

Relationship specific encoding of social touch in the somatosensory cortices

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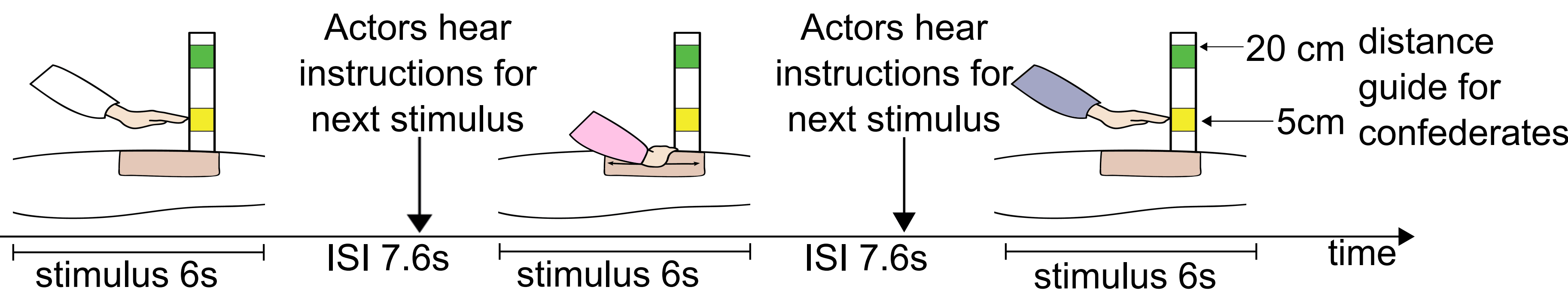
Introduction

- ” Social touch is an important form of affective communication.
- ” Patterns of social touch depend on the relationship between toucher and the person being touched and adults have implicit topographies which guide where different members of social network are allowed to touch (Suvilehto et al. 2015, Jourard 1996).
- ” It remains unresolved how the brain represents the relationship-specific aspects of social touching.

Methods

- ” 19 subjects (10 male) from 10 heterosexual couples. Haemodynamic brain activity was measured using at fMRI 3 T (MAGNETOM Skyra 3.0 T & 32-channel receive head coil, Siemens, Erlangen). EPI sequence, TR 1.52 s, TE 30 ms, flip angle 70°, 72 × 72 matrix, 2.7 × 2.7 mm² in-plane resolution, 35 slices (3.7 mm thickness, no gap). 2150 volumes were acquired in 5 runs. 1-mm isotropic MP-RAGE for anatomical reference.
- ” During the fMRI scan three assistants (subject's partner and same and opposite sex researchers), took turns in 1) touching the subject's upper thigh, or 2) bringing their hand to close (5cm) or 3) moderate (20cm) proximity from the subject's thigh (see Fig 1).

1. Experimental design



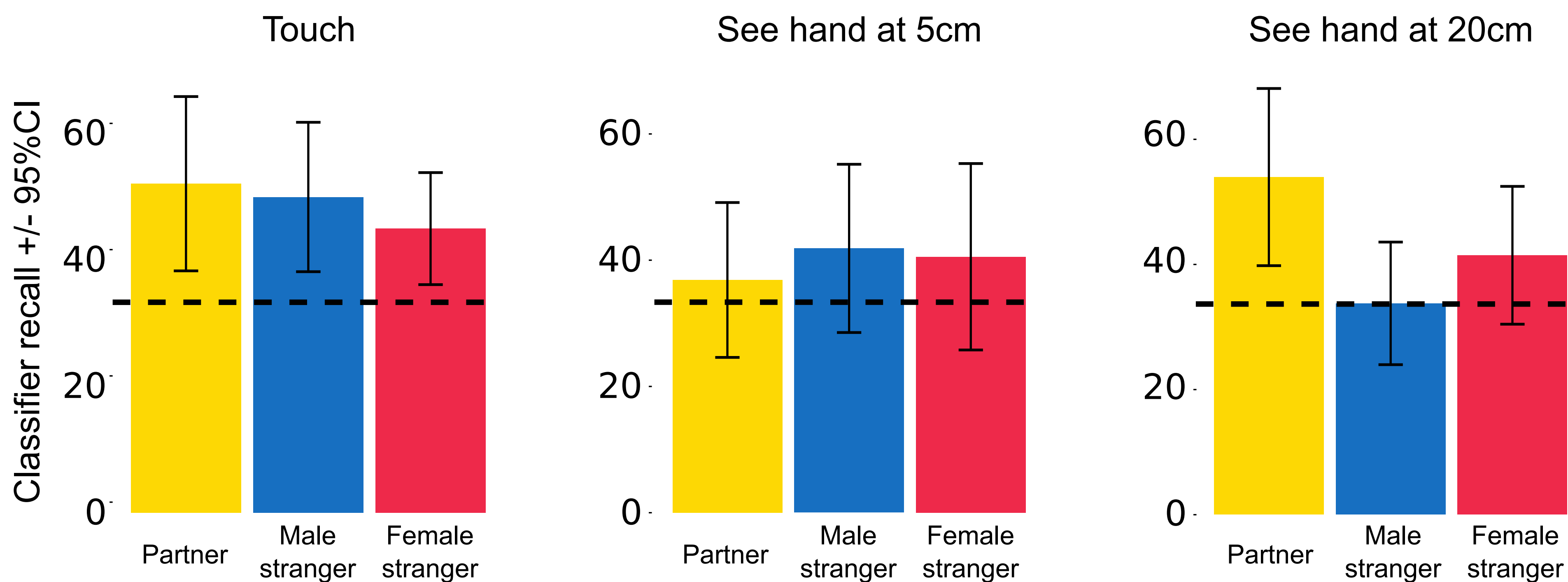
- ” Timing of the stimulation was communicated to the assistants via headphones. Subject was able to see the hand of the assistant currently performing the action and distinguish between actors based on the colour of clothing (see Fig 2 for schematic).
- ” Data were analyzed using the PyMVPA toolbox (Hanke et al. 2009), with Linear Support Vector Machine (SVM) classifier implementation from LIBSVM toolbox (<http://www.csie.ntu.edu.tw/~cjlin/libsvm/>). ROI masks were made with Harvard-Oxford cortical structural atlas.

2. Schematic of the measurement situation



Results

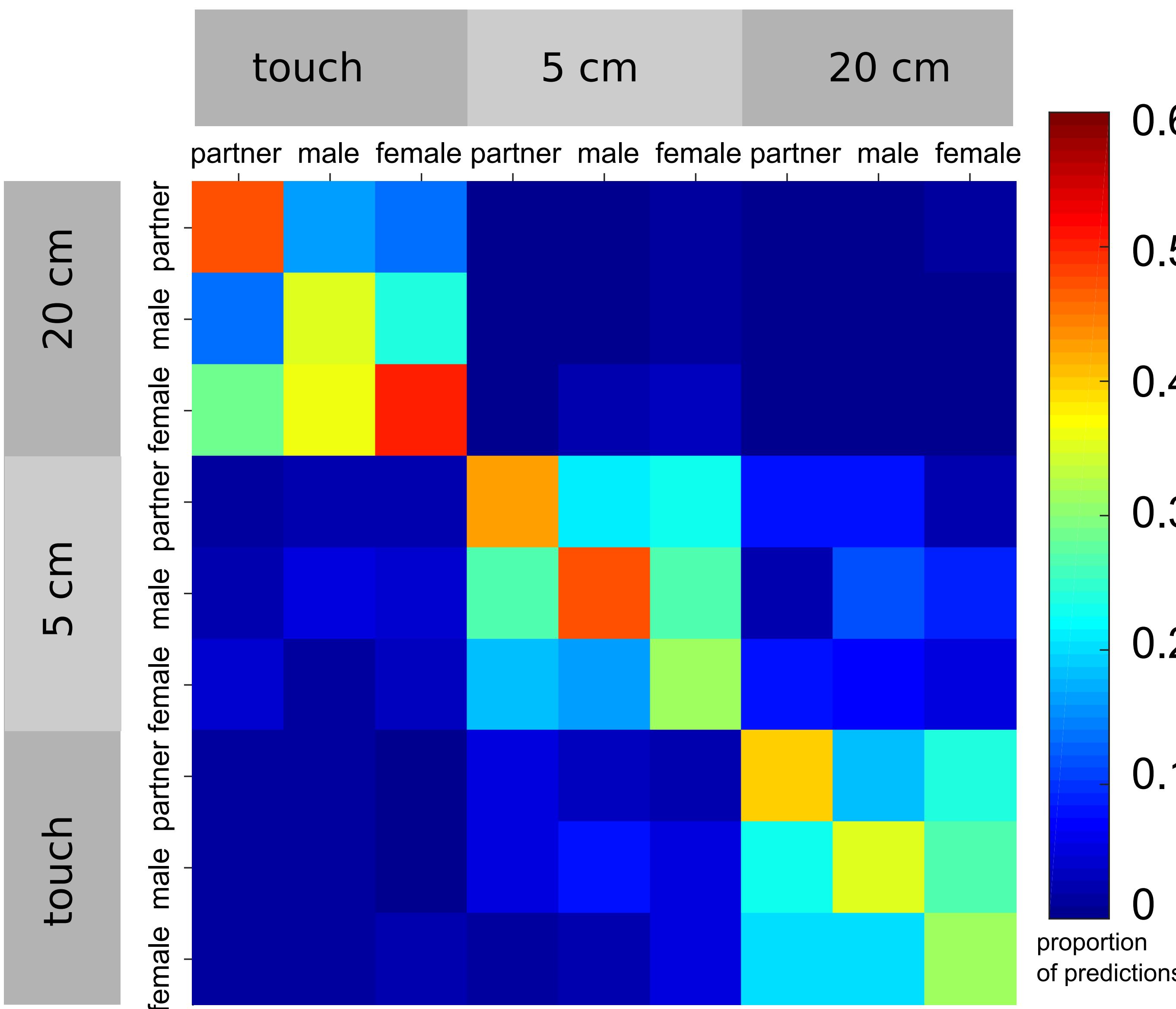
3. All actors can be classified at above chance level in touch events, but not either type of see events



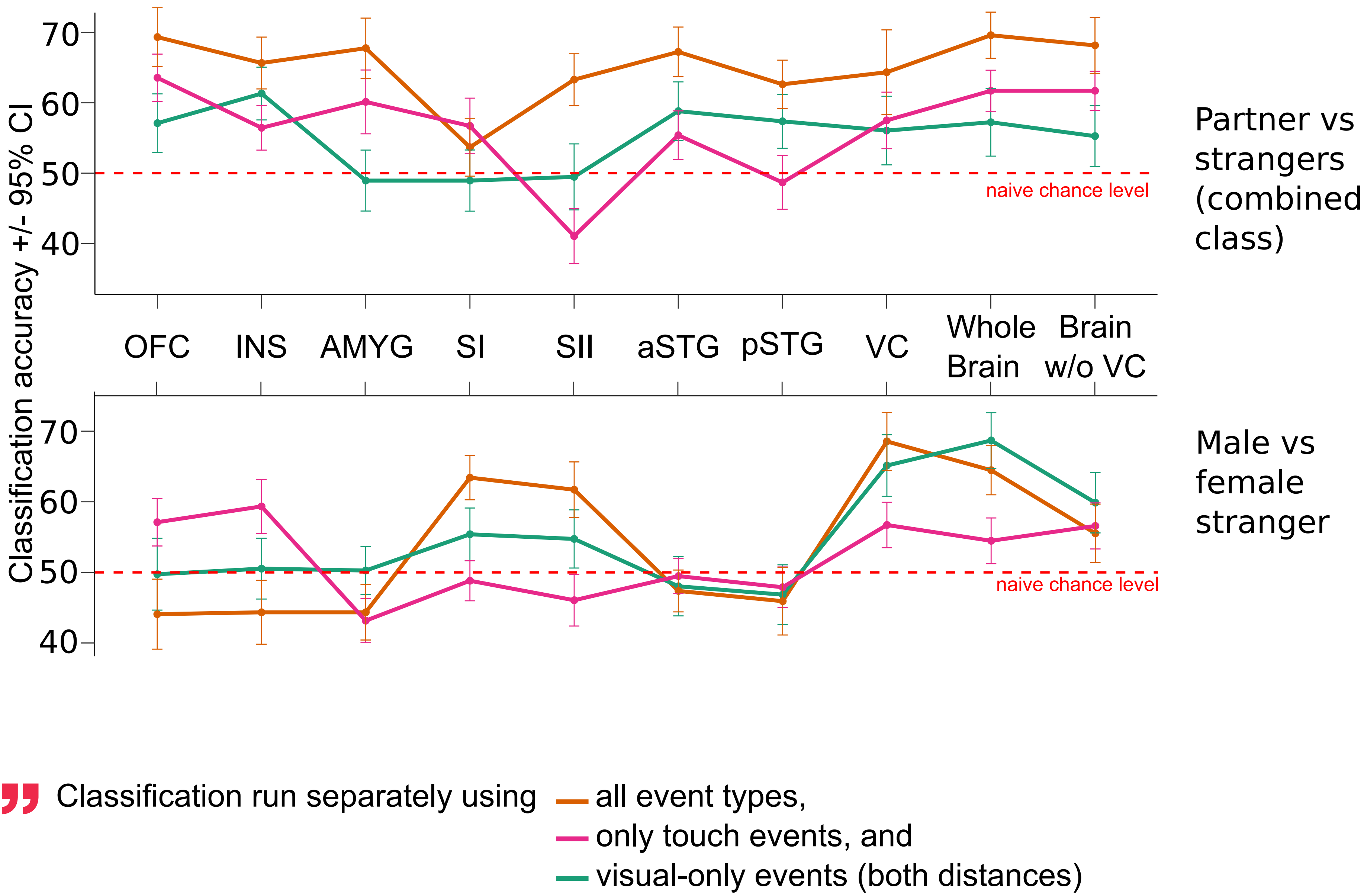
- ” Between-subjects classifier performance in whole brain minus visual cortices, performed separately for each action type (touch, see hand at 5cm, see hand at 20cm). Presented classification value is recall, calculated as True Positives / All Positives.

4. What was done was easier to classify than who did it

- ” Class-wise classification by linear SVM classifier, calculated in a 1-vs-rest fashion. Columns represent targets and rows represent classifications.
- ” Classification was performed between-subjects on whole brain excluding visual cortices, with leave-one-subject-out cross validation.



5. Fingerprints of classification accuracy are very different in relationship and between two strangers



- ” Classification run separately using — all event types, — only touch events, and — visual-only events (both distances)

Conclusions

- ” Many cortical areas are involved in processing the social features of interpersonal touch.
- ” Different brain regions were able to classify relationship category (partner vs stranger) and between individuals in same relationship category (male stranger vs female stranger).
- ” Already primary somatosensory cortex processes affective content of toucher identity, which might be due to the different physical characteristics of male vs. female touchers (but see Gazzola et al. 2012). The evidence did not find SI distinguishing the social relationship with the toucher.

References

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Acknowledgments

We would like to thank all the members of the Brain & Mind Lab and Human Emotion Systems lab in Aalto University who acted as researcher confederates in this experiment.

This research was supported by Emil Aaltonen Foundation, European Research Council, the Finnish Academy, and Finnish Cultural Foundation Kalle and Dagmar Välimaa Fund.