# Temporal dynamics of facial identity and expression processing from magnetoencephalography

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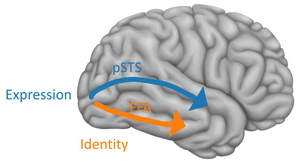
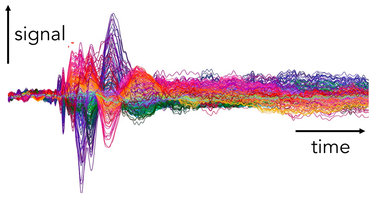
## Background

- Facial identity and expression may be processed by distinct neural pathways




- fMRI has shown us where, magnetoencephalography (MEG) can tell us when

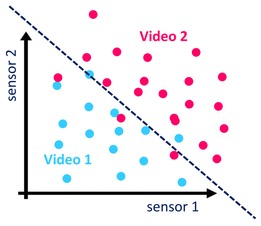



What is the time course of facial identity and expression processing in the brain?

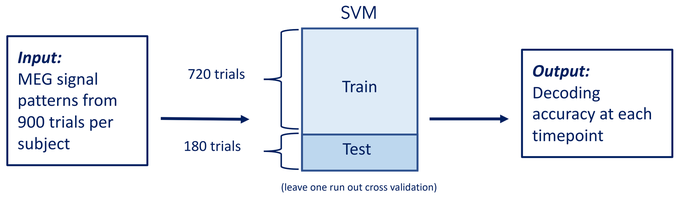
## Methods

*Stimuli*


*Machine Learning Model:* linear SVM



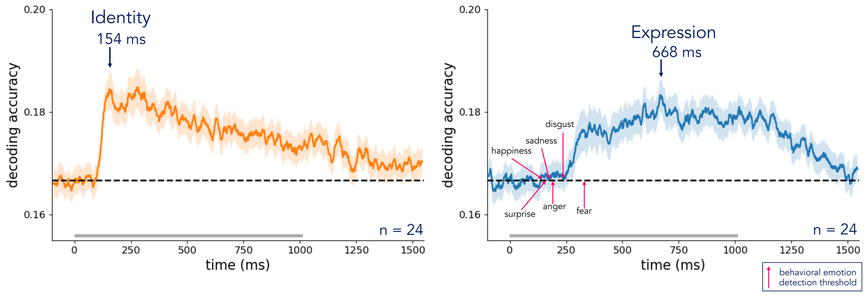

- Dynamic one second face videos from KDEF-dyn
- 6 identities x 6 expressions
- Task: look for target videos with unnatural motion



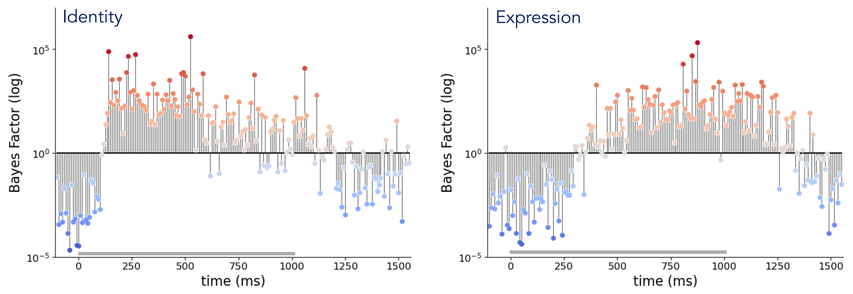

Which of the six identities was presented?
*or*
Which of the six expressions was presented?

## Classification Analysis

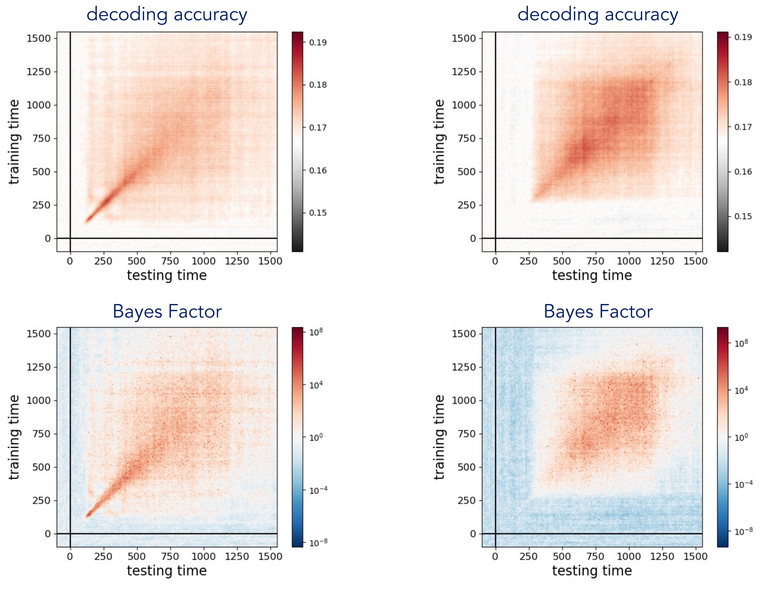
### Identity decoding peaks earlier than Expression




### Bayes factors show evidence for above-chance decoding

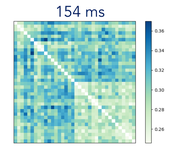


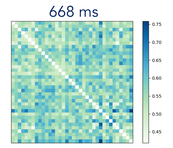

### Temporal generalization shows more stability for expression representation over time




## Representational Similarity

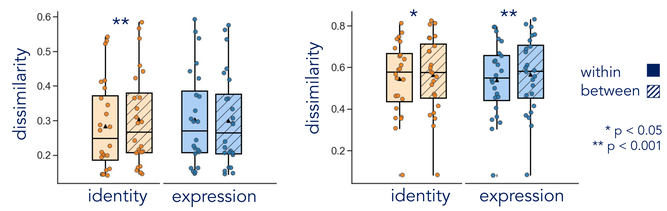
Dissimilarity of MEG signal patterns for each pair of stimuli



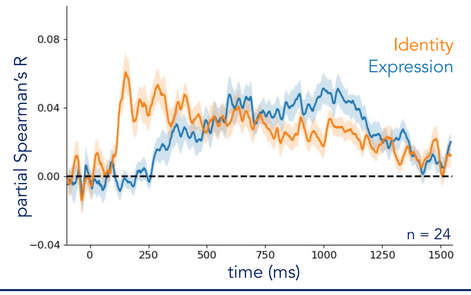

Greater dissimilarity between than within identity at 154 ms

Greater dissimilarity between than within identity and expression at 668 ms




Correlation between dissimilarity matrix and model matrix


Correlation with identity model peaks earlier than expression model




## Conclusions

- Identity processing occurs shortly after stimulus onset.
- Expression processing occurs later and evolves as the expression unfolds dynamically (peaking more than 400 ms after explicit detection).

### *Future work:*

- Source reconstruction to identify brain regions that mediate identity and expression processing
- Compare time course of processing between controls and prosopagnosics

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