# Idiosyncratic Interhemispheric Connectivity During Face Processing

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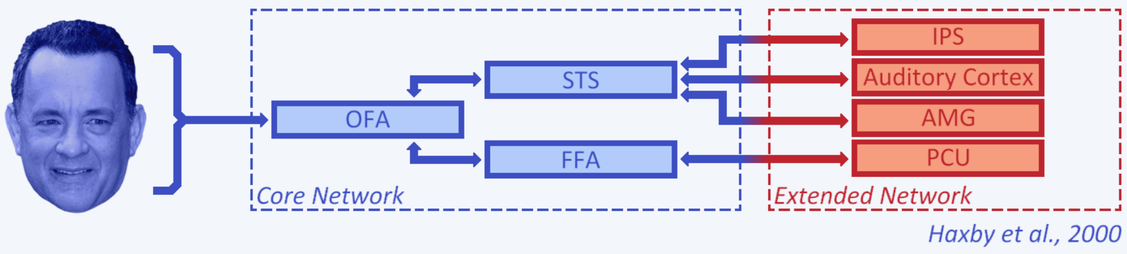
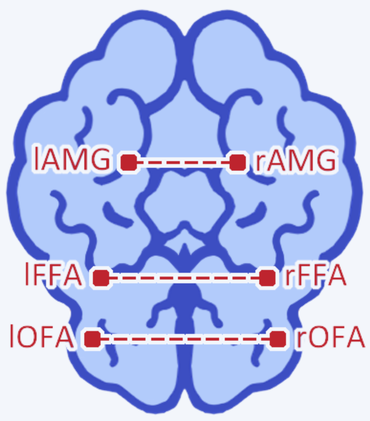
## Background

- Neural models of face perception have largely focussed on the importance of ***intrahemispheric*** connections between face-selective regions in the human brain[1].



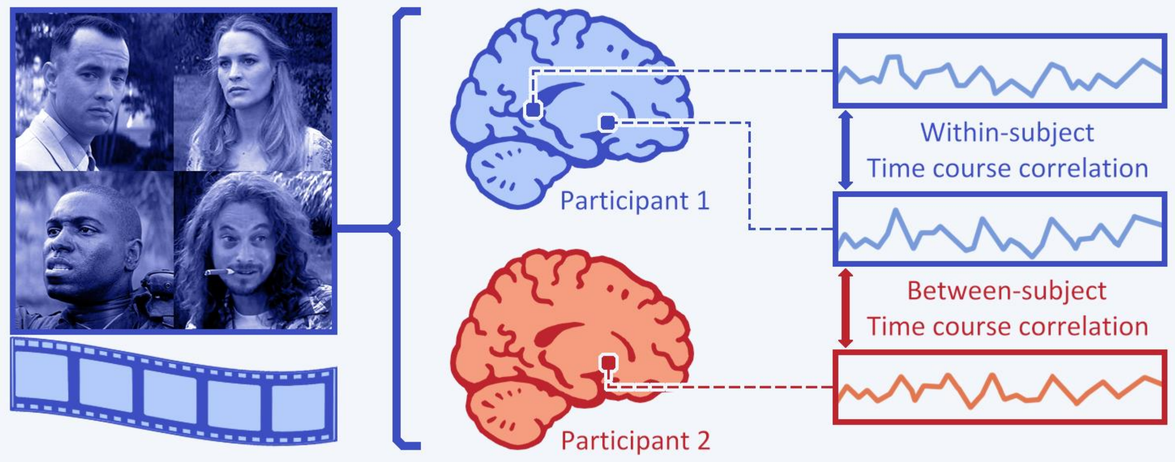

- However, behavioural[2] and neurophysiological[3, 4] studies suggest that ***interhemispheric*** functional connectivity may also play an important role in face processing.

- The aims of this study were:
  1) To compare the relative strength of *interhemispheric* and *intrahemispheric* connectivity during face perception processing during dynamic viewing.
  2) To determine whether patterns of *interhemispheric* connectivity were idiosyncratic.

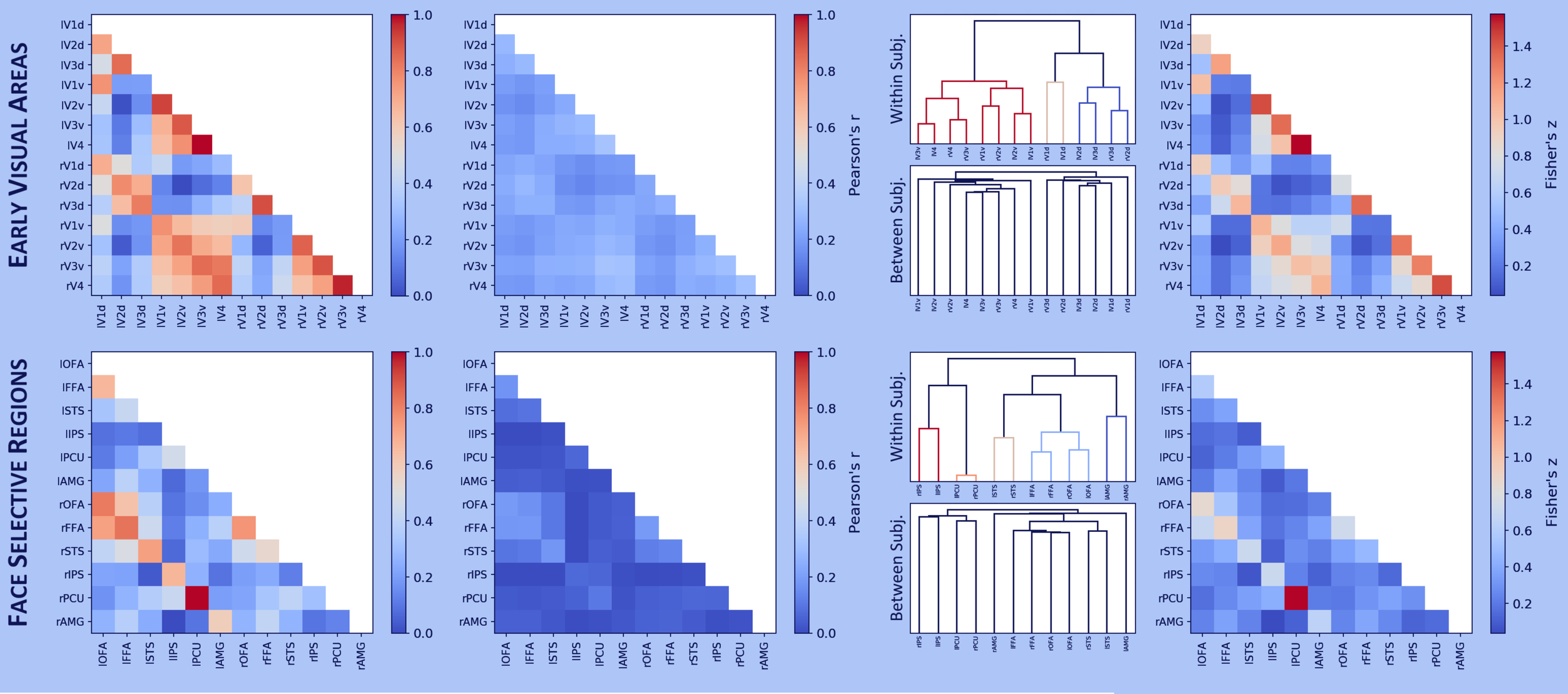



## Methods

- Analysis of pre-existing data from the 'StudyForrest' dataset[5].
- fMRI was recorded as 15 participants completed a functional localizer task to define face regions, and then watched the audiovisual movie 'Forrest Gump' to determine connectivity between regions.
- Time-courses during movie watching within each region were correlated with activity in the corresponding *interhemispheric* region, or with *intrahemispheric* regions within the face network and early visual areas.
- To determine whether interhemispheric connectivity was idiosyncratic, correlations were calculated within each subject and between subjects.



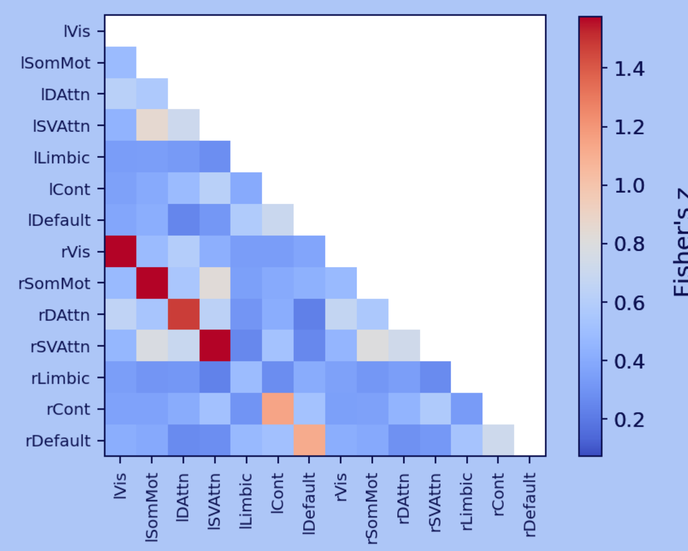

| Network: | Dorsal EVAs | | | Ventral EVAs | | | | Core Face Regions | | | Extended Face Regions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROI (abb): | | | | | | | | OFA | FFA | STS | IPS | PCU | AMG |
| ROI: | V1d | V2d | V3d | V1v | V2v | V3v | V4 | Occipital Face Area | Fusiform Face Area | Superior Temporal Sulcus | Intraparietal Sulcus | Precuneus | Amygdala |




## Conclusions

- Within-subjects, our results provide evidence for strong *interhemispheric* functional connectivity across all regions during natural viewing.
- Notably, within the face network, *interhemispheric* connectivity was significantly greater than *intrahemispheric* connectivity across all regions, suggesting its substantial role in face processing.
- Comparison with between-subject connectivity analysis suggested that these patterns of *interhemispheric* connectivity were idiosyncratic, when compared to *intrahemispheric* connectivity.
- These findings, also evident in a whole brain network analysis[6], suggest that differences in *interhemispheric* connectivity may contribute towards individual differences in behaviour.

### WITHIN-BETWEEN DIFFERENCE IN WHOLE BRAIN NETWORKS




**[1]** Haxby, J. V., Hoffman, E. A., & Gobbini, M. I. (2000). The distributed human neural system for face perception. *Trends in cognitive sciences*, *4*(6), 223-233.; **[2]** Mohr, B., Landgrebe, A., & Schweinberger, S. R. (2002). Interhemispheric cooperation for familiar but not unfamiliar face processing. *Neuropsychologia*, *40*(11), 1841-1848.; **[3]** Frässle, S., Paulus, F. M., Krach, S., Schweinberger, S. R., Stephan, K. E., & Jansen, A. (2016). Mechanisms of hemispheric lateralization: Asymmetric interhemispheric recruitment in the face perception network. *Neuroimage*, *124*, 977-988.; **[4]** Davies-Thompson, J., & Andrews, T. J. (2012). Intra-and interhemispheric connectivity between face-selective regions in the human brain. *Journal of neurophysiology*, *108*(11), 3087-3095; **[5]** Hanke, M., Adelhöfer, N., Kottke, D., Iacovella, V., Sengupta, A., Kaule, F. R., ... & Stadler, J. (2016). A studyforrest extension, simultaneous fMRI and eye gaze recordings during prolonged natural stimulation. *Scientific data*, *3*(1), 1-15.; **[6]** Yeo, B. T., Krienen, F. M., Chee, M. W., & Buckner, R. L. (2014). Estimates of segregation and overlap of functional connectivity networks in the human cerebral cortex. *Neuroimage*, *88*, 212-227.