

Evidence for a general neural signature of face familiarity

Alexia Dalski¹, Géza Gergely Ambrus², Gyula Kovács³

¹ Philipps-Universität Marburg, Department of Psychology; ² Bournemouth University, Department of Psychology; ³ Friedrich Schiller University Jena, Institute of Psychology;

Background

In this study we investigated, whether there is a neural signature that encodes the broad concept of face familiarity across

- Idiosyncratic differences
- Contexts of familiarization (in which situation do we “get to know” a new face?)
- Faces that become familiar (“who” do we get to know?)

Therefore, we reanalyzed data collected in a previously published EEG-study by Ambrus et al. [1] investigating the emergence of face familiarity. We used cross-participant and cross-experiment decoding of event-related potentials, evoked by unknown and experimentally familiarized faces from a set of experiments with different participants, stimuli, and familiarization-types. [2]

Methods

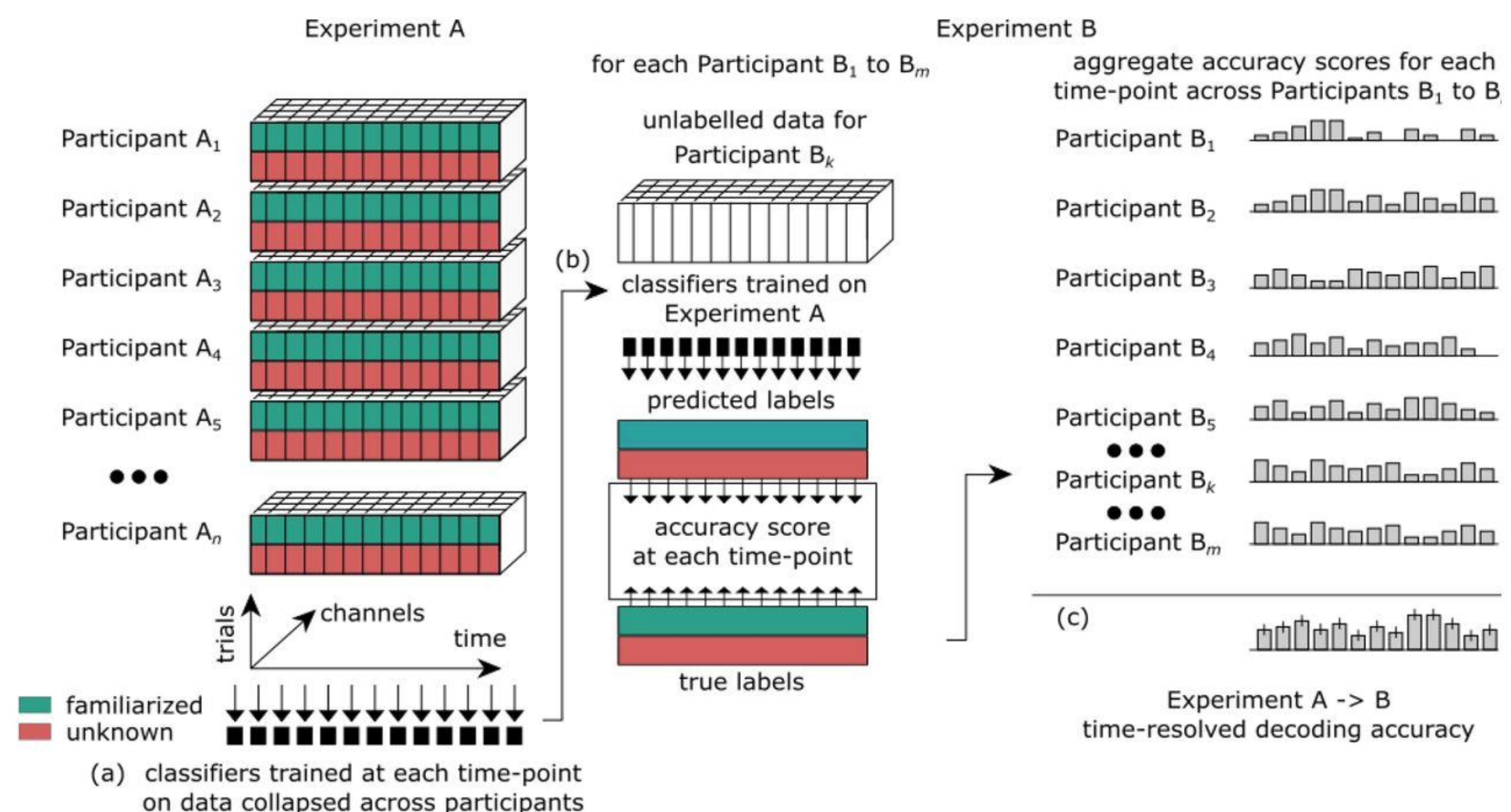
Participants were familiarized with new in faces in three different ways:

- Perceptual Experiment (N = 42): participants viewed photos of the to-be-familiarized identity
- Media Experiment (N = 24): participants viewed a Netflix series, starring the to-be-familiarized identity (around 10 h of video material)
- Personal (N = 23) : participants played on two occasions an interactive game with the to-be-familiarized identity (1h per session)

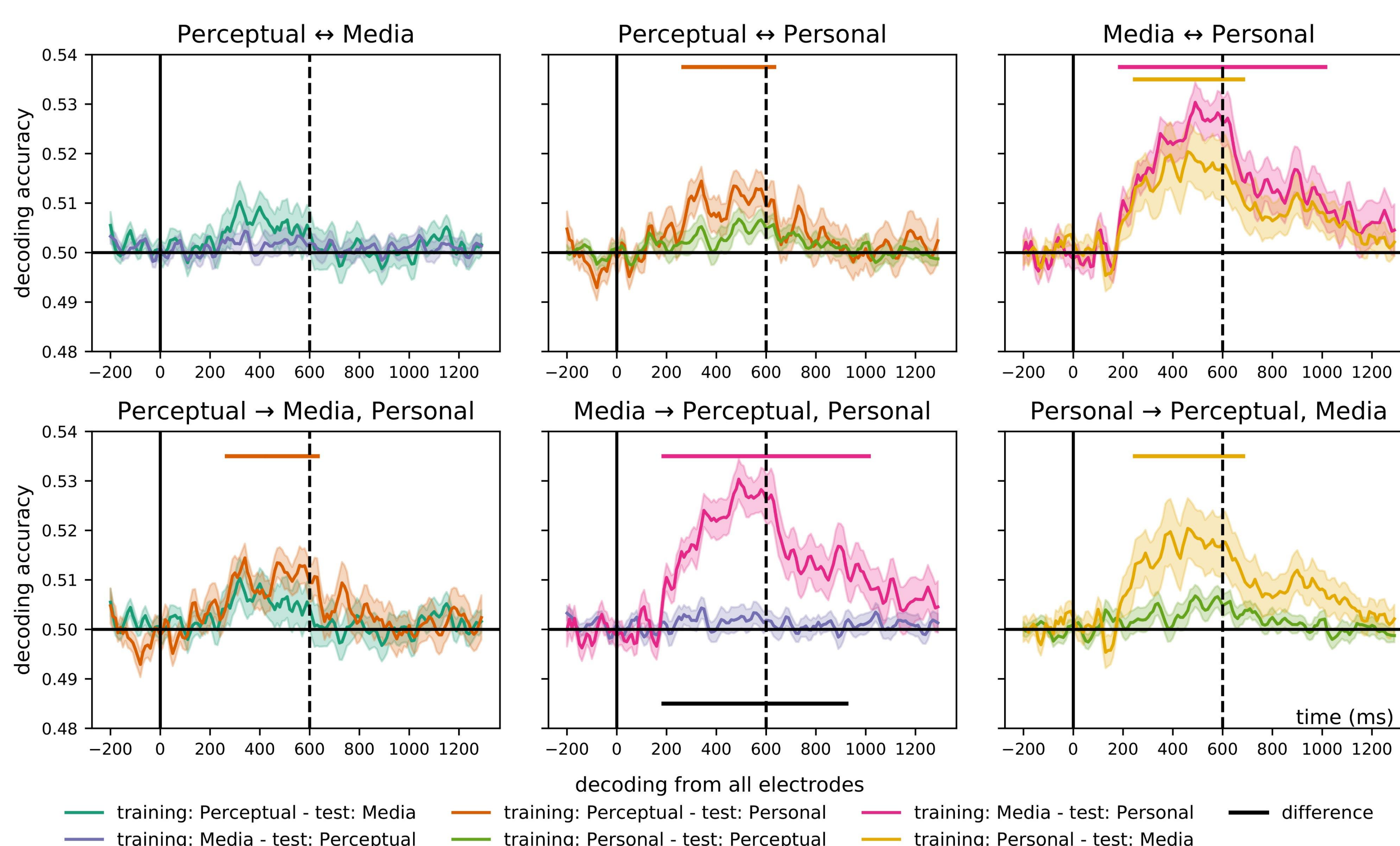
After the familiarization period the participant were shown the newly familiarized and unknown faces while their EEG was recorded (64 channels, down sampled to 100 Hz, bandpass filtered between 0.1 and 40 Hz, segmented between -200 and 1300 ms in regard to stimulus onset).

Cross-Experiment Cross-Participant Decoding:

- A Linear Discriminant Classifier was trained on data from one experiment to recognize “familiar” and “unfamiliar” neural representations, separately for each time point
- the classifier then was tested to predict for data of a different experiment (different familiarization context, participants and target identities) whether the participants saw a familiar or unfamiliar face
- The classification accuracies were averaged across participants for each single time point
- High classification accuracies indicates the presence of shared information regarding face familiarity



Results



Overview over classifier performances:

- significant cross-experiment familiarity decoding involving all three experiments, predominantly over posterior and central regions of the right hemisphere in the 270 – 630 ms time window
- shared face familiarity effect was most prominent between the Media and Personal, as well as between the Perceptual and Personal experiments
- Effects predominantly found over posterior and central regions of the right hemisphere

We observed a significant cross-experiment familiarity decoding involving all three experiments, making this signal a strong candidate for a general neural indicator of face familiarity, independent of familiarization methods and stimuli. Furthermore, we found a sustained pattern of temporal generalization suggesting a single automatic processing cascade that is maintained over time.

References:

1. Ambrus et al. (2021) J Neurosci. DOI: 10.1523/JNEUROSCI.2466-20.2021
2. King et al. (2014) Trends Cogn DOI: 10.1016/j.tics.2014.01.002