

Accurate head models for cortical source analysis in infants at high risk of autism spectrum disorders



Maggie W. Guy, John E. Richards, and Jane E. Roberts

<http://jerlab.psych.sc.edu/jerpdf/icis2018headmodels.pdf>



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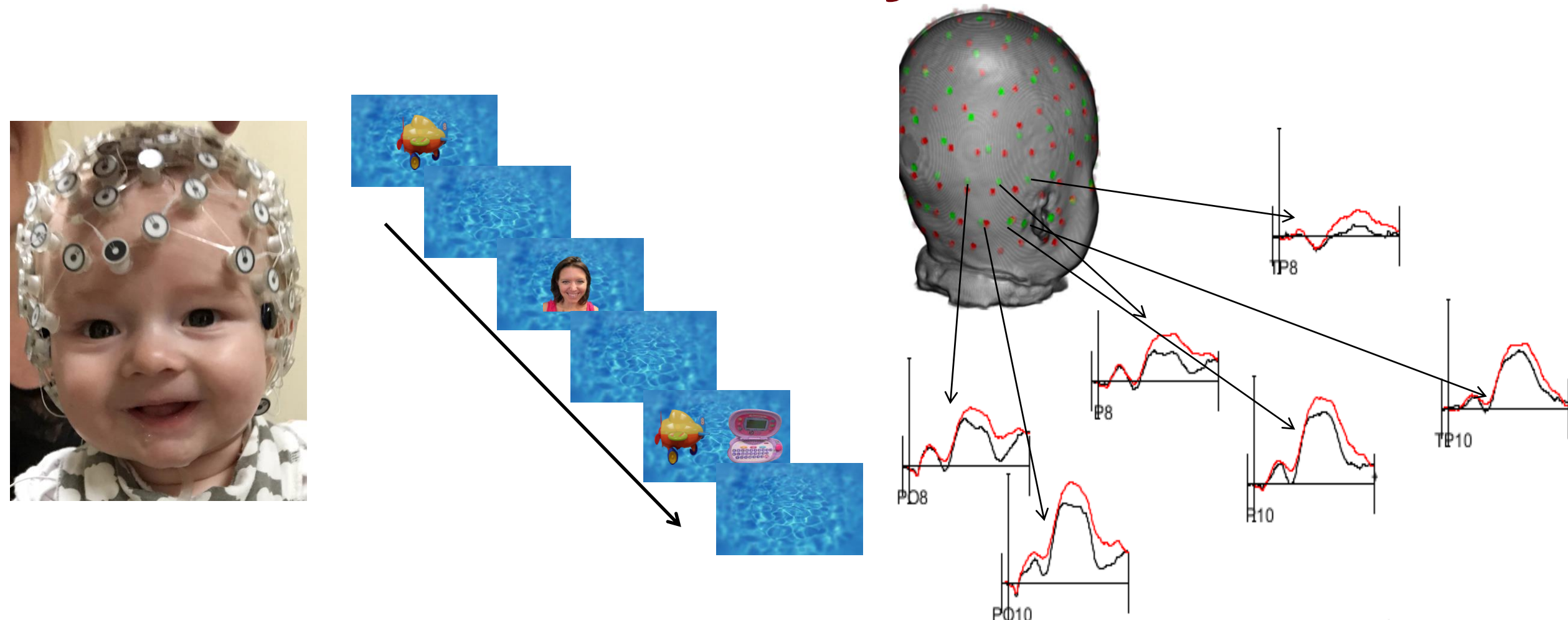
Abstract

The aim of this study was to develop realistic head models for use with infants at high risk of ASD. The optimal approach for source analysis uses realistic head models based upon individual participants' structural MRIs, however, this is not always feasible. Careful selection of alternative head models may be satisfactory for accurate source localization. Head models created from a large group of MRIs of high-risk, same neurodevelopmental disorder infants were a good match to infants' own MRIs. Greater heterogeneity in the brains of infants at high risk of ASD may account for the improved fit from these models.

Participants

12-month-old infants: 21 low-risk control (LRC), 21 siblings of children with autism (ASIB), 15 with fragile X syndrome (FXS)¹

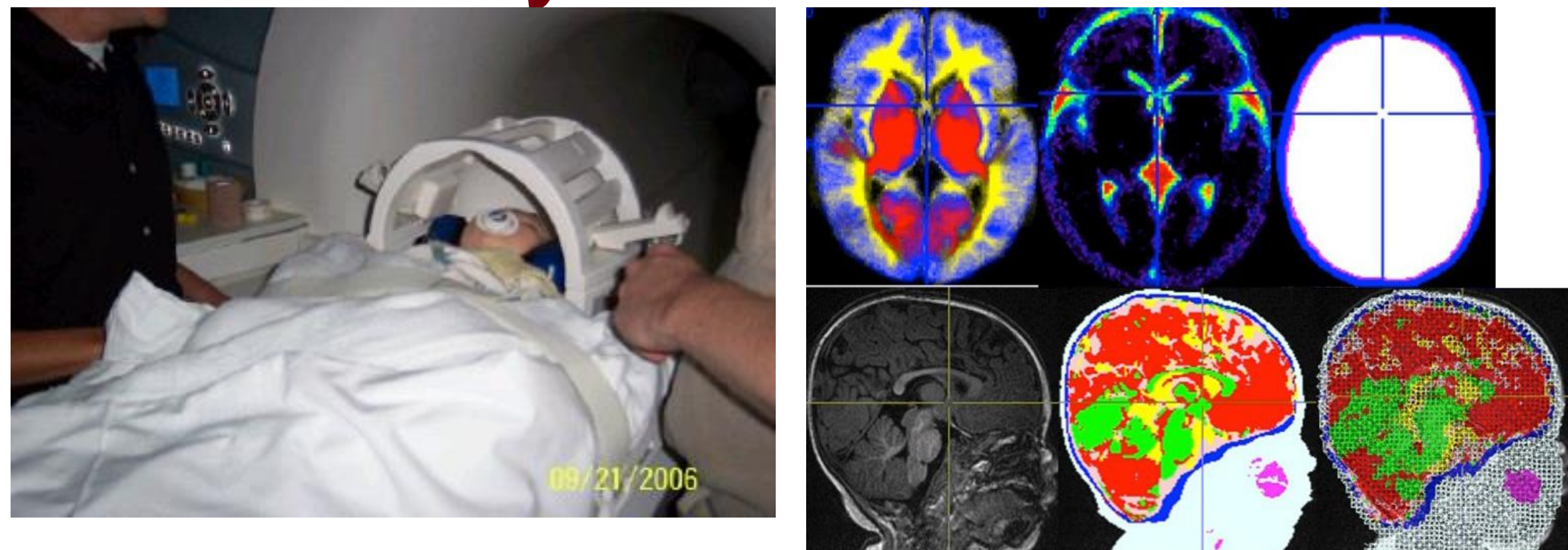
ERP Procedure & Analyses



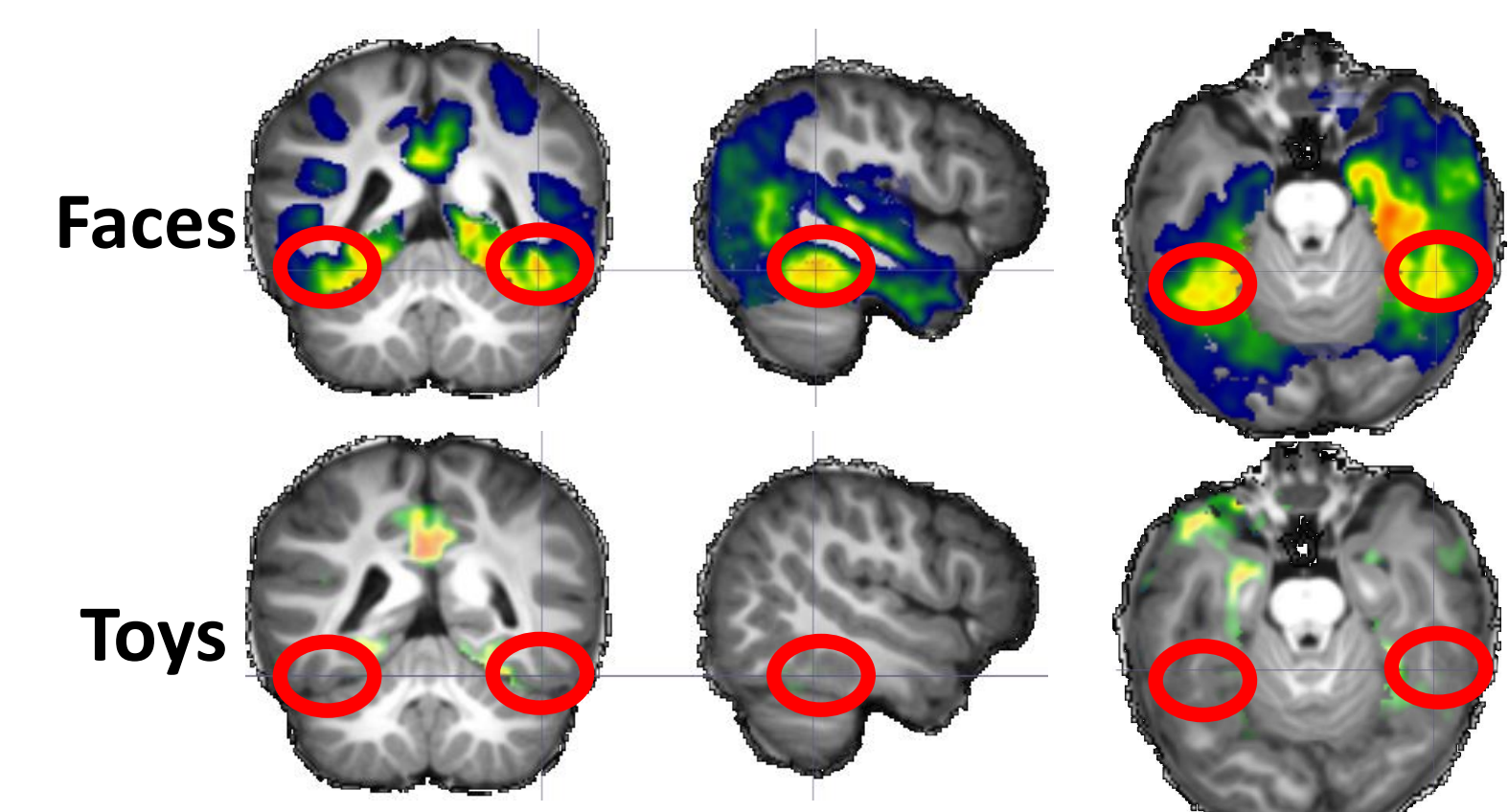
Head Model Comparison

- Infant's own MRI
- Study & group-specific average template (ASIB N = 8, FXS N = 12)
- Group-specific average template from MRI database, Infant Brain Imaging Study (IBIS; ASIB N = 53, FXS N = 24)
- Typically developing 12-month-old infants average template
- Children (12 years) or adults (20-24 years) average template

Source Analysis

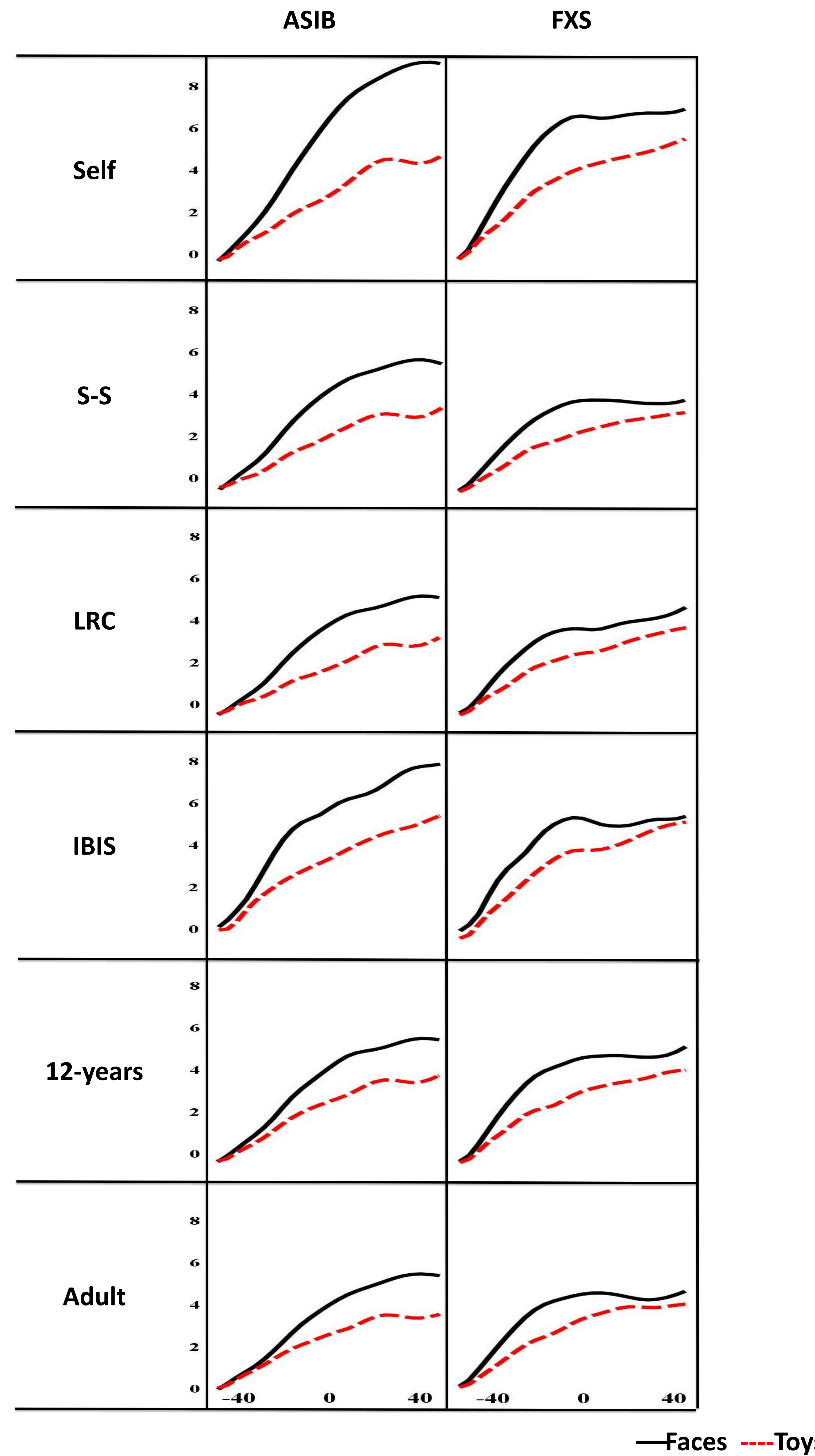


Activity in the middle FFG at the N290 latency

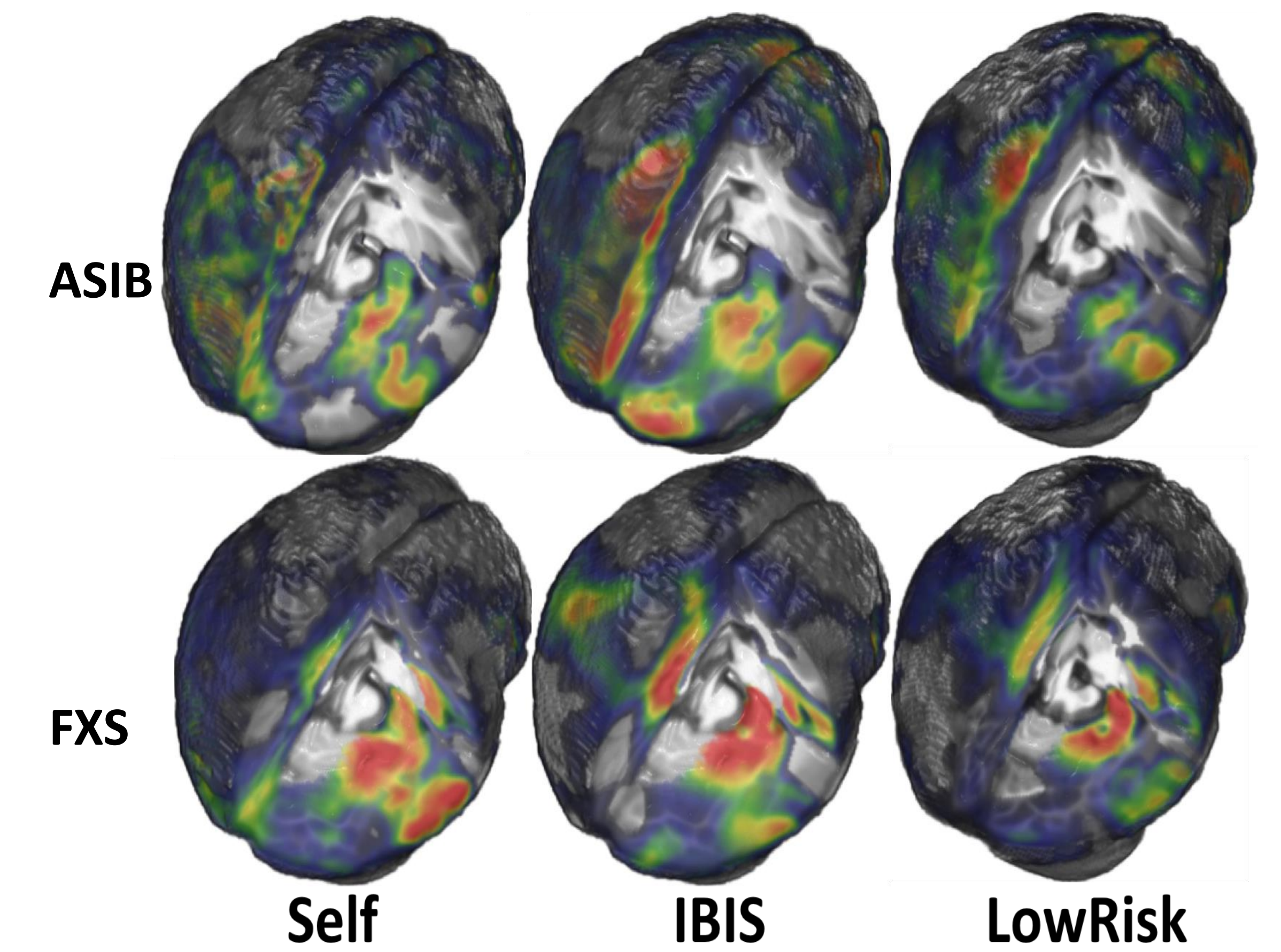


Results

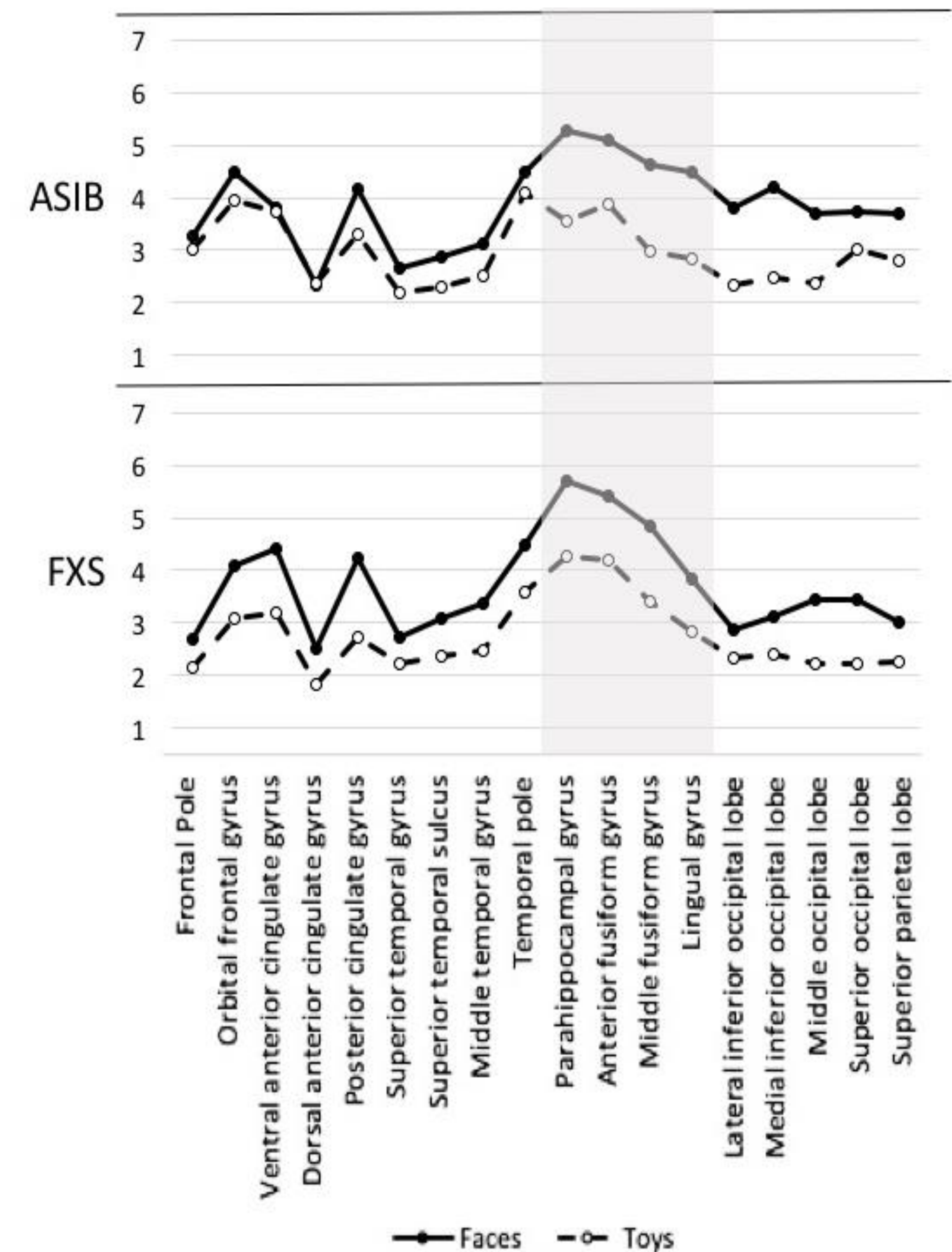
N290 CDR at the Right Middle Fusiform Gyrus



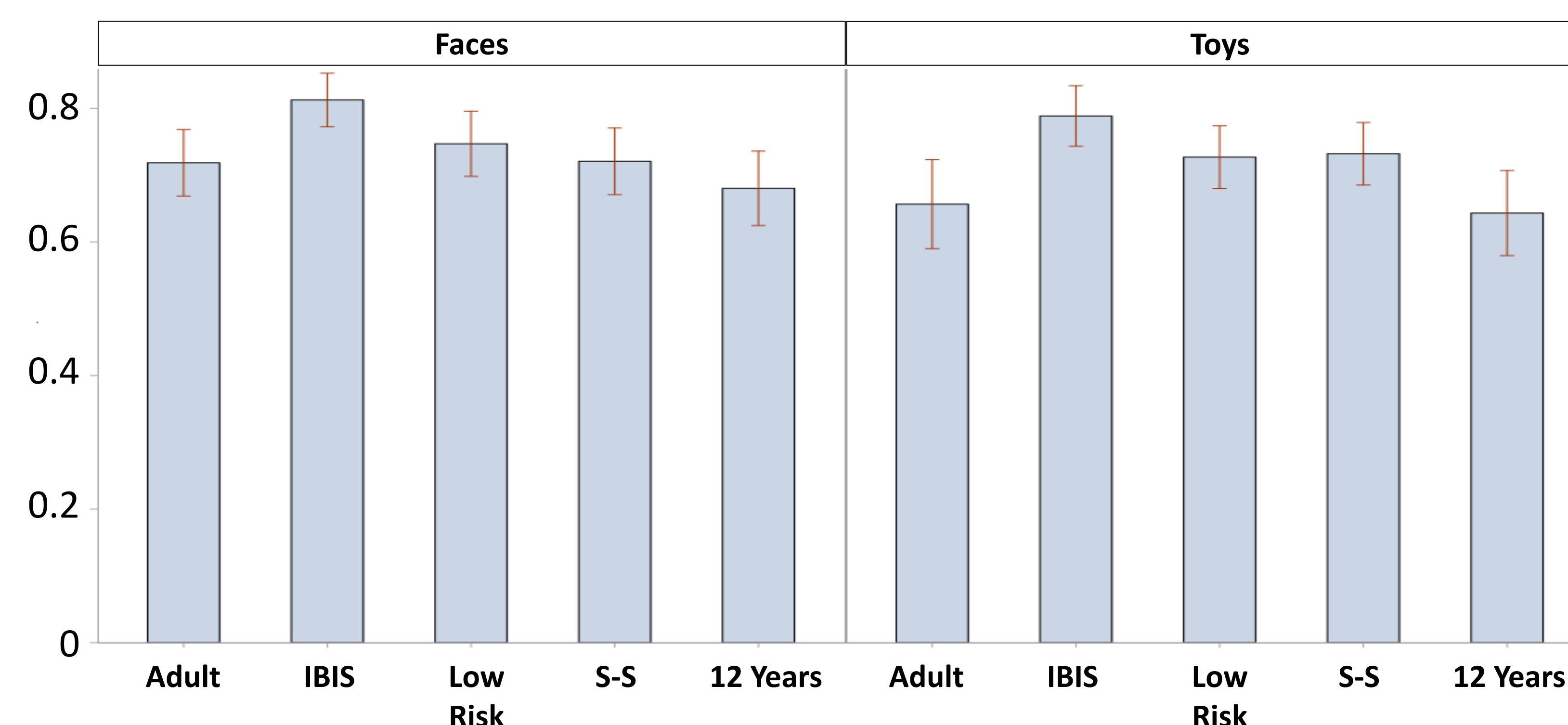
Peak N290 CDR to Faces



CDR to Faces and Toys by Group and ROI (including own and IBIS head models)



Correlation over ROI between Self and Head Models



Acknowledgements

¹Guy, M. W., Richards, J. E., Tonnsen, B. L., & Roberts, J. E. (2017). Neural correlates of etiologically-distinct 12-month-old infants at high-risk of autism spectrum disorder. *Developmental Cognitive Neuroscience*.

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