

Relationship specific encoding of social touch in the somatosensory cortices

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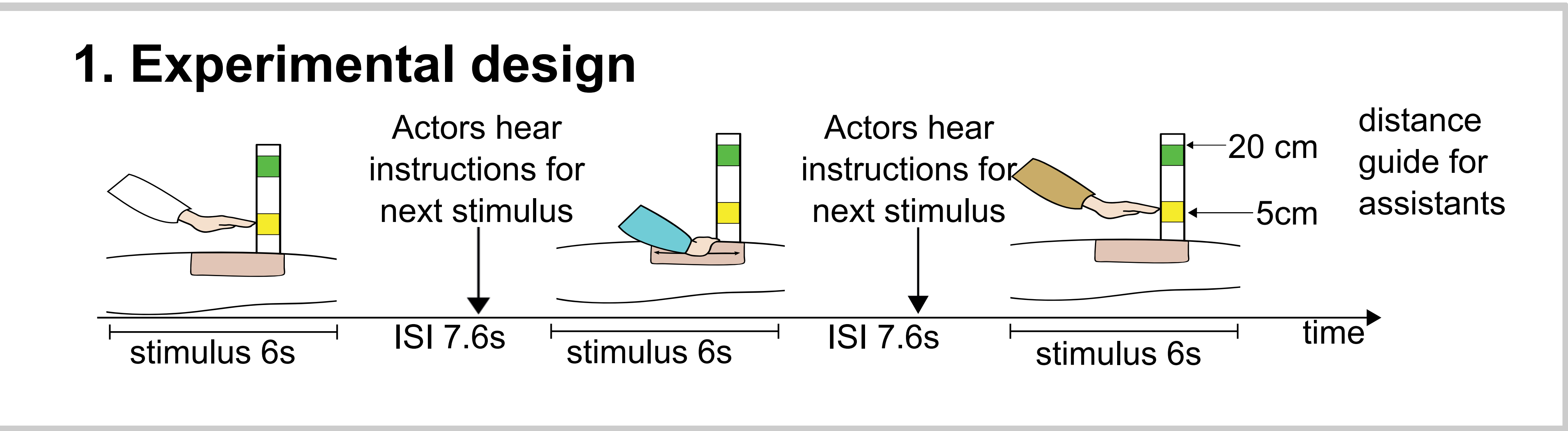
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Introduction

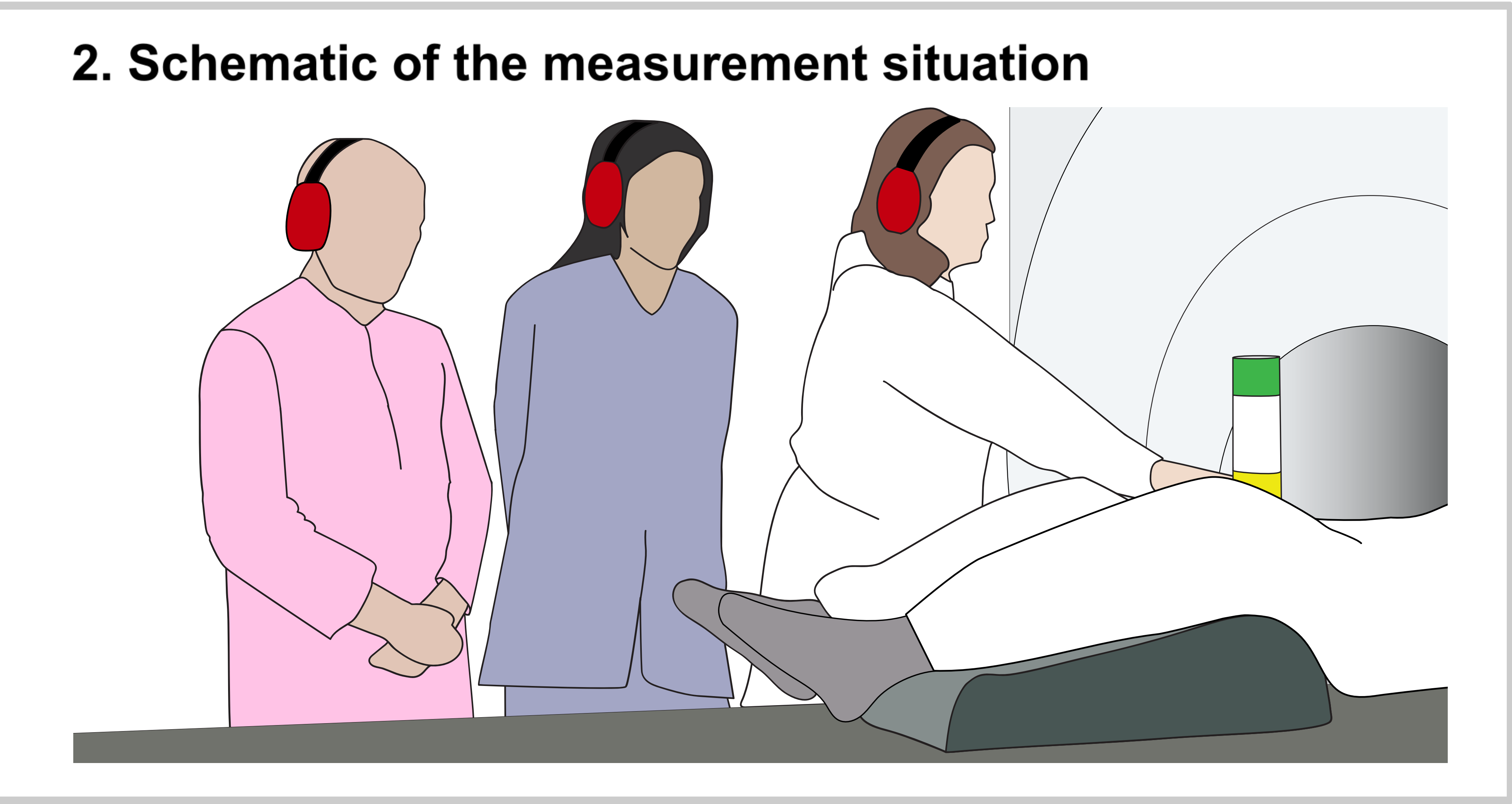
- ” Social touch is an important form of affective communication.
- ” Patterns of social touch depend on the relationship between toucher and the person being touched and adults have implicit topographies which guide where different members of social network are allowed to touch (Suvilehto et al. 2015,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

Methods

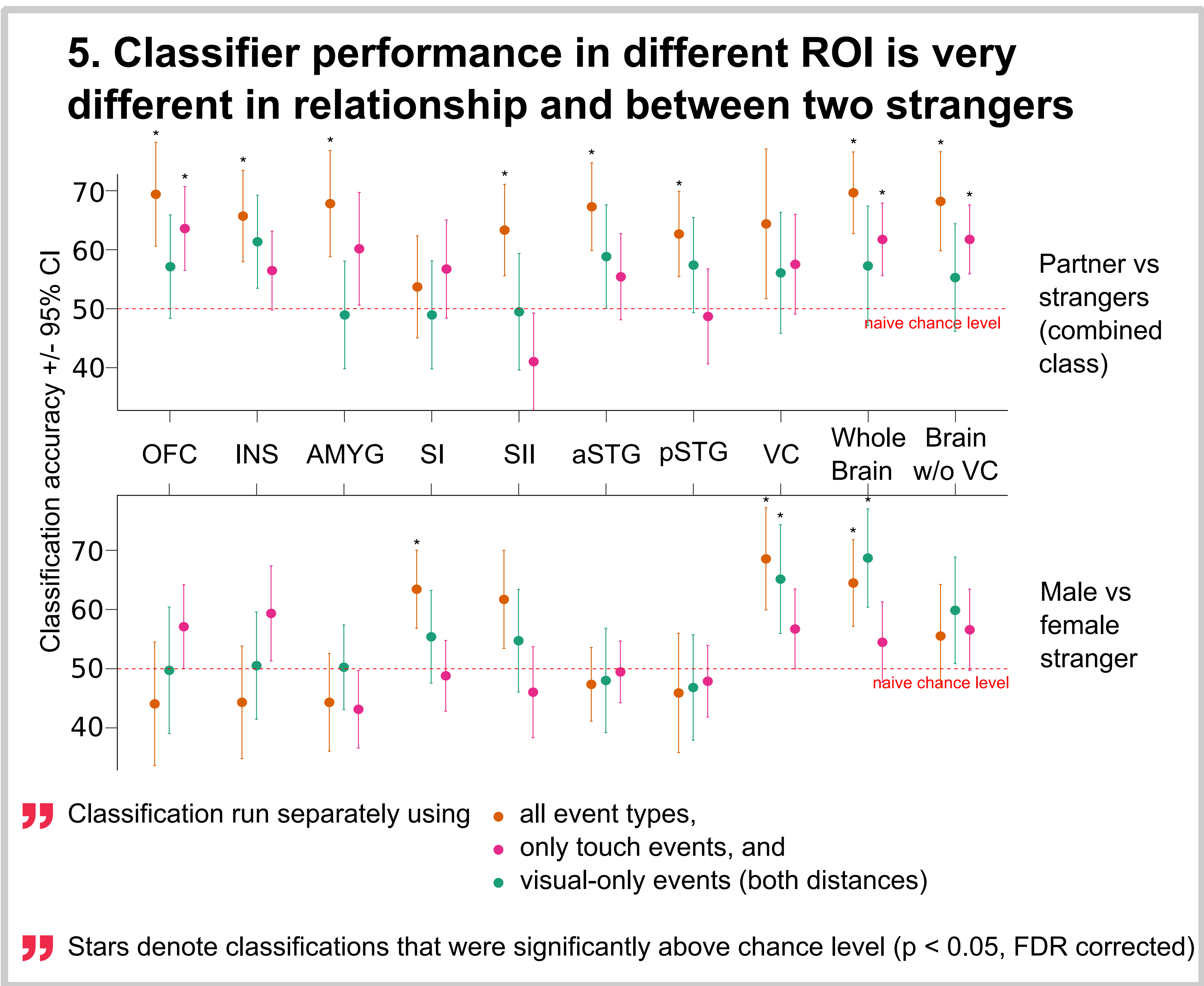
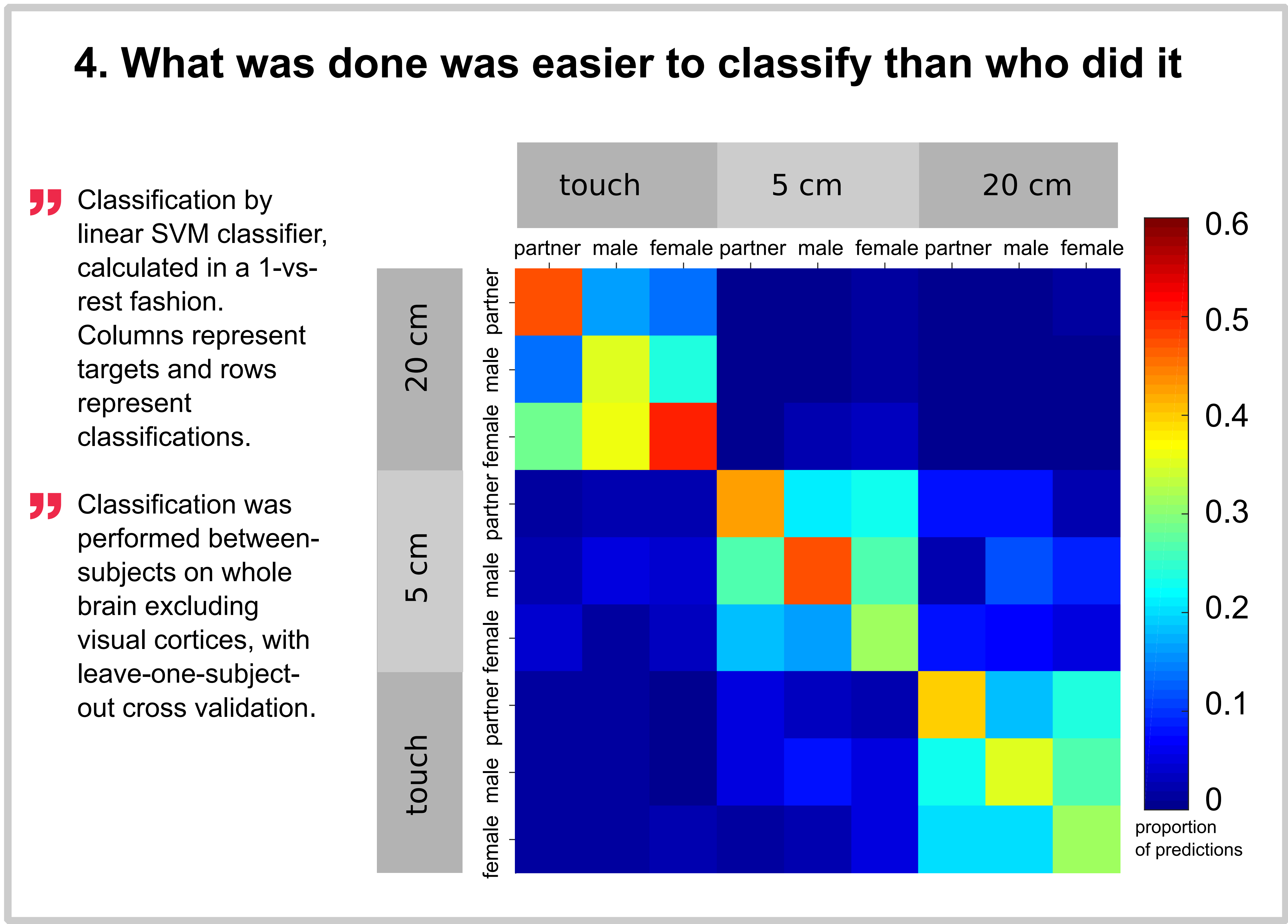
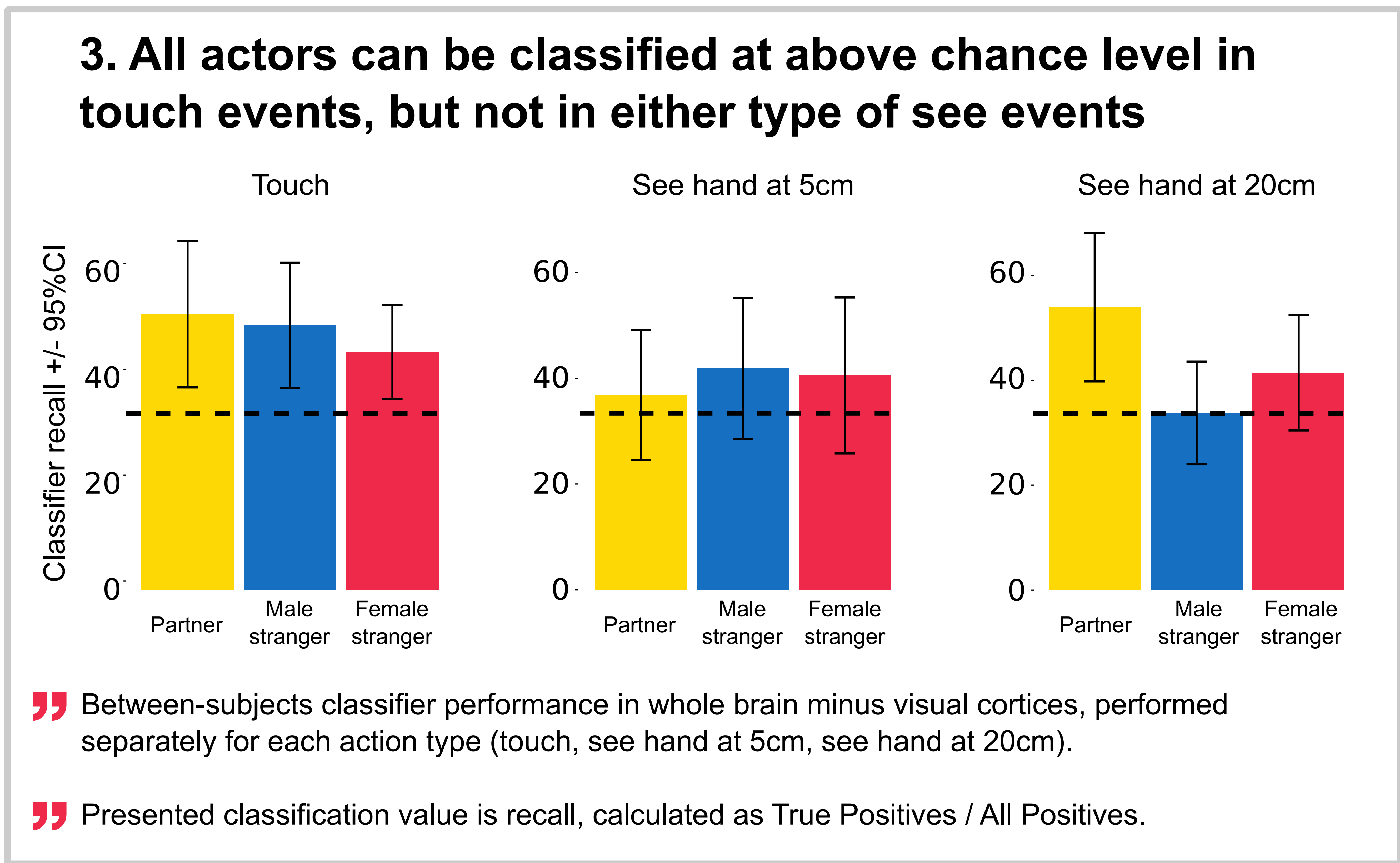
- ” 19 subjects (10 male) from 10 heterosexual couples. Haemodynamic brain activity was measured using at fMRI 3 T (MAGNETOM Skyra 3.0 T & 32-channel receive head coil, Siemens, Erlangen). EPI sequence, TR 1.52 s, TE 30 ms, flip angle 70°, 72 × 72 matrix, 2.7 × 2.7 mm² in-plane resolution, 35 slices (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, male & female 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).



- ” 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.



Results



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 assistant identity. The evidence did not find SI distinguishing the social relationship with the toucher.

References

Gazzola, V., Spezio, M. L., Etzel, J. A., Castelli, F., Adolphs, R., & Keysers, C. (2012). Primary somatosensory cortex discriminates affective significance in social touch. *Proceedings of the National Academy of Sciences*, 109(25), E1657-66.

Hanke, M., Halchenko, Y. O., Sederberg, P. B., Hanson, S. J., Haxby, J. V., & Pollmann, S. (2009). PyMVPA: A python toolbox for multivariate pattern analysis of fMRI data. *Neuroinformatics*, 7(1), 37-53.

Jourard, S. M. (1966). An exploratory study of body-accessibility. *The British Journal of Social and Clinical Psychology*, 5(3), 221-231.

Suvilehto, J. T., Glerean, E., Dunbar, R. I. M., Hari, R., & Nummenmaa, L. (2015). Topography of social touching depends on emotional bonds between humans. *Proceedings of the National Academy of Sciences*, 112(45).

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