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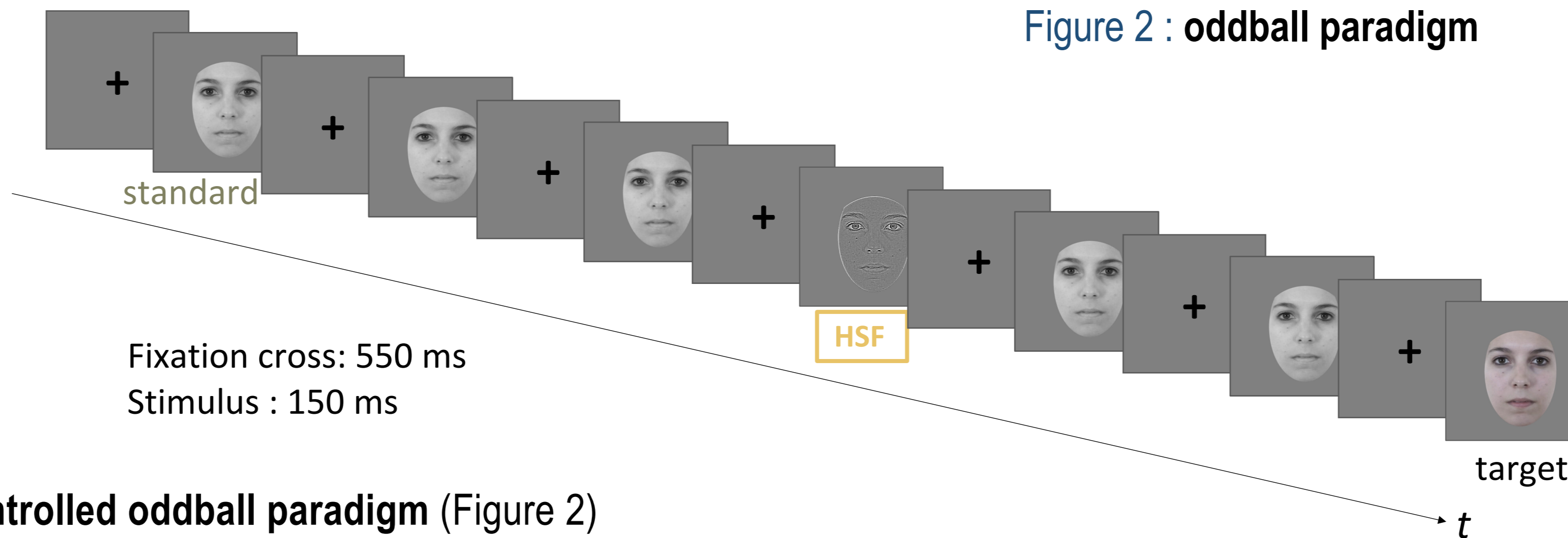
SEX DIFFERENCES IN ATYPICAL PREDICTIVE PROCESSES FROM LOW SPATIAL FREQUENCIES: Evidence from mismatch responses to filtered faces in autism

Adeline Lacroix^a, Martial Mermillod^a, Sylvain Harquel^b, Marta Garrido^{c,d}, Leonardo Barbosa^{a,e}, Laurent Vercueil^a, David Alleysson^a, Frédéric Duthéil^f, Klara Kovarski^{g,h} and Marie Gomotⁱ

1 INTRODUCTION

- Fast visual recognition in non-autistic (NA) adults relies on coarse information conveyed by Low Spatial Frequencies (LSF), which possibly trigger predictions (Figure 1)¹.
- Atypical predictive processes have been suggested in autistic individuals². In visual perception, this might be linked to their bias toward local information³ conveyed by High Spatial Frequencies (HSF), which might reduce predictions and thus impair facial processing.

2 METHOD



- Controlled oddball paradigm** (Figure 2)
- EEG**, 96 channels
- Investigation of the mismatch response (**MMR**) to spatially filtered faces (deviants in **HSF** or **LSF**) during a stream of a repeated unfiltered face (**standard**).
- Participants: **41 autistic adults (20 females)** and **48 NA adults (24 females)**, matched on age (Mean age = 30 ± 8) and IQ (mean Full Scale IQ = 118 ± 12)

4 DISCUSSION

- Confirmation of the predictive role of LSF during face processing in NA individuals
- Atypical predictive mechanisms from LSF during face processing in autistic individuals.
- Intermediate neurophysiological phenotype of autistic females during face prediction, who present both characteristics of autistic males and of NA females.

→ Better face processing in autistic females might be related to less atypical neurophysiological response to faces.

→ Longitudinal studies are required to determine if differences are inherited or due to compensation mechanisms.

→ A better understanding of autism heterogeneity is needed to better specify sex differences.

3 RESULTS

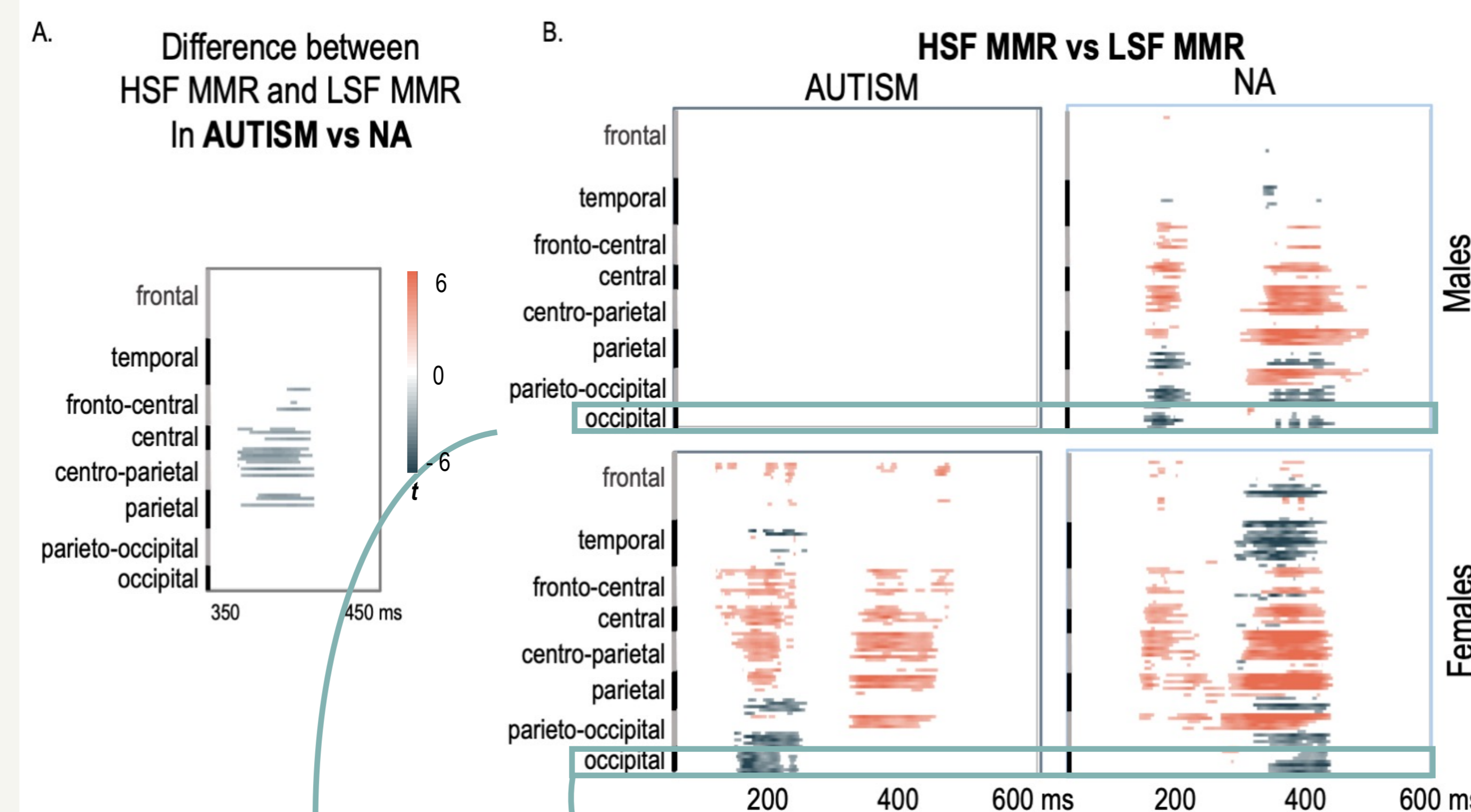


Figure 3. Cluster statistics.

- Mismatch to HSF (HSF MMR) > mismatch to LSF (LSF MMR) => reduced in autism (A) between 367 to 411 ms.
- Intact early MMR in autistic females contrary to autistic males (B).

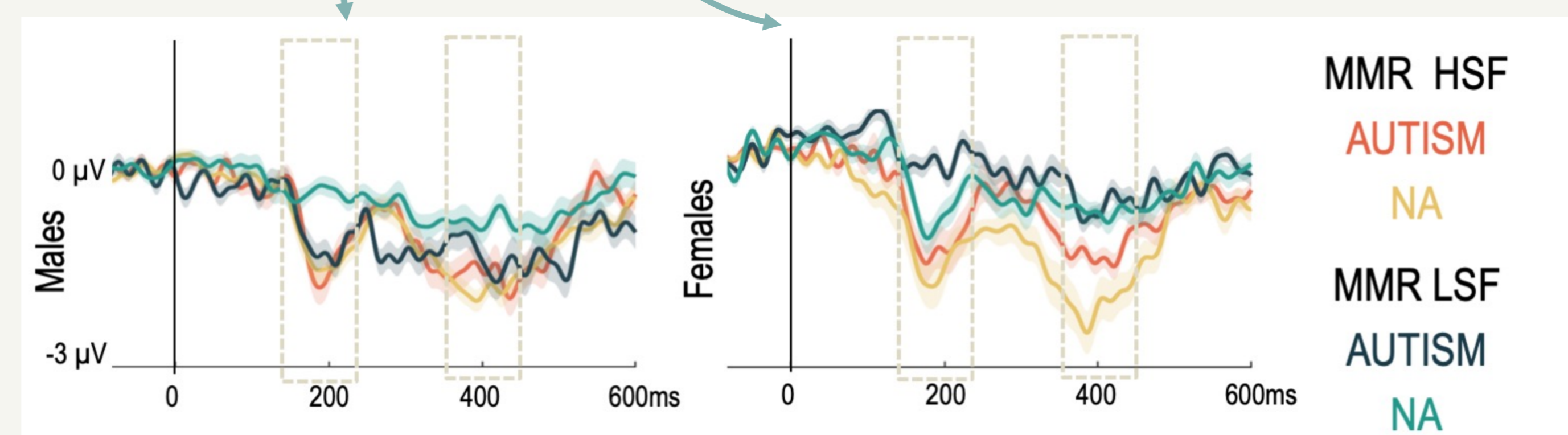


Figure 4. MMR waveforms on P9 electrode.

- In 130 – 230 ms : HSF MMR > LSF MMR in NA males, NA females and autistic females
- In 350 – 450 ms : HSF MMR > LSF MMR in NA males and NA females only.

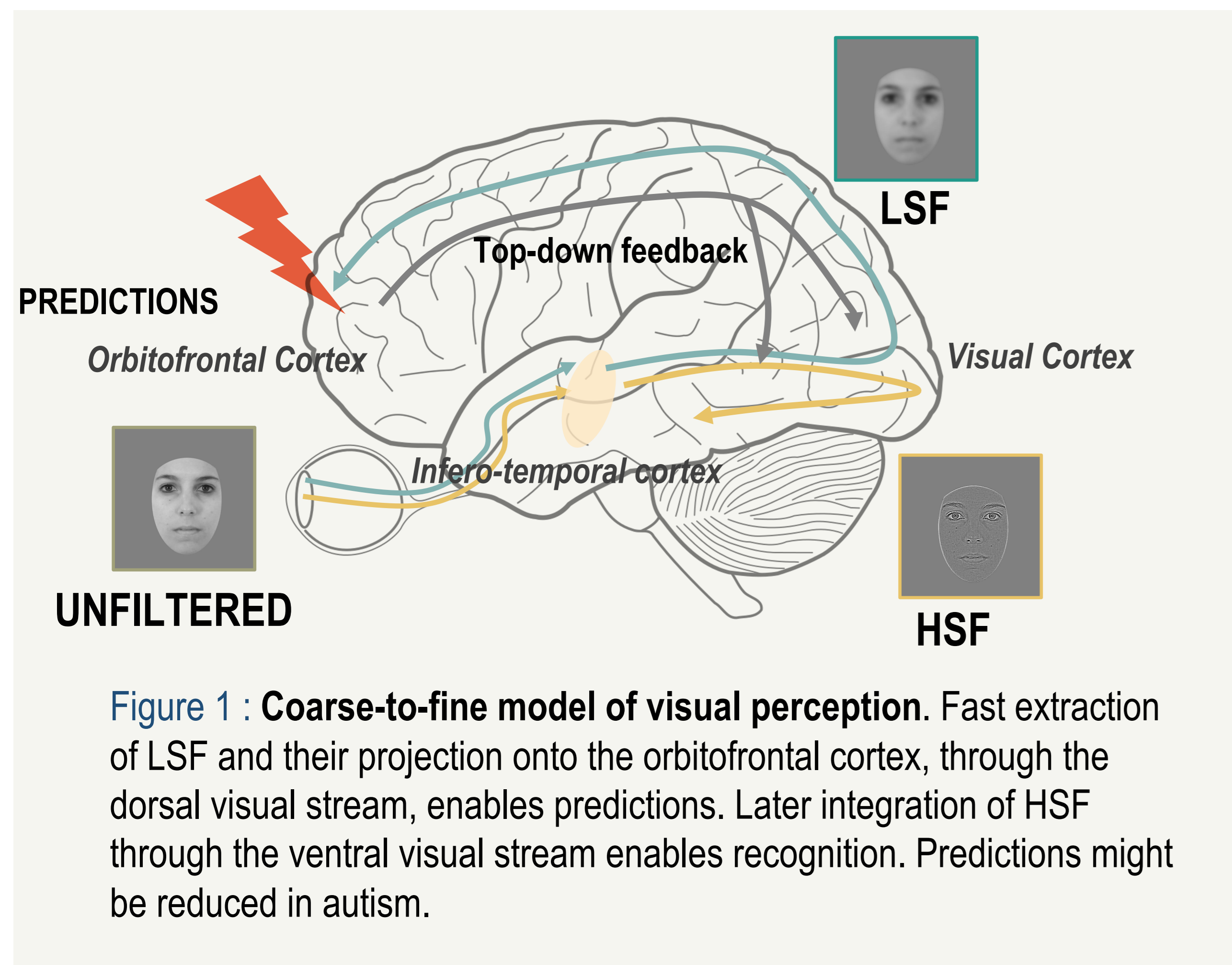


Figure 1 : **Coarse-to-fine model of visual perception.** Fast extraction of LSF and their projection onto the orbitofrontal cortex, through the dorsal visual stream, enables predictions. Later integration of HSF through the ventral visual stream enables recognition. Predictions might be reduced in autism.

- Meanwhile, recent research suggests better social abilities in autistic females⁴. More specifically, they differ from males in face processing. This could indicate less atypical neurophysiological response during face processing, with better predictive mechanisms.

Hypotheses :

- Reduced predictive processes from LSF during face processing in autistic adults compared to NA.
- Intermediate neurophysiological phenotype of autistic females during face processing, situated between autistic males and NA females.

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