Brain labeling, feature identification and shape analysis of:

Anatomical, functional, and diffusion magnetic resonance imaging (MRI)

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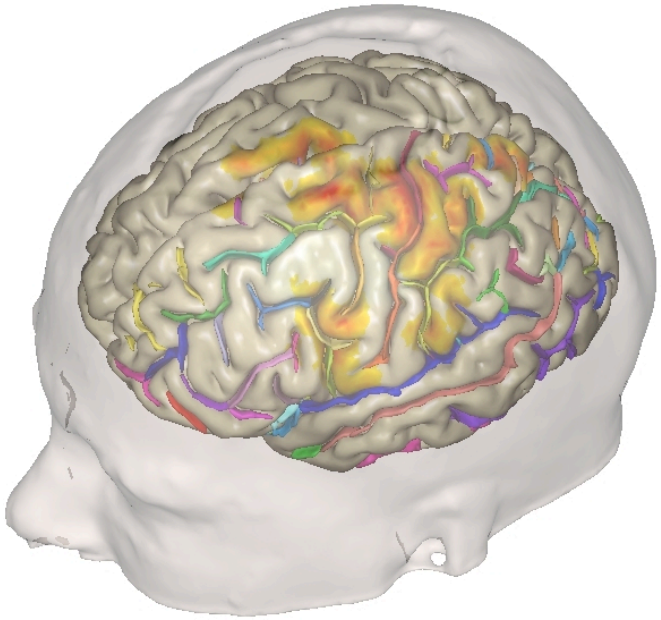
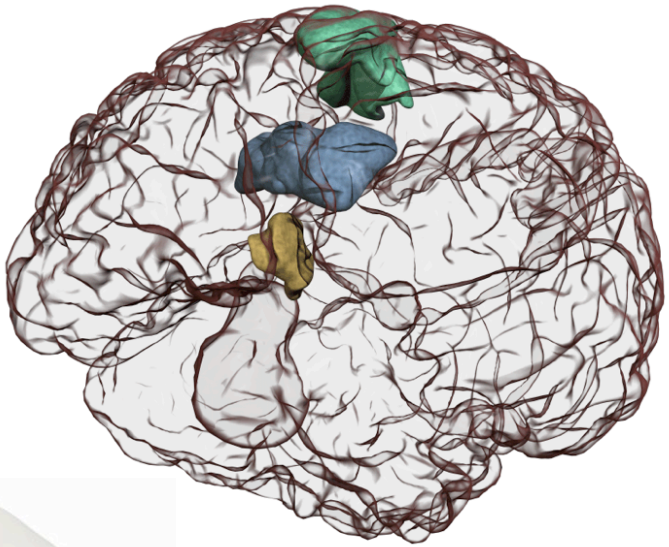
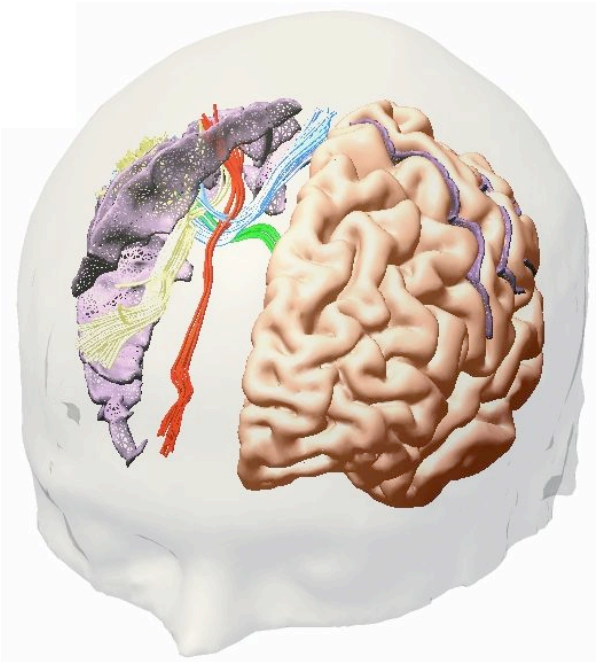
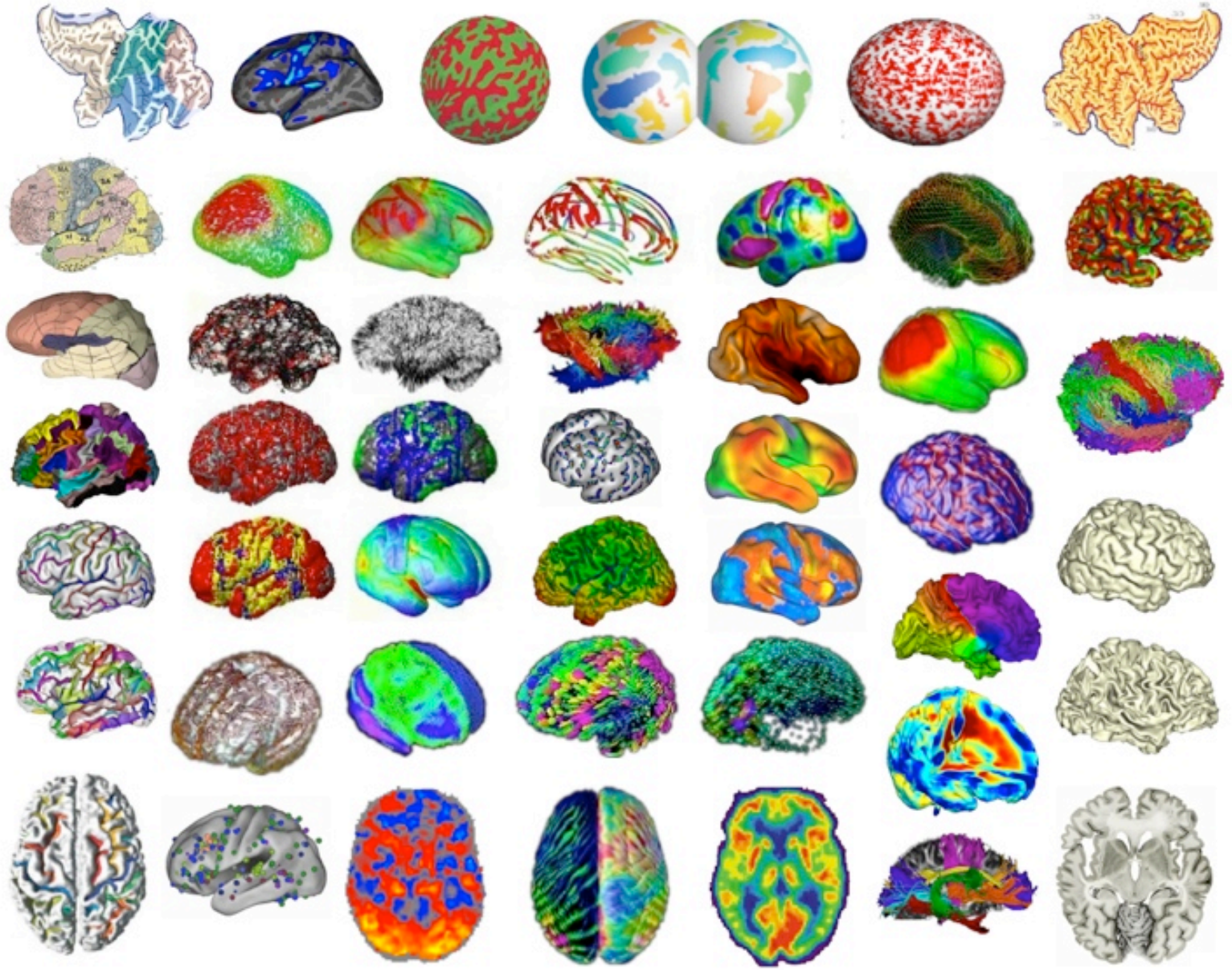




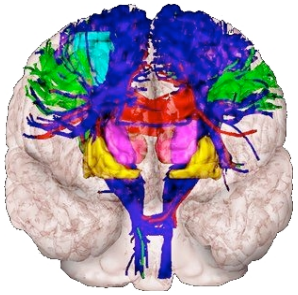




Why label and quantify brain features?

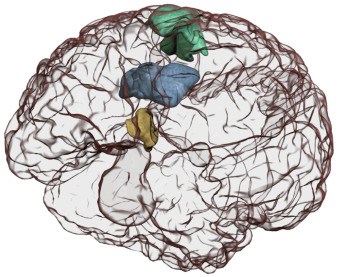
Labels visually augment anatomy

- teach anatomy
- guide surgery



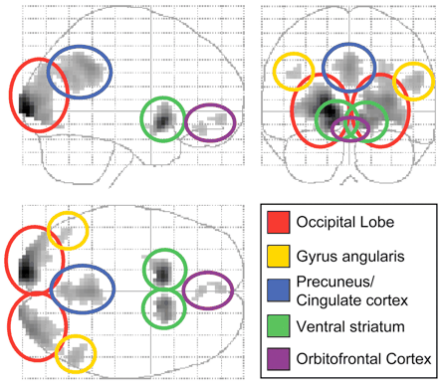
Labels break up data

- process data by region
- quantify and report data by region

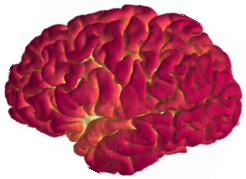


Labels identify corresponding objects

- communicate using the same terms
- compare data across subjects and studies

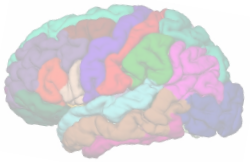


http://www.cbd.ucla.edu/bios/iacoboni.html, http://brainvisa.info/, http://dx.doi.org/10.1126/science.1145876
http://groups.csail.mit.edu/vision/medical-vision/past-projects.html, http://www.spl.harvard.edu/publications/item/view/1265

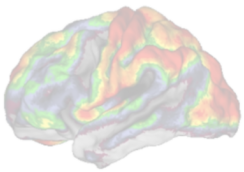


morphometry

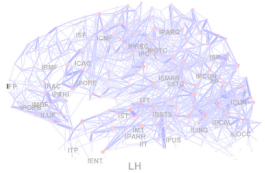
features



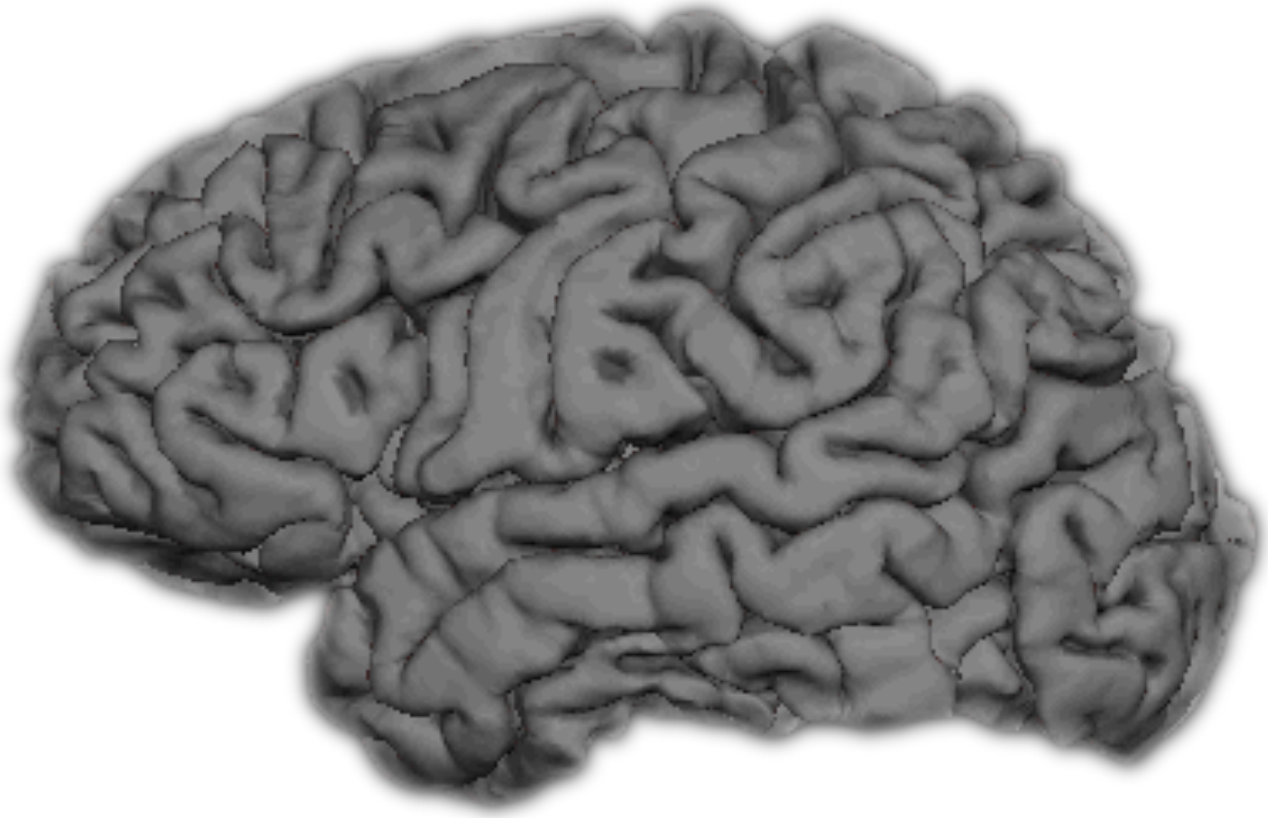
labels

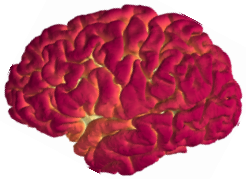


fMRI



dMRI





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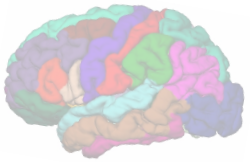

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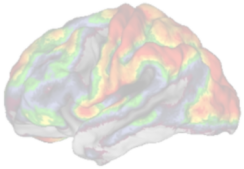

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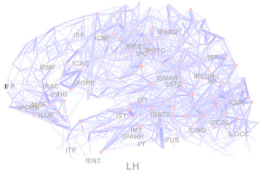
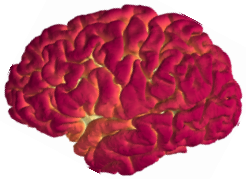


dMRI

Mean curvature



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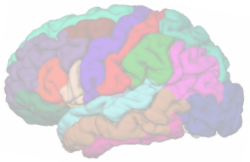

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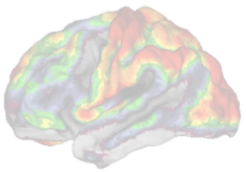

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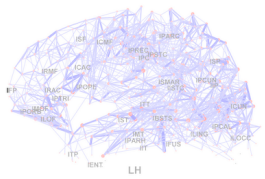

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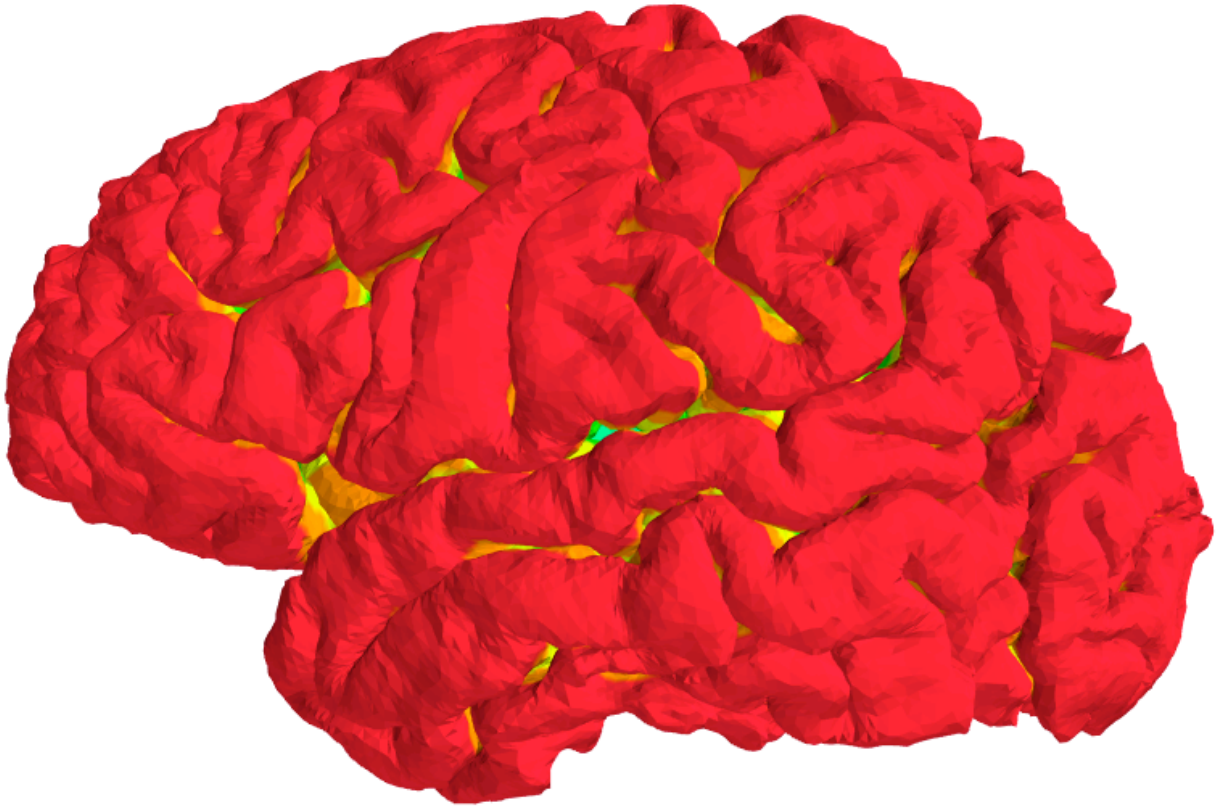
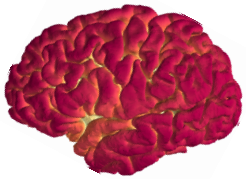


Travel depth



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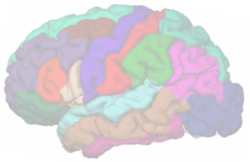

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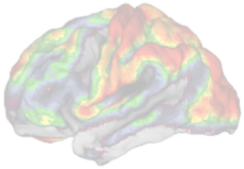

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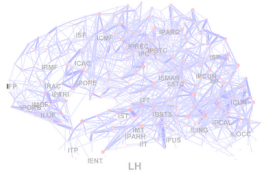

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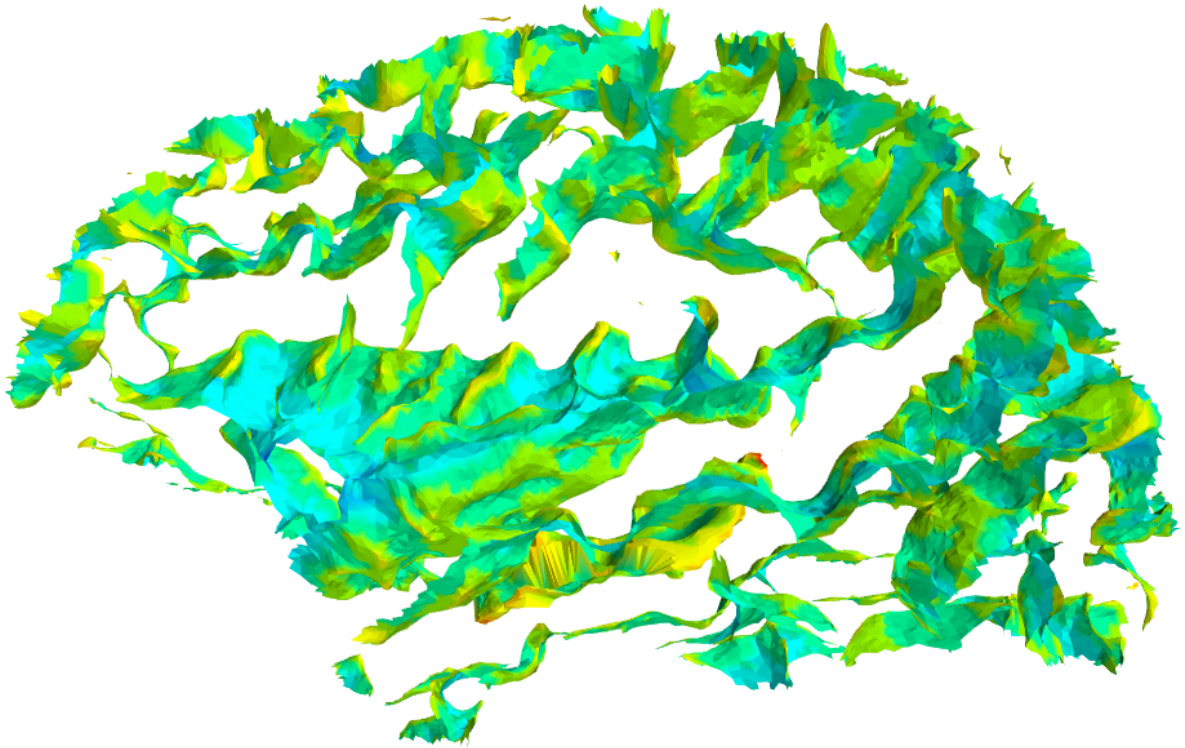
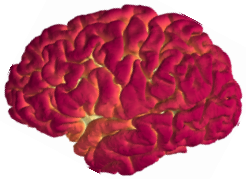
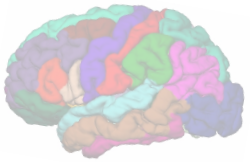


Mean curvature (folds)



morphometry

features



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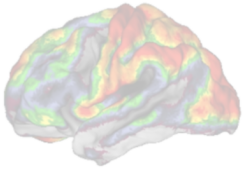

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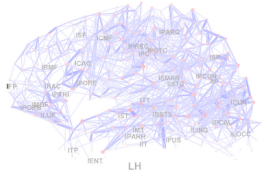

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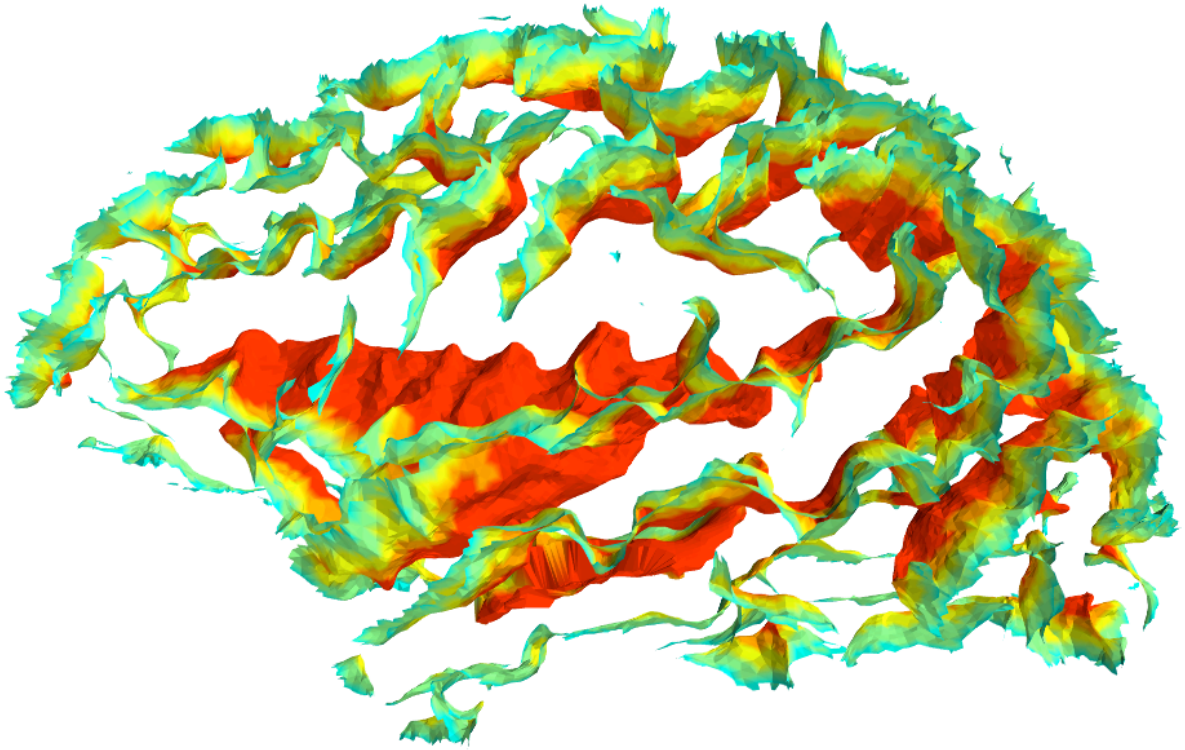
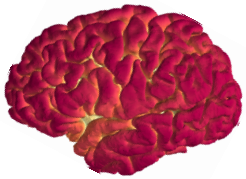
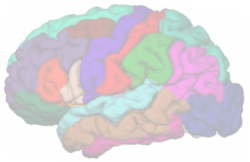


Travel depth (folds)



morphometry

features



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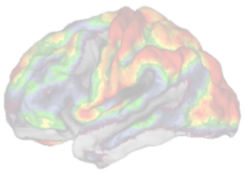

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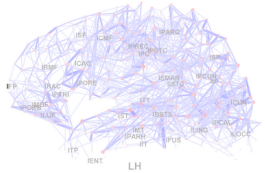

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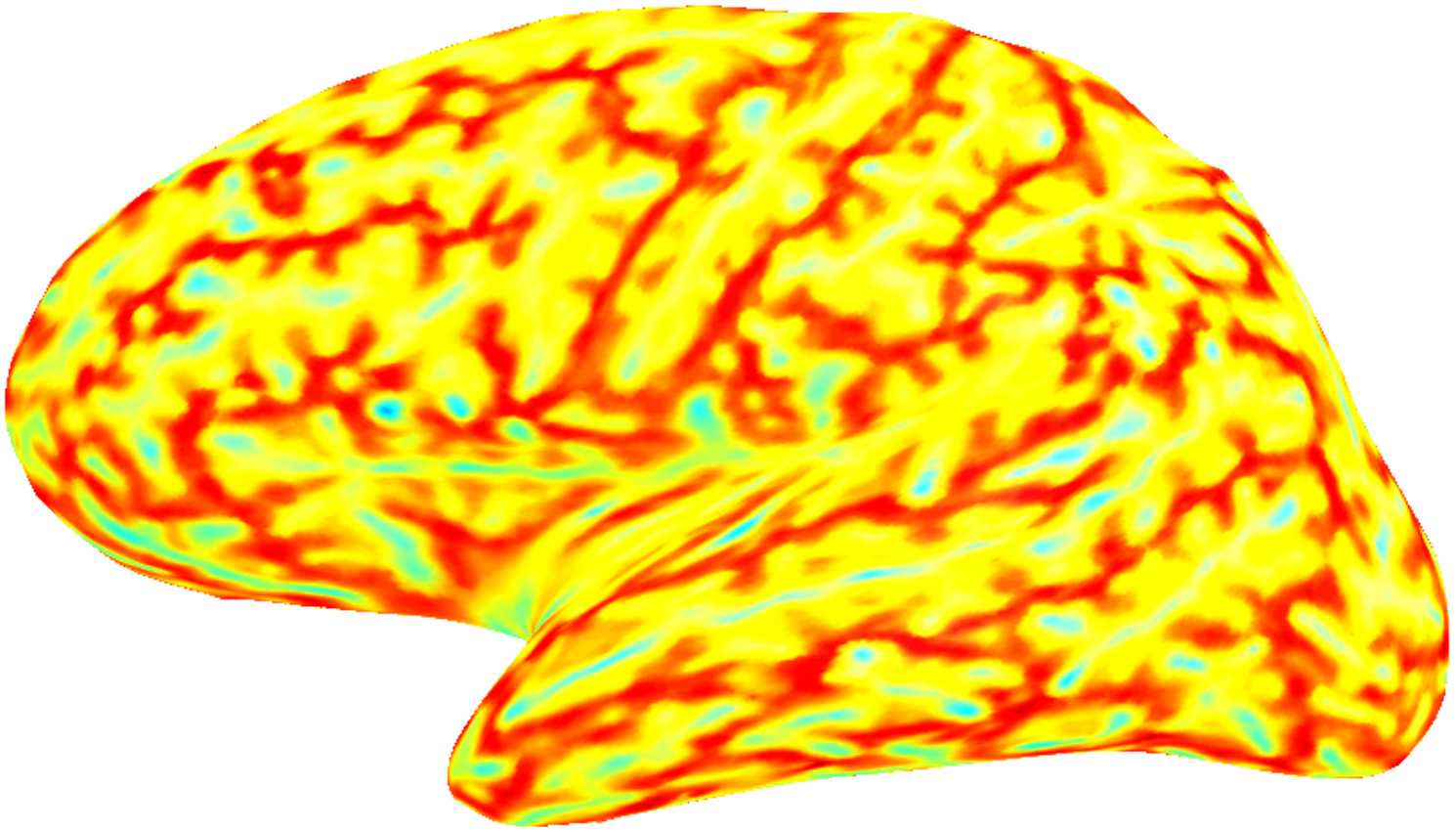
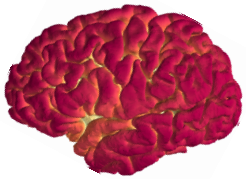
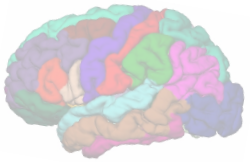


Mean curvature (inflated surface)



morphometry

features



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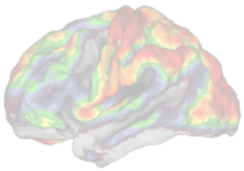

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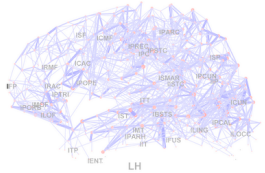

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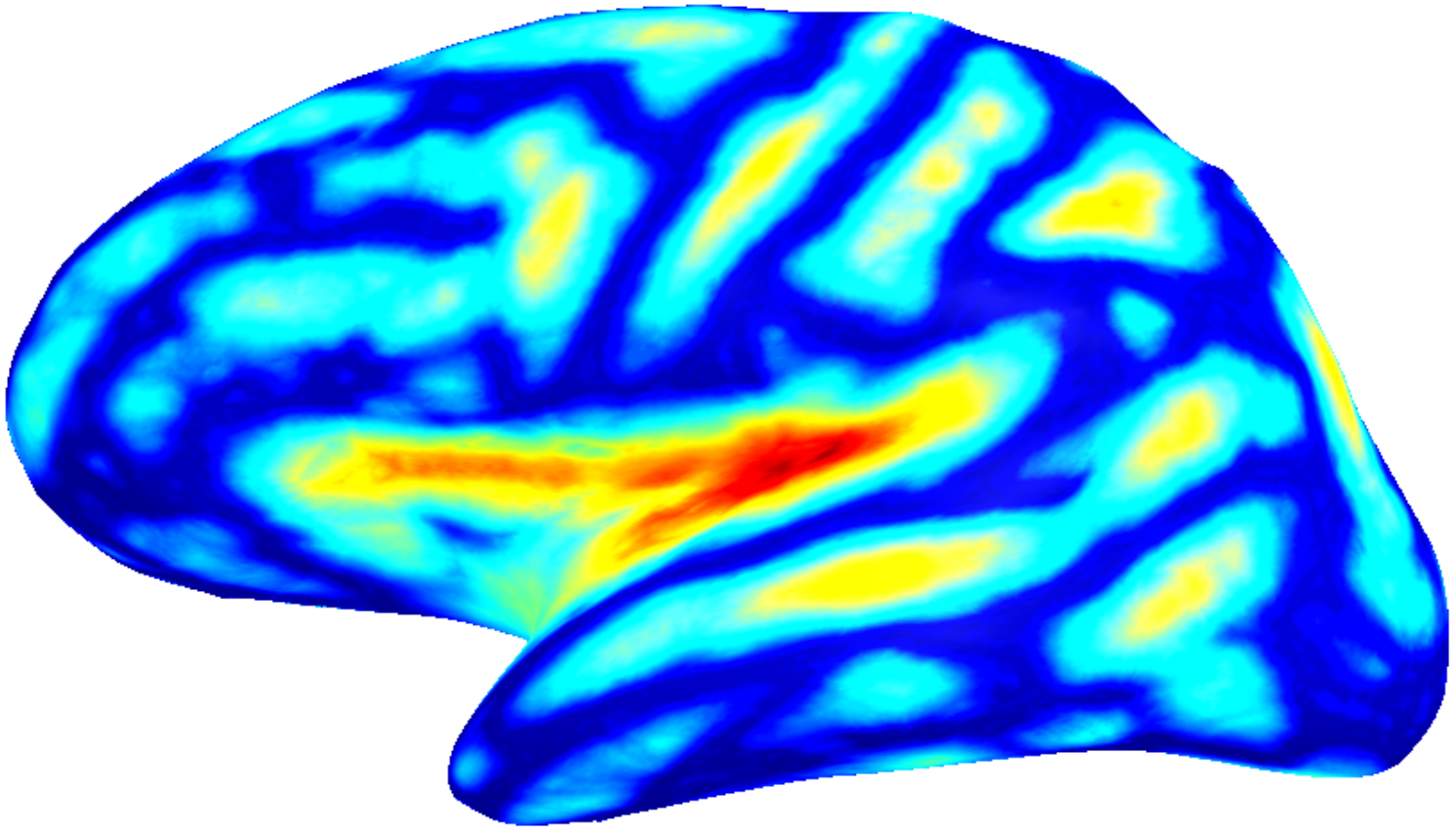
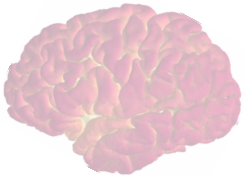
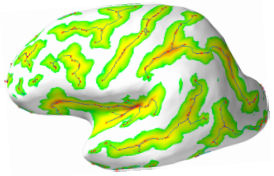


Travel depth (inflated surface)



morphometry



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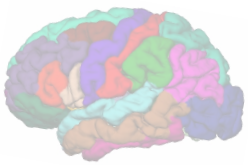

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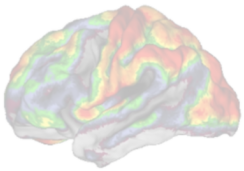

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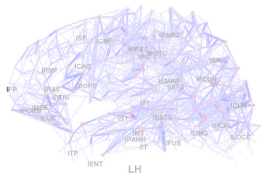

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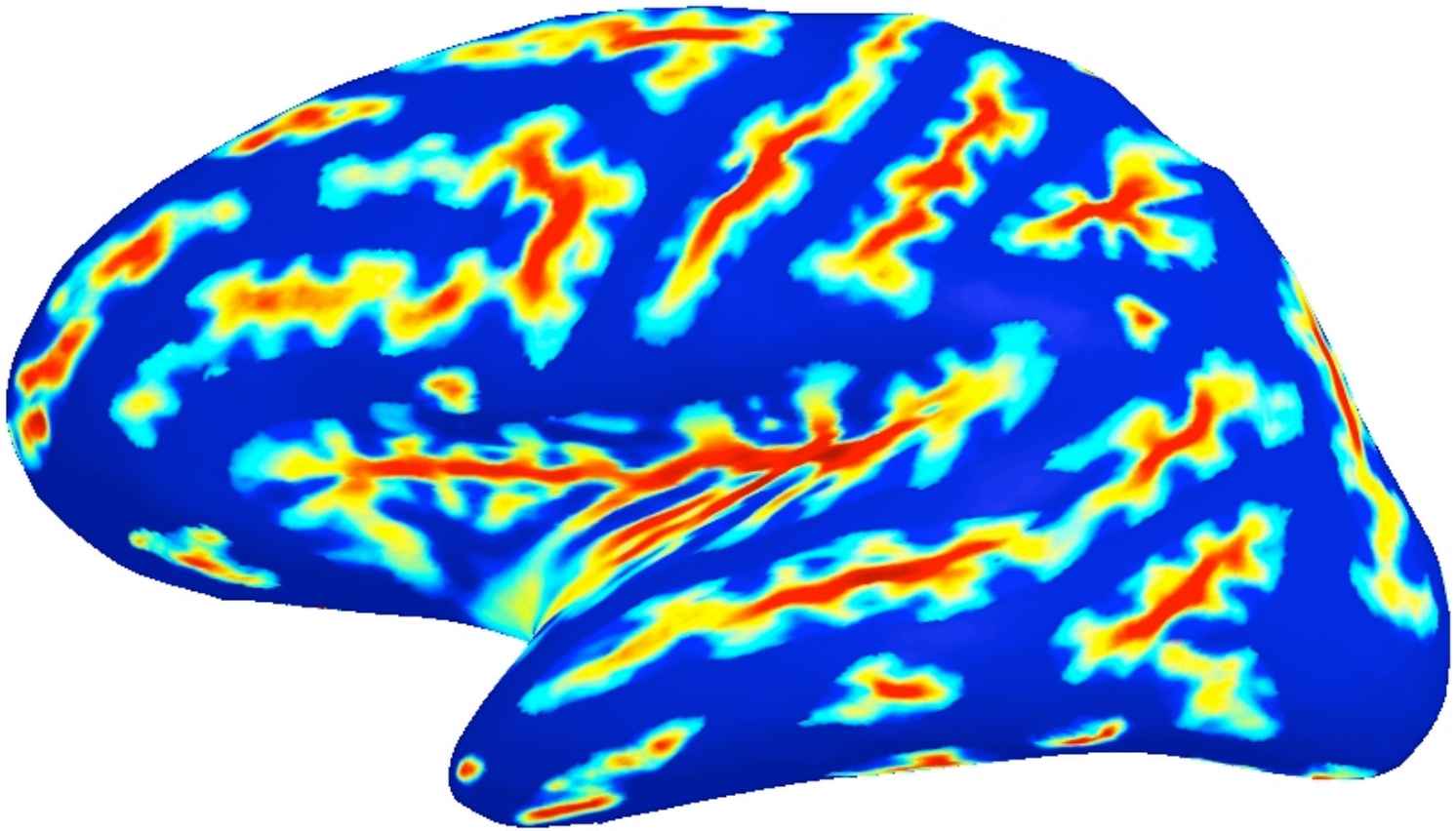
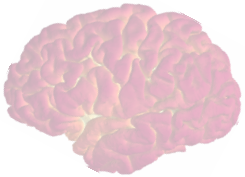


Fundus curves (HMMF)



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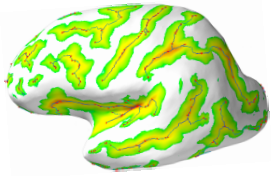

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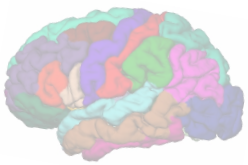

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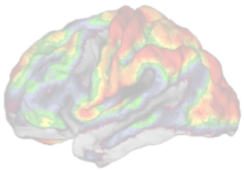

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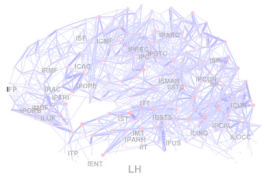

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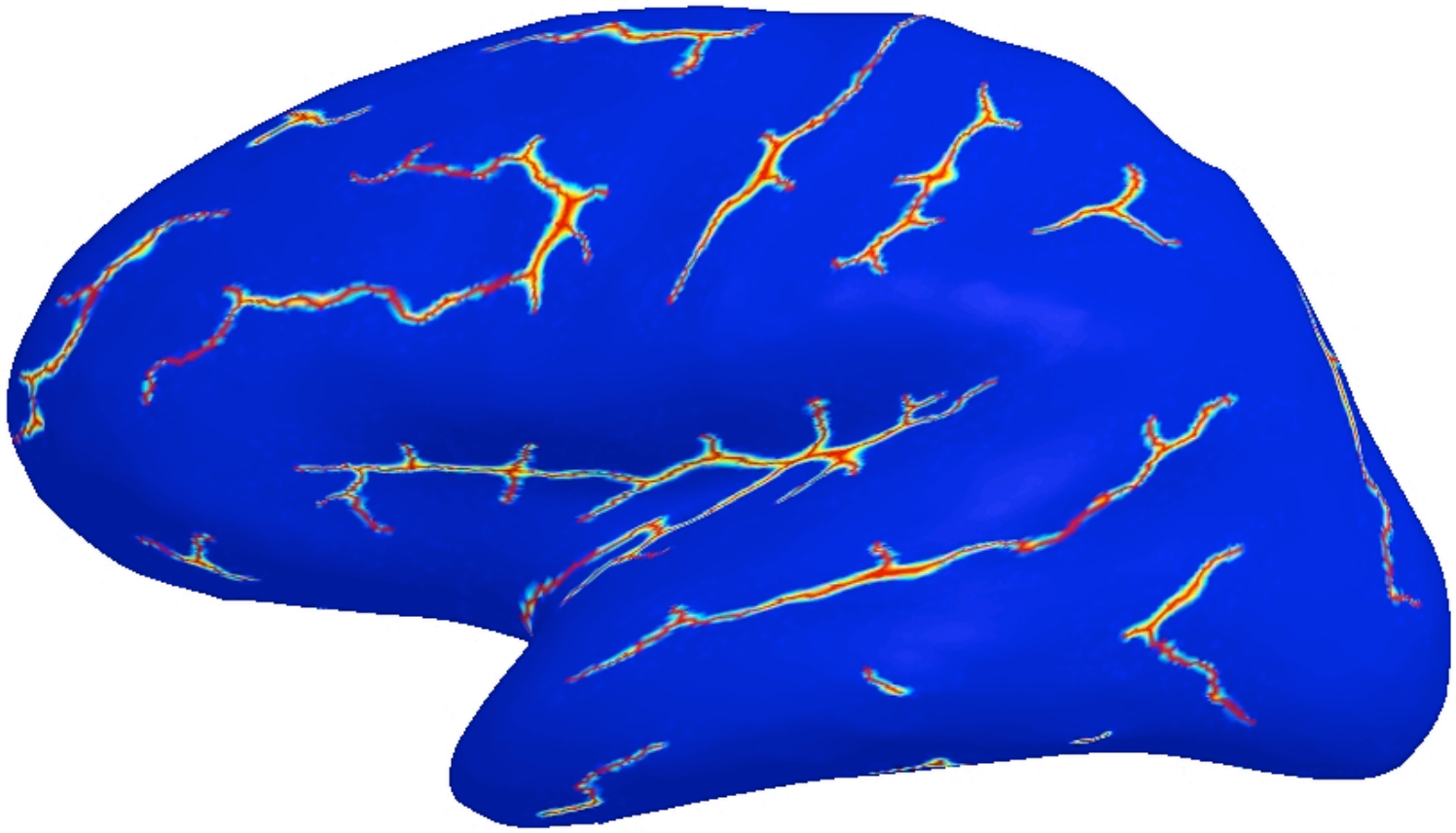

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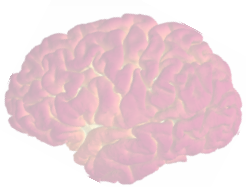

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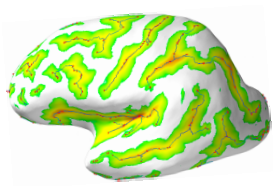
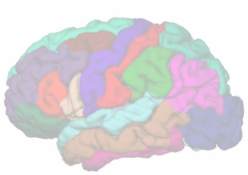


features



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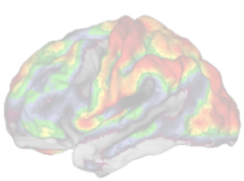

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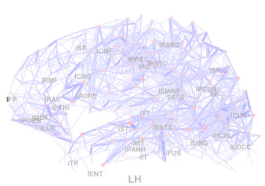

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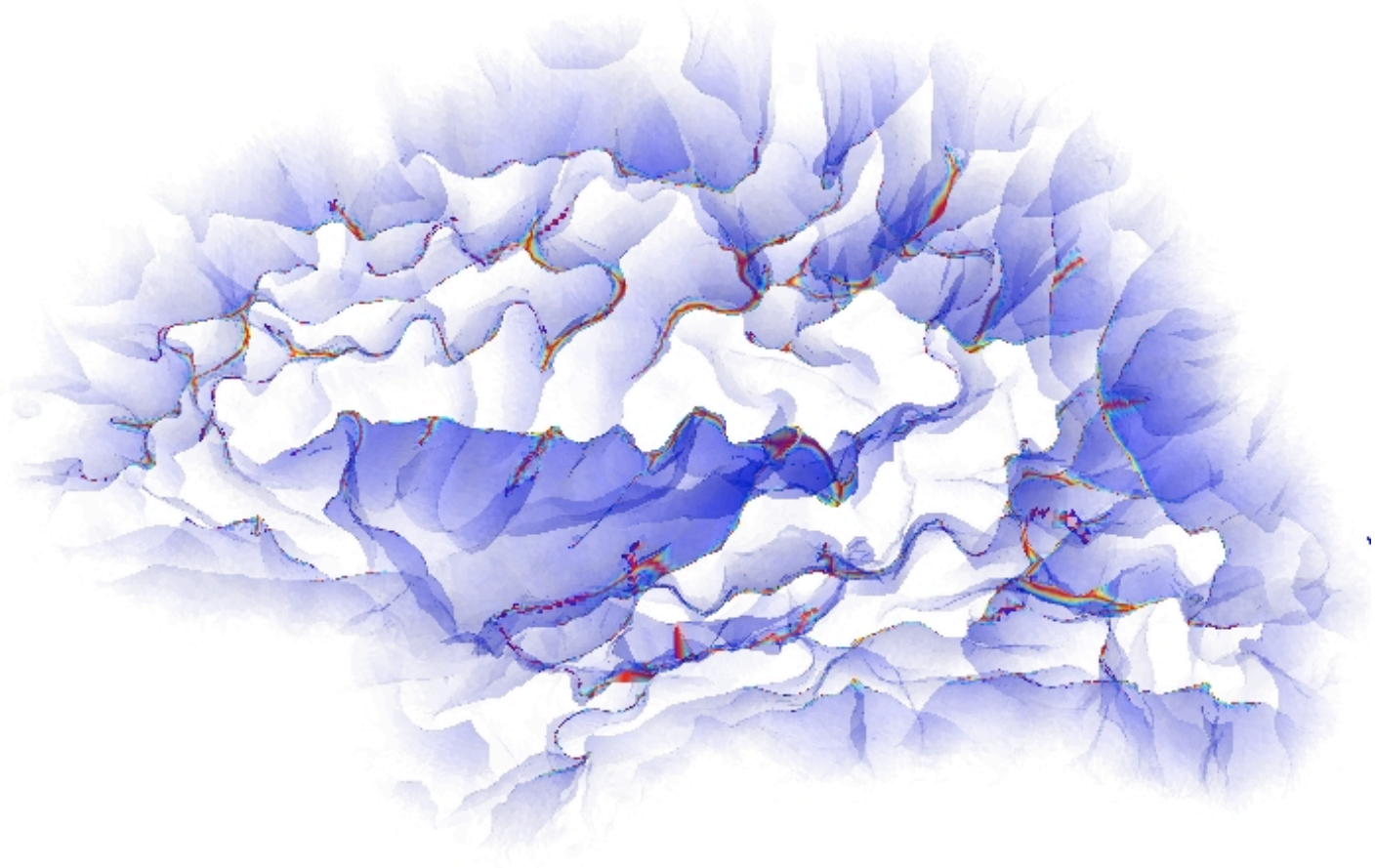
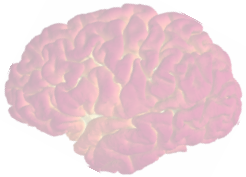


Fundus curves (HMMF)



morphometry

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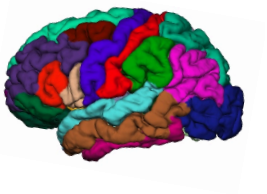

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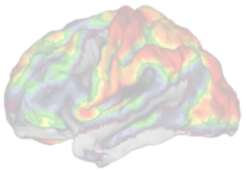

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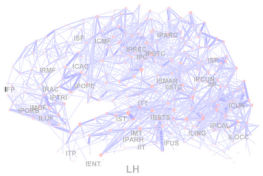

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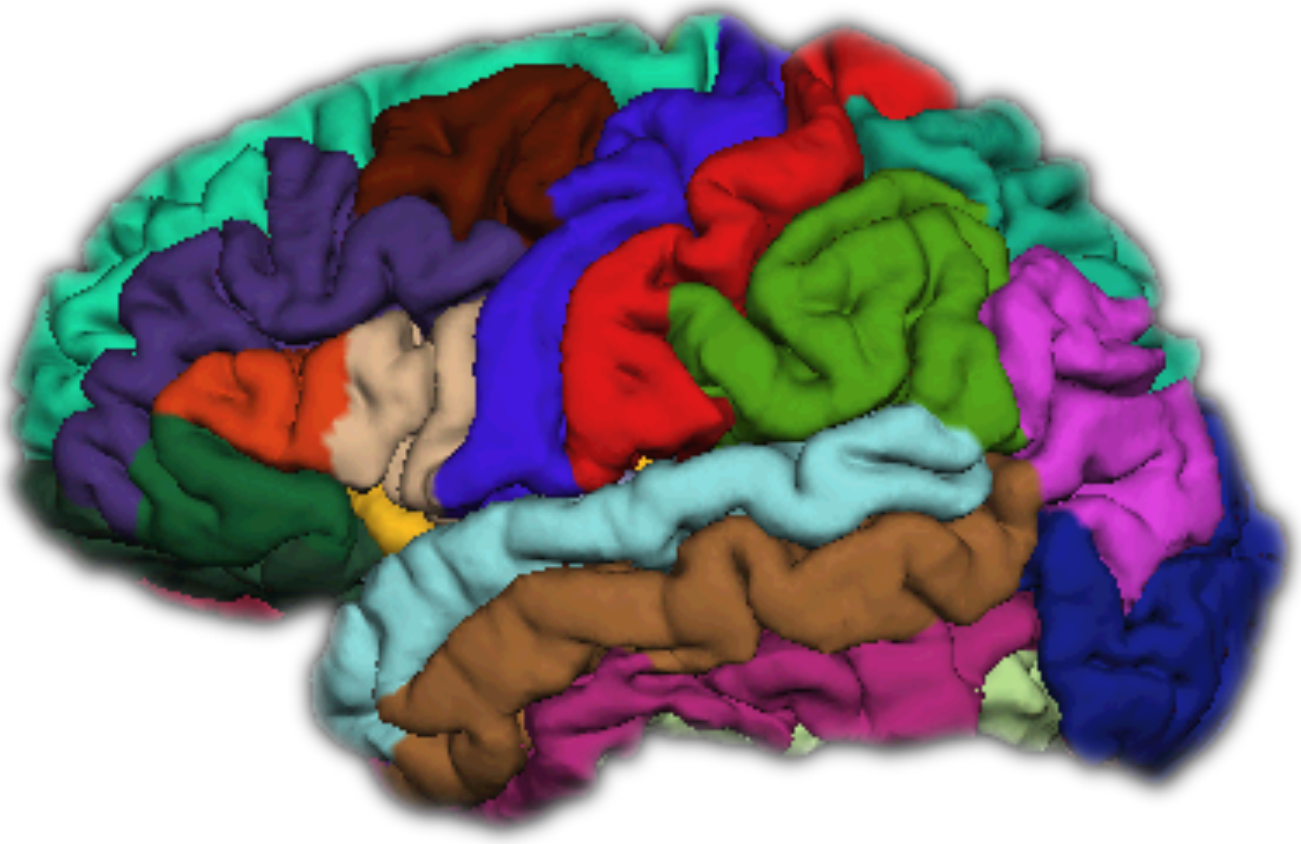

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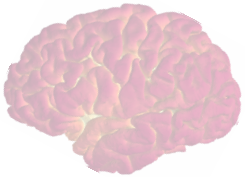
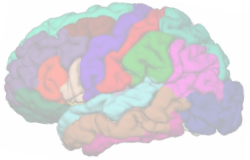


morphometry

features



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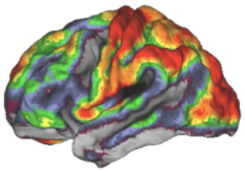

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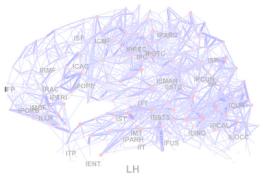

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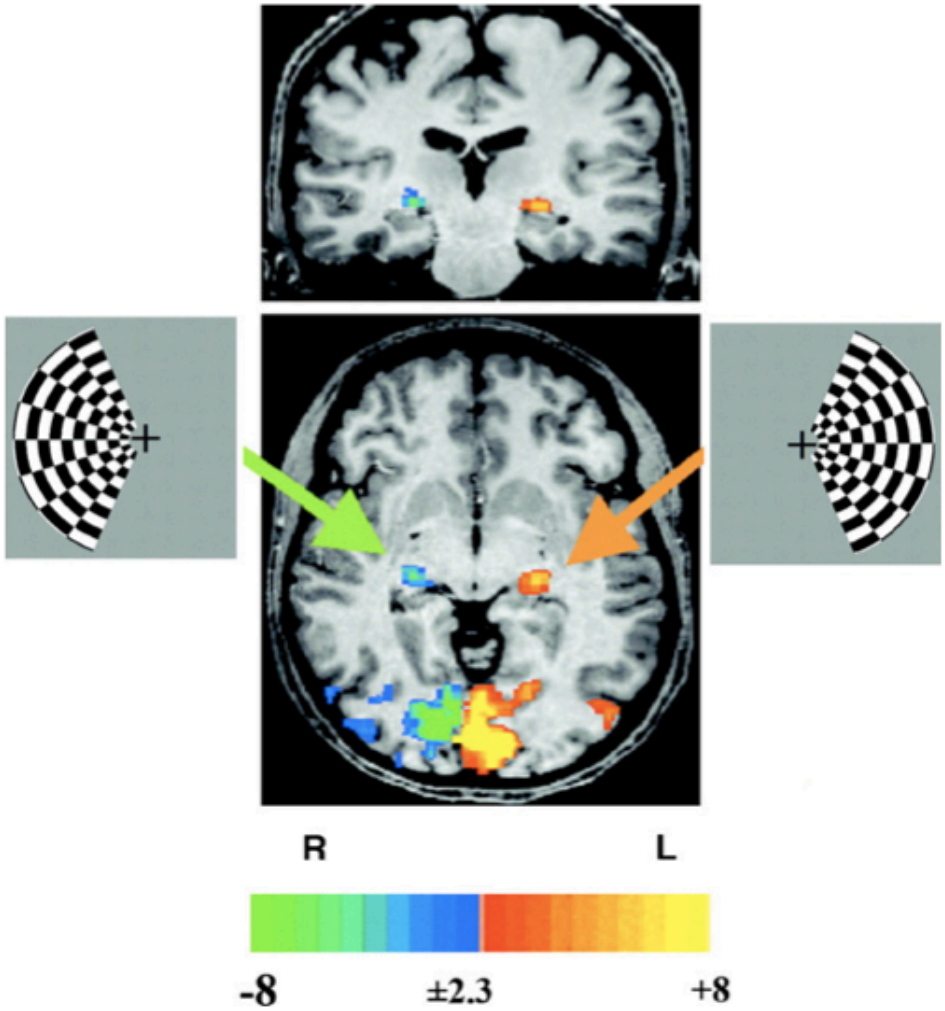
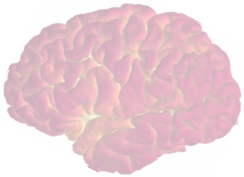
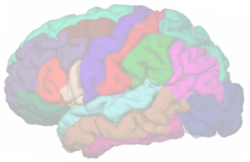


Kastner, et al., 2004



morphometry

features



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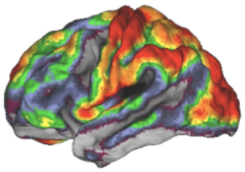

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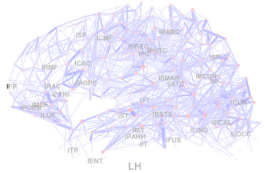

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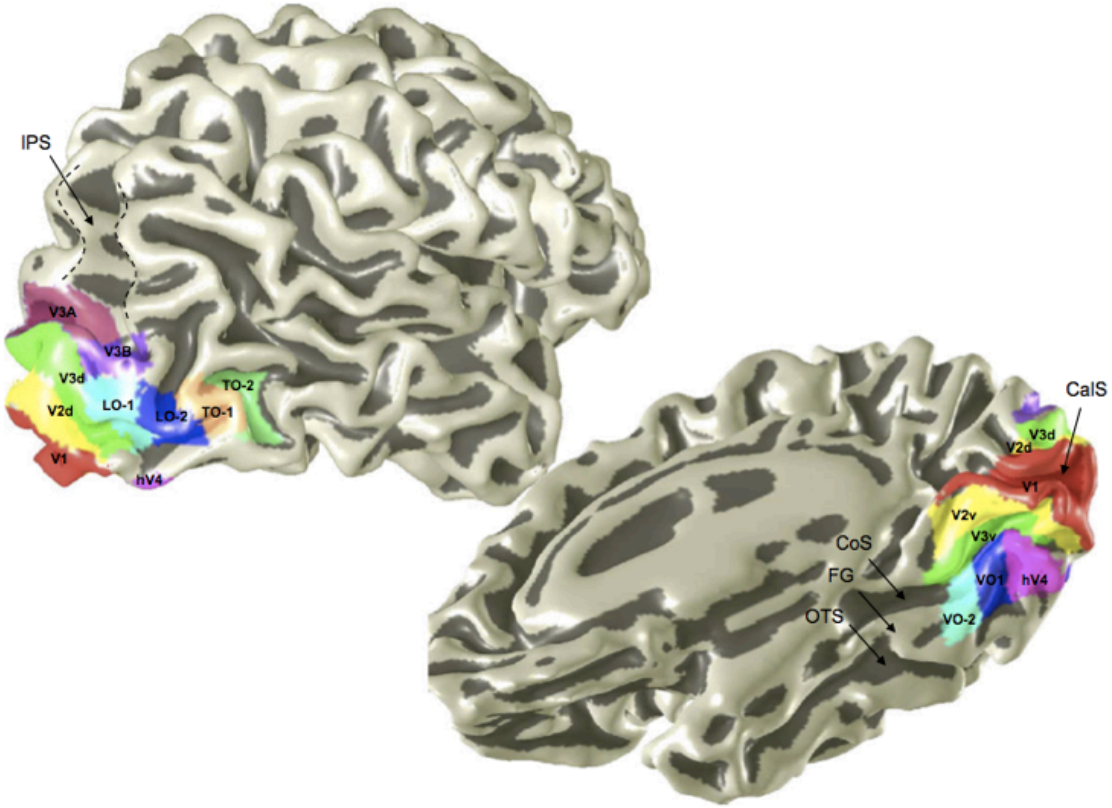

Visuotopic mapping

Wandell and Winawer, 2011

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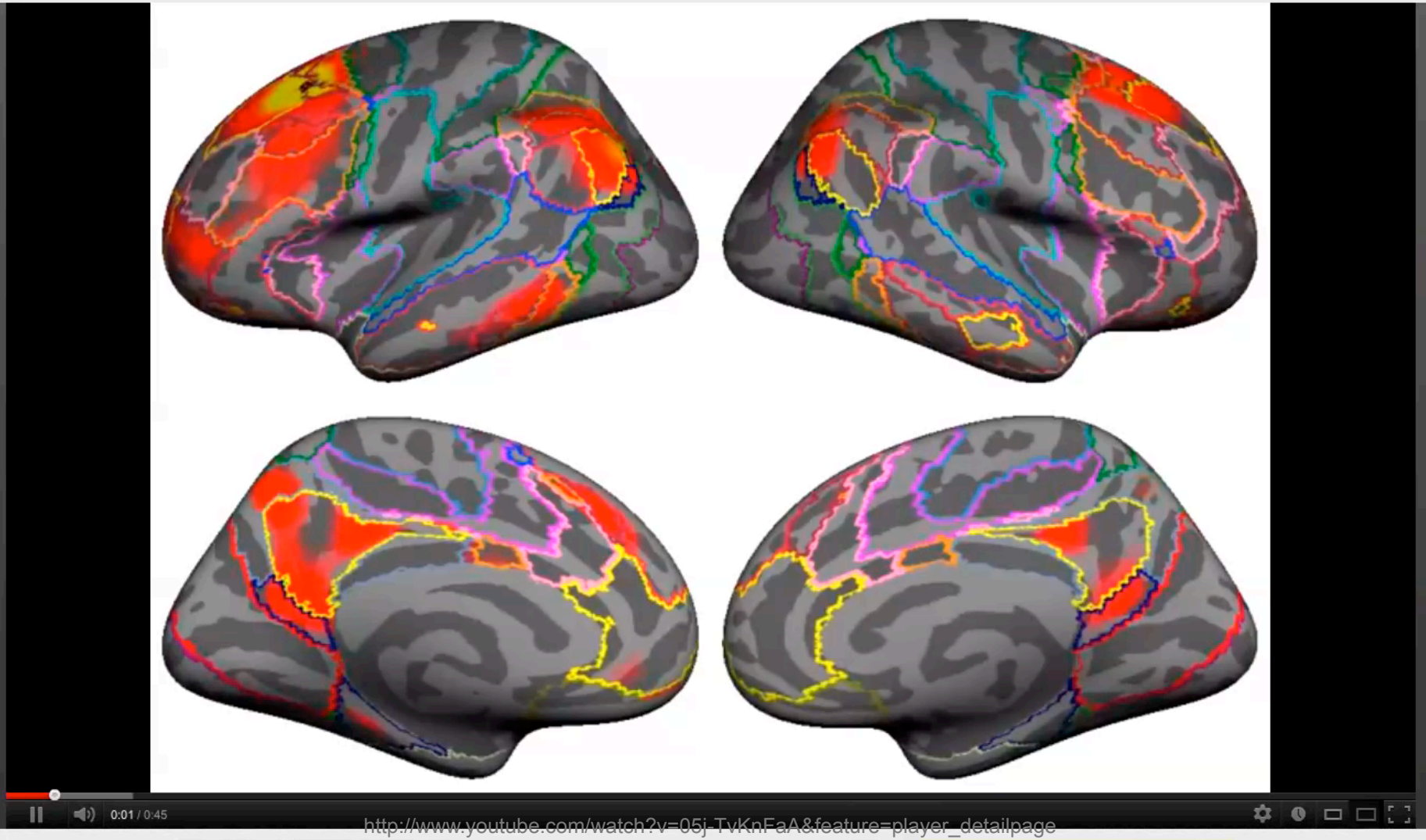

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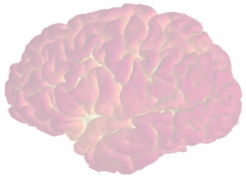
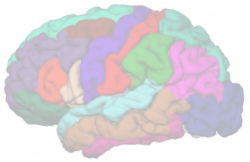


morphometry

features



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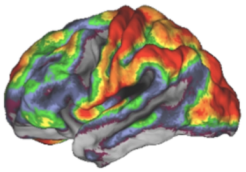

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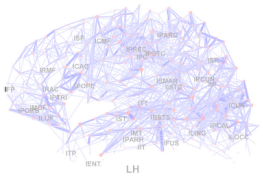
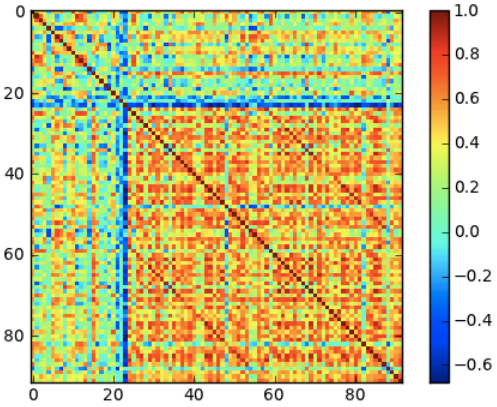
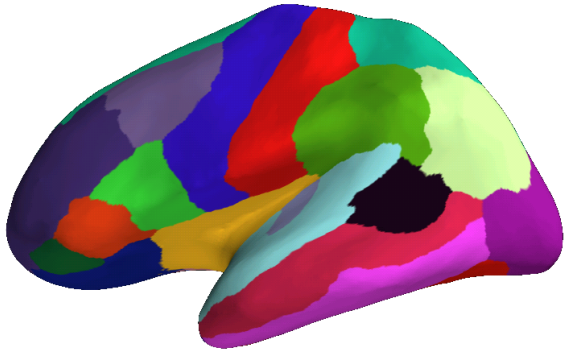
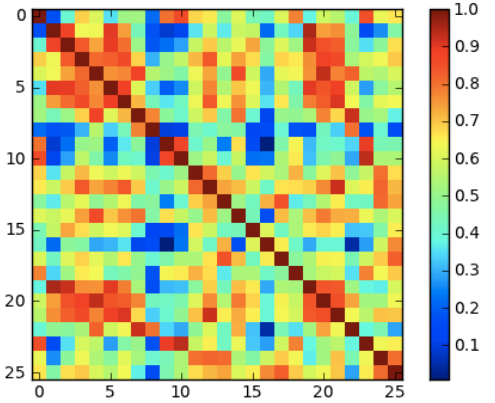
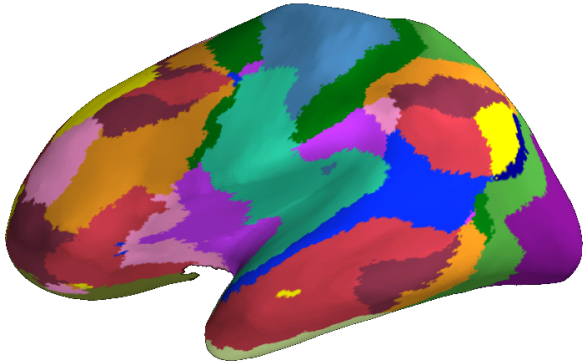


dMRI









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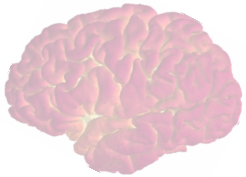
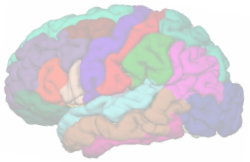


morphometry

features



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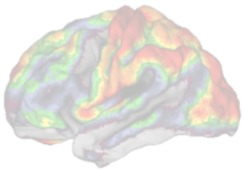

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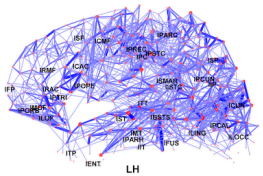

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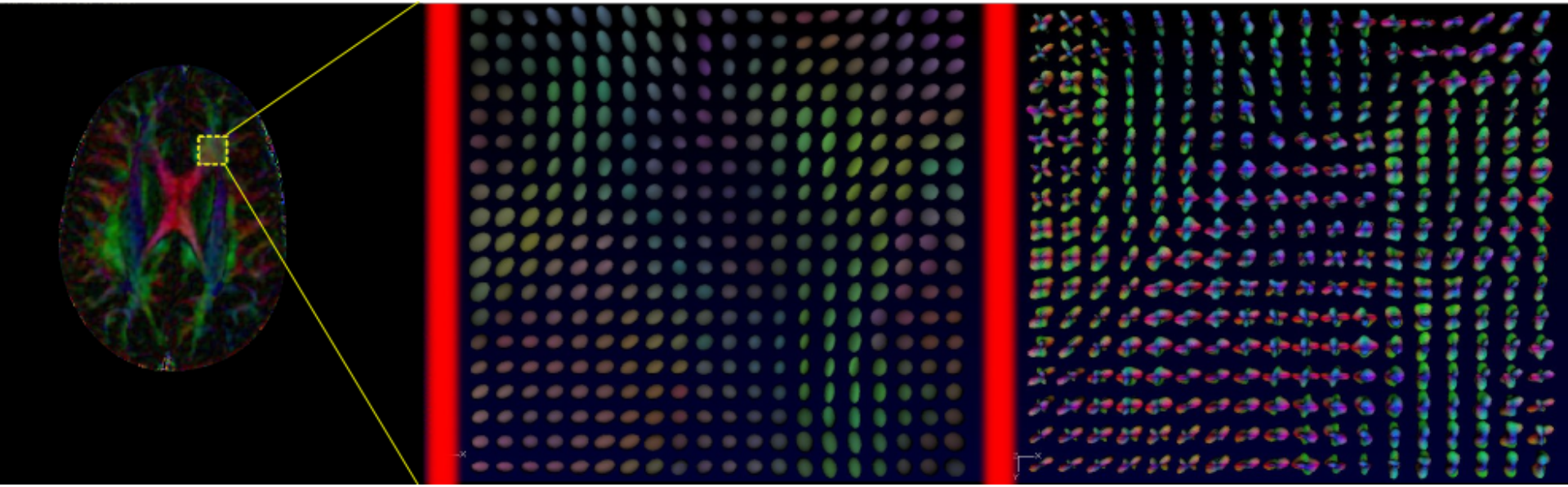
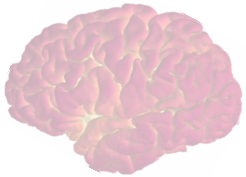


Diffusion MRI

http://www.cim.mcgill.ca/~assemlal/spip.php?



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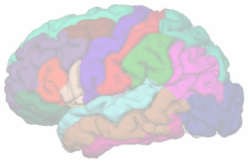

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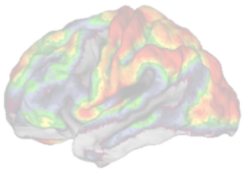

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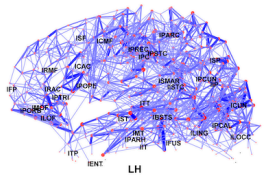

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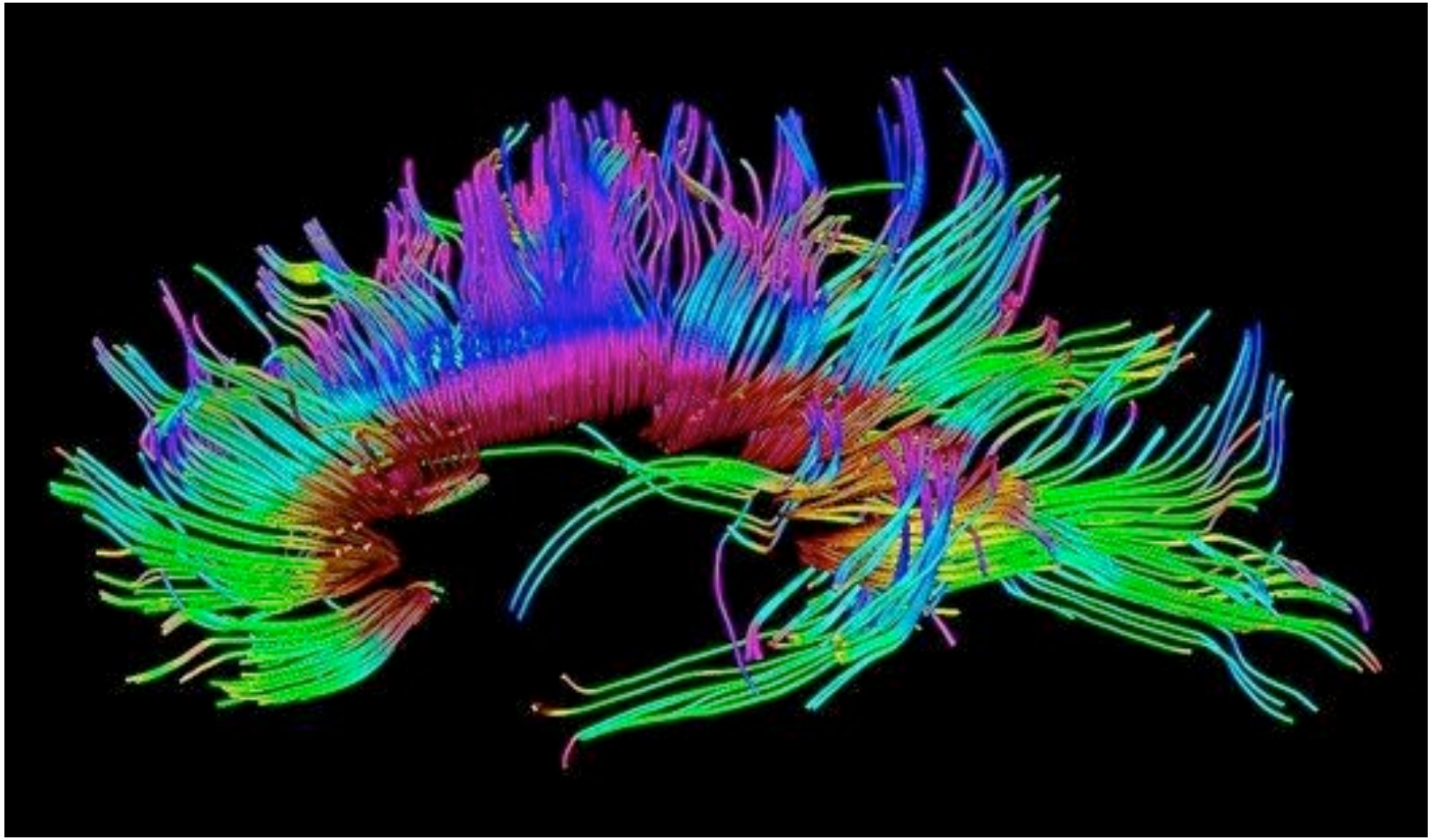
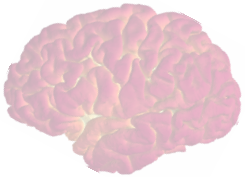


Diffusion tractography

Wiegall et al., 2003, Kirby



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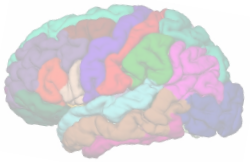

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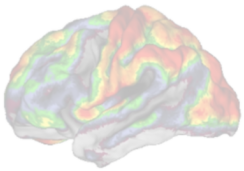

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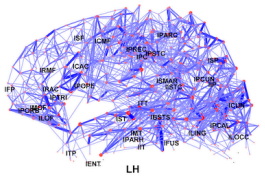

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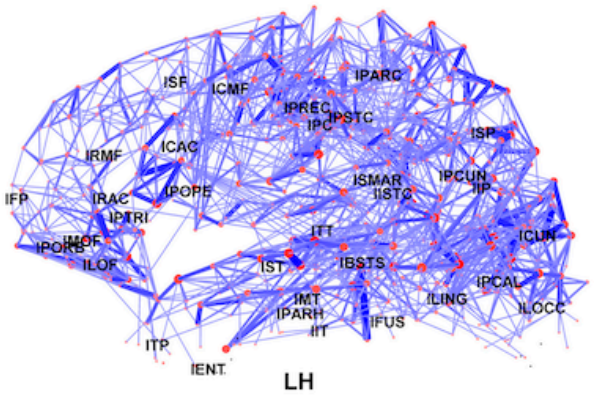

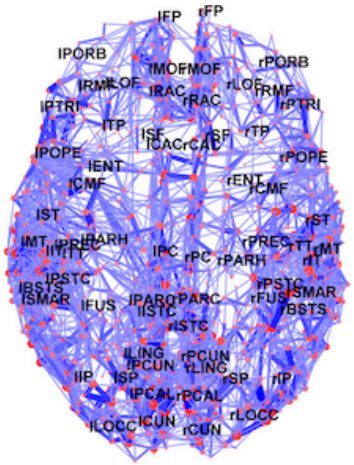

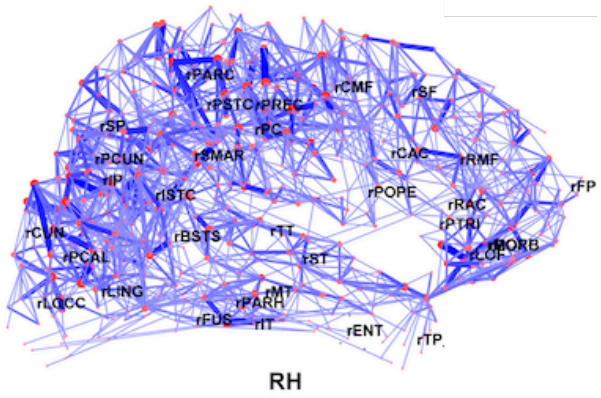

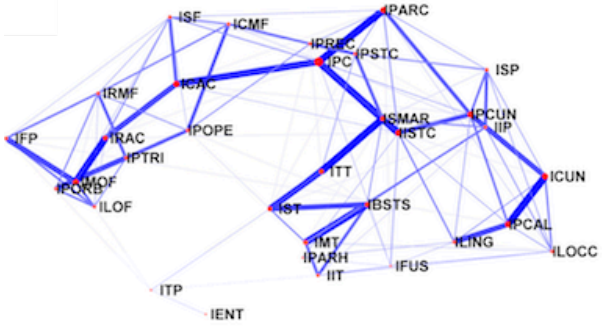

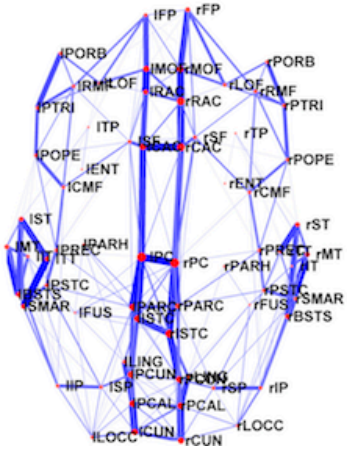

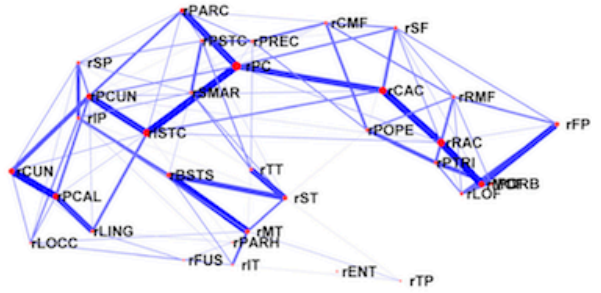

Tractography networks

Hagmann, et al., 2008