Introduction

- Different brain regions and time-windows have been implicated in face processing [1]. Here we investigated the spatiotemporal nature of face processing using multimodal machine learning modelling implemented in the third version of the “Pattern Recognition for Neuroimaging ToolBox” (PRoNTo v3.0) [2].
- Data from different imaging techniques with both high spatial (fMRI) and temporal (EEG and MEG) resolution were combined in the models.
- Multiple Kernel Learning (MKL) classification models [3] were used to learn the contribution of different brain regions and time-windows to discriminate between faces (famous or unfamiliar) vs. non-faces stimuli, providing information about the overall spatiotemporal pattern involved in face processing.

Methods

Dataset: publicly available multimodal dataset [4] containing EEG, MEG and fMRI neuroimaging data from 16 healthy participants (7 women, mean age = 26.37 years).

Task: perceptual task with images of famous and unfamiliar faces, and scrambled stimuli [4].

Pre-processing: Data were pre-processed using SPM12 software as in Henson et al. [5].

Models: two MKL models were implemented in PRoNTo v3.0 [2]. Model 1 was trained to discriminate between spatiotemporal patterns of brain activation to unfamiliar faces vs. scrambled stimuli and Model 2 to discriminate between spatiotemporal patterns of brain activation to famous faces vs. scrambled stimuli.

Results

MKL classification model 1: unfamiliar faces versus scrambled Balance accuracy: 81.25% (p < 0.001); ROC/AUC: 0.89

MKL classification model 2: famous faces versus scrambled Balance accuracy: 96.88% (p < 0.001); ROC/AUC: 0.95

Conclusions

- Faces’ familiarity plays a role in the discriminability between spatiotemporal patterns of brain activity to faces versus non-faces stimuli.
- Processing famous faces may involve the activation of multiple brain regions in parallel.
- Processing famous and unfamiliar faces may involve similar but yet different networks and dynamics.
- The multimodal machine-learning framework applied here provides a new approach to uncover fine-grained characterization of the spatiotemporal dynamics underlying face processing.

References


Acknowledgements

Department of Computer Science: www.ucl.ac.uk/computer-science/
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A video related to this Poster can be found in: https://www.dropbox.com/sb/tquqg7700vgaj63/AAB-81PVRShHag7r7/8509GqI+&dl=0