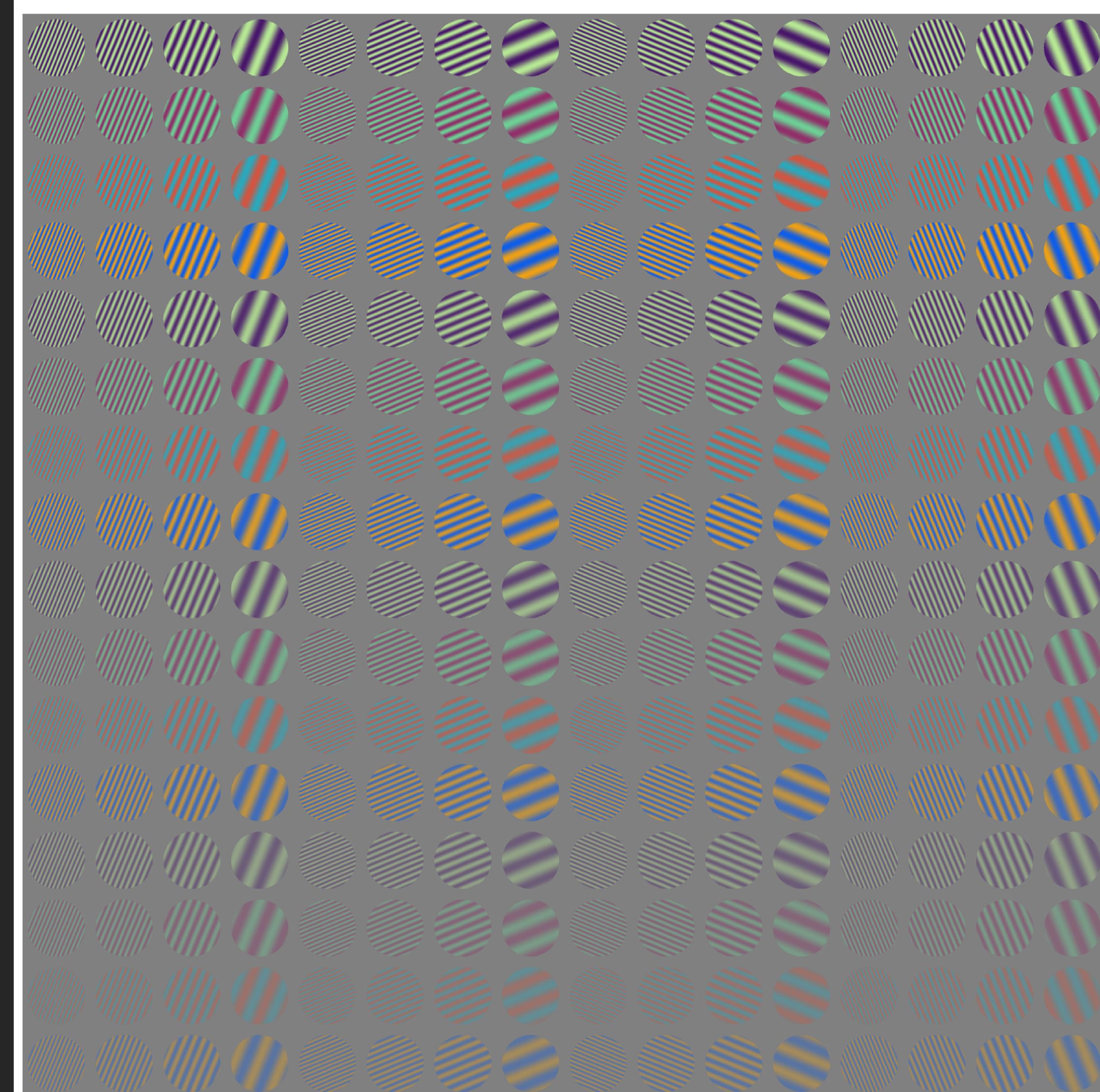
Introduction

- Early visual cortex encodes basic visual features^[1]
- Are individual features coded at the same time?^[2]
- How does encoding performance relate to behavioural judgements of similarity?^[3]

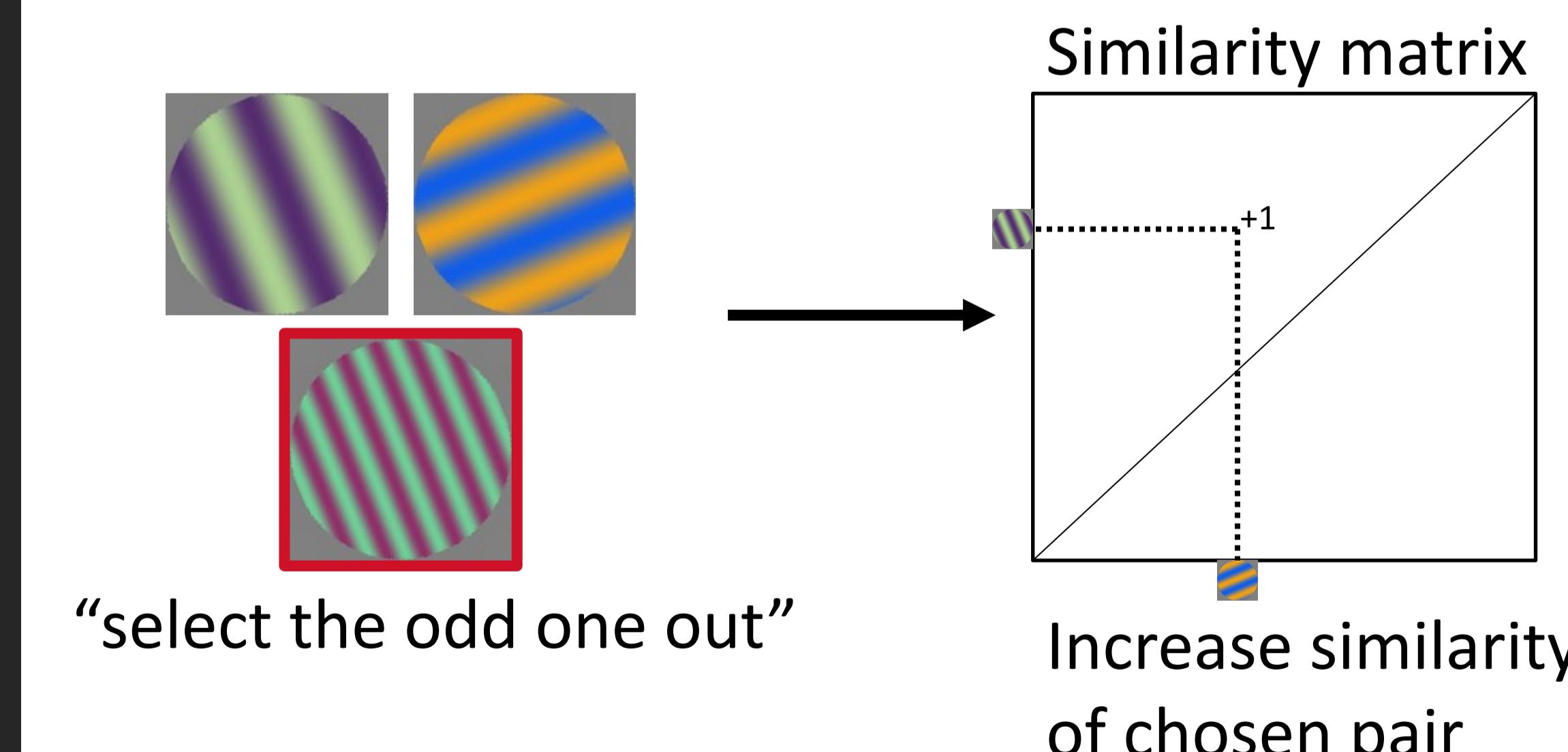
Methods

- 256 visual grating stimuli varying in:
Orientation | **spatial frequency** | **colour** | **contrast**
- Presented in **6.67Hz** and **20Hz** RSVP sequences^[4]
- 20480 epochs (40 per stimulus per condition)
- 64-channel EEG (n=16)
- Representational Similarity Analysis relating EEG to behaviour & test contribution of feature models

Stimuli



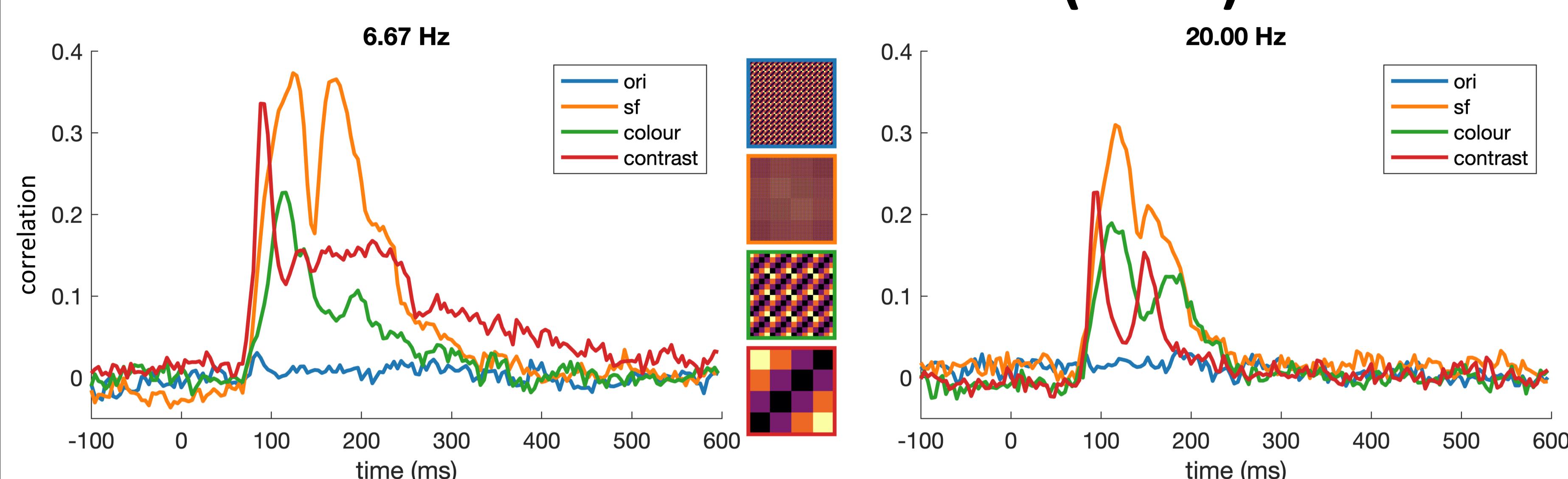
Behavioural task (online)



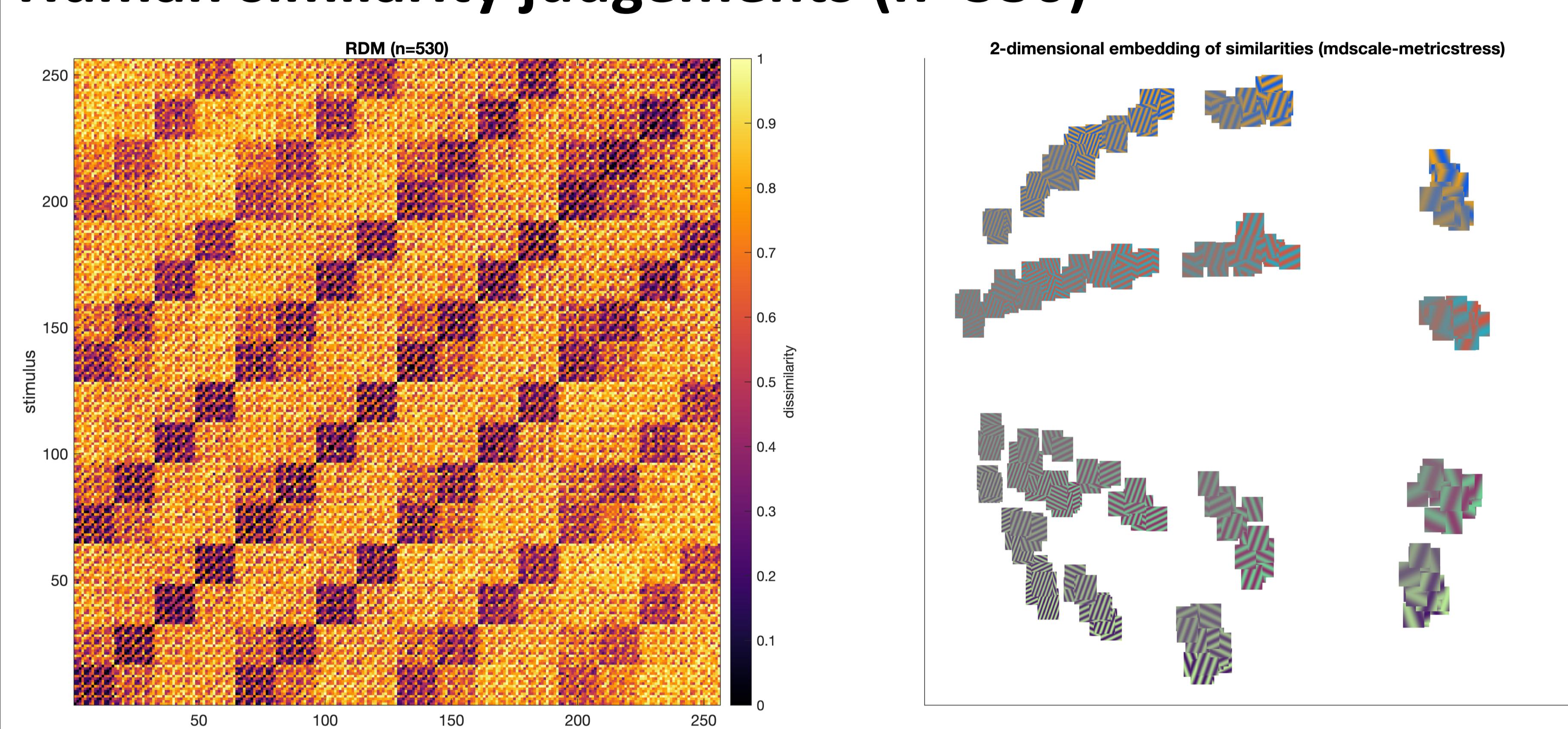
Conclusions

- Visual feature coding with different time-courses
- Human similarity ratings strong predictor of EEG
- Contributions of feature models in the EEG differs from their contribution to behaviour

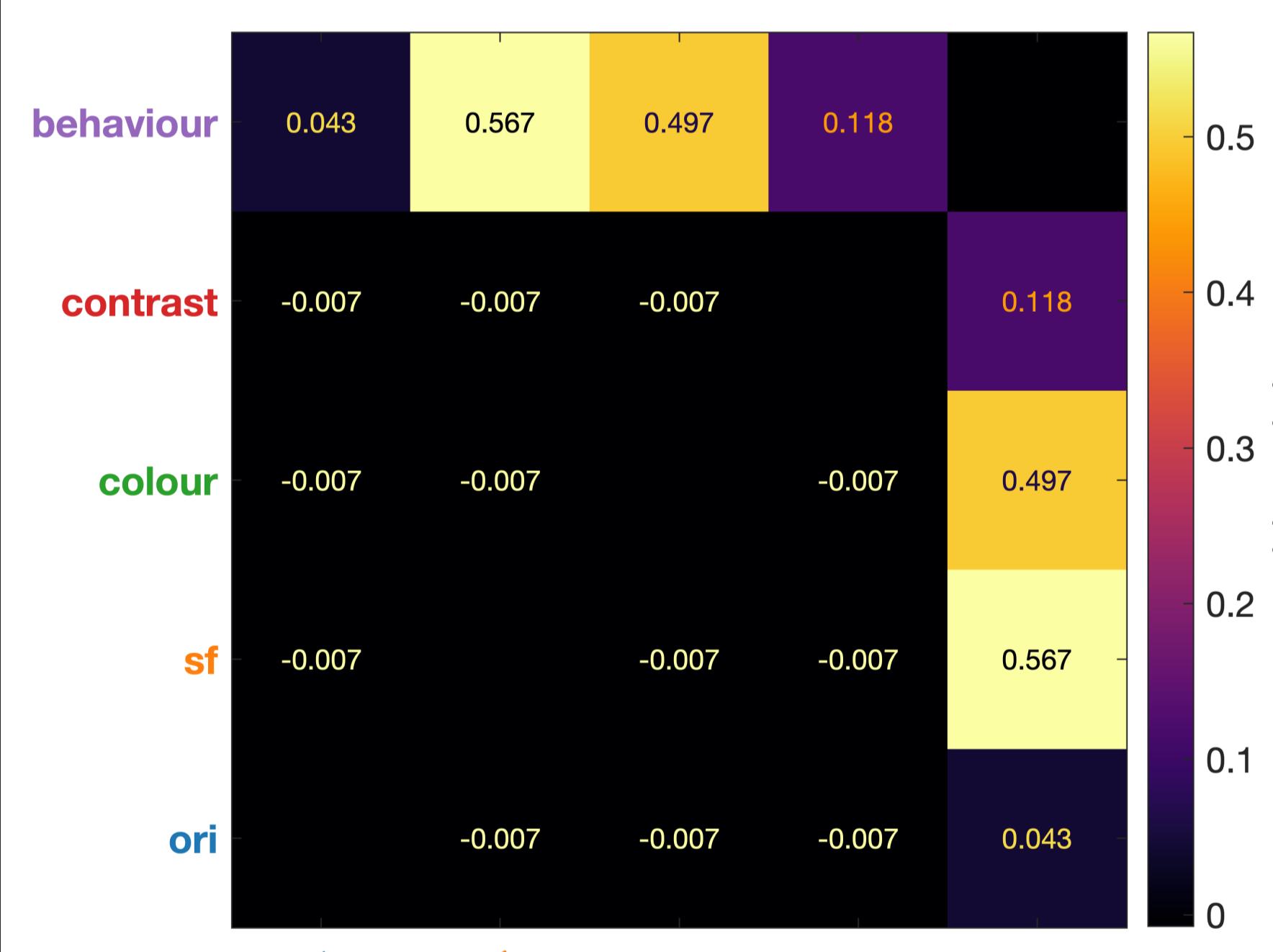
Feature model correlations with EEG (n=16)



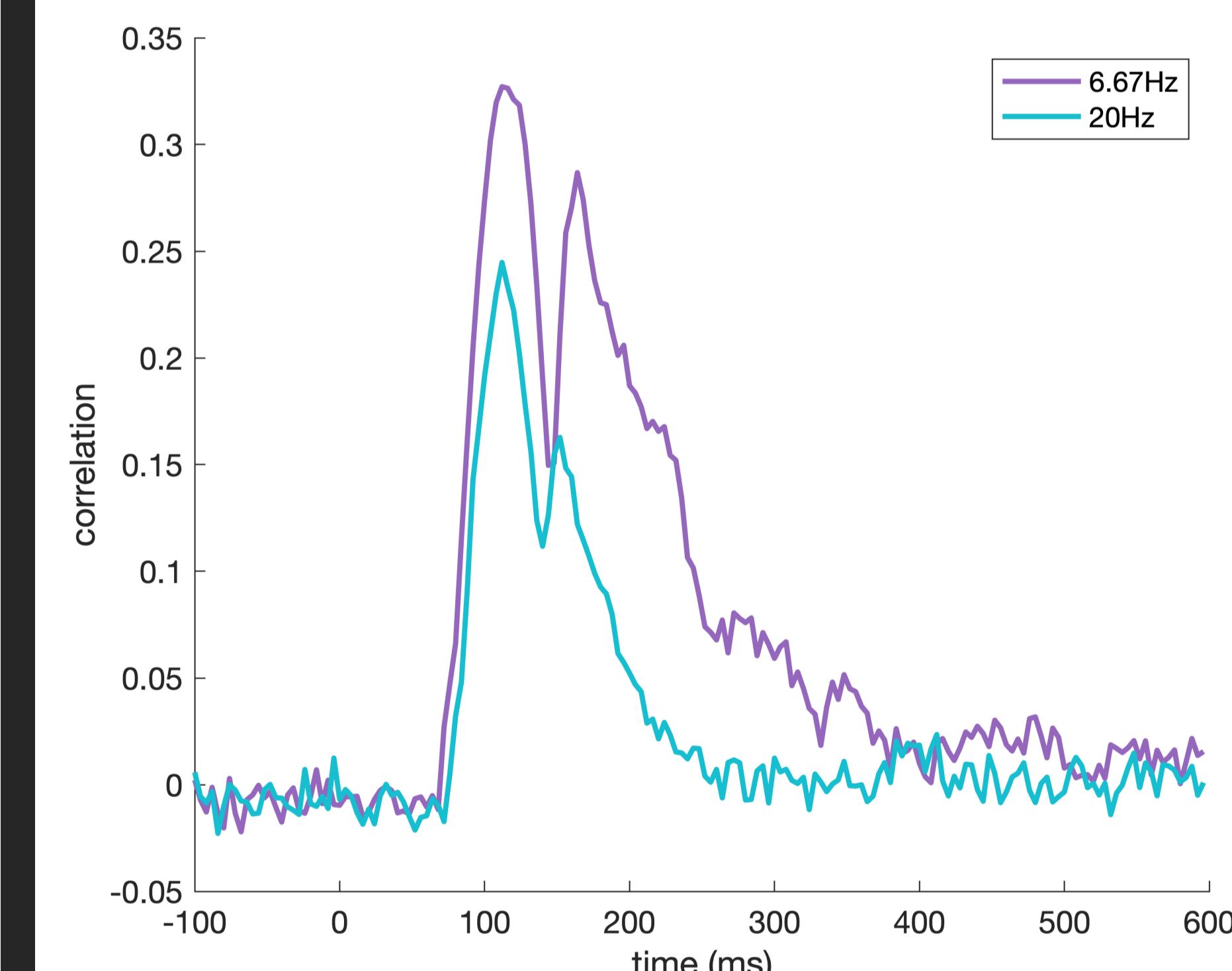
Human similarity judgements (n=530)



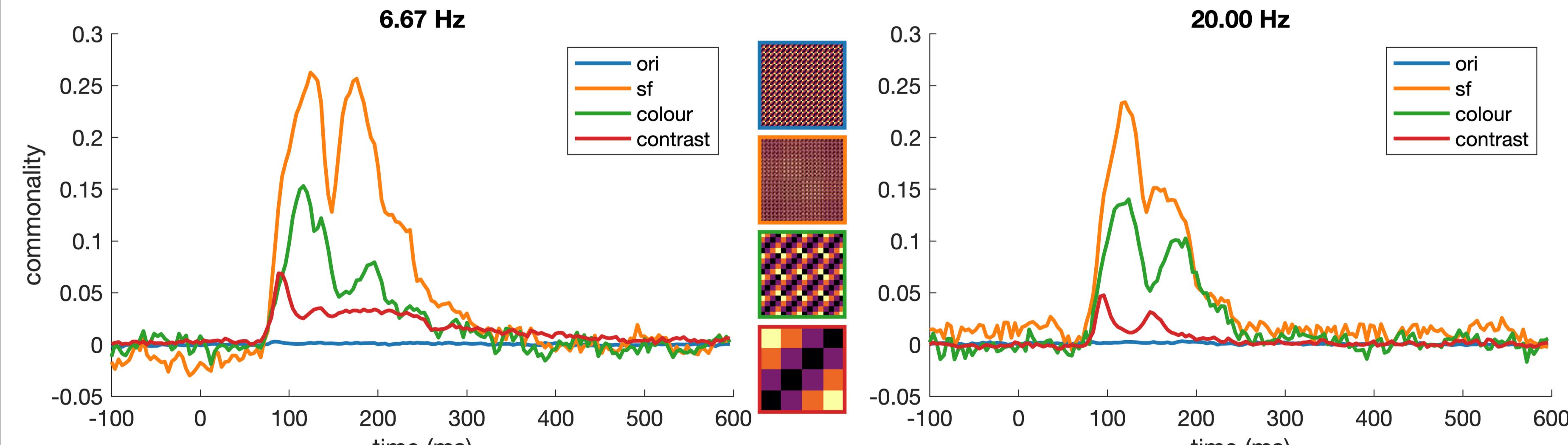
Model comparisons



EEG-behaviour correlation



Model contributions to EEG-behaviour correlation



References

1. Grill-Spector, K., Malach, R., 2004. The Human Visual Cortex. *Annual Review of Neuroscience* 27, 649–677.
2. Ramkumar, P., Jas, M., Pannasch, S., Hari, R., Parkkonen, L., 2013. Feature-Specific Information Processing Precedes Concerted Activation in Human Visual Cortex. *J. Neurosci.* 33, 7691–7699.
3. Wardle, S.G., Kriegeskorte, N., Grootswagers, T., Khaligh-Razavi, S.-M., Carlson, T.A., 2016. Perceptual similarity of visual patterns predicts dynamic neural activation patterns measured with MEG. *NeuroImage* 132, 59–70.
4. Grootswagers, T., Robinson, A.K., Carlson, T.A., 2019. The representational dynamics of visual objects in rapid serial visual processing streams. *NeuroImage* 188, 668–679.