541
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A sulcal depth-based anatomical parcellation of the cerebral cortex

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Introduction

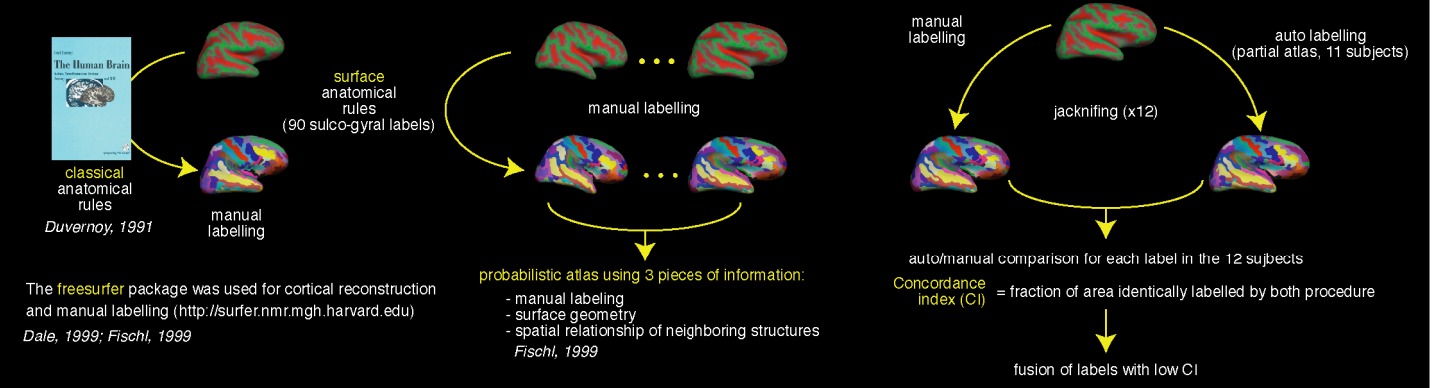
- One half to two thirds of the cortex is hidden in sulci
- Variability in the gyrification process leads to variable adult sulco-gyral pattern
- This variability makes recognition of sulco-gyral structures difficult on classical volumic views
- Inflated/flattened reconstructions decrease this 3D complexity and allow better inter-subjects comparison, averaging and automated cortical labeling *Dale, 1999; Fischl, 1999*
- Users need to get trained to inflated anatomy of the cortical surface

Goals

- To describe a set of precise anatomical rules labelling the entire inflated cortical surface
- To use them for automated labelling of the cerebral cortex

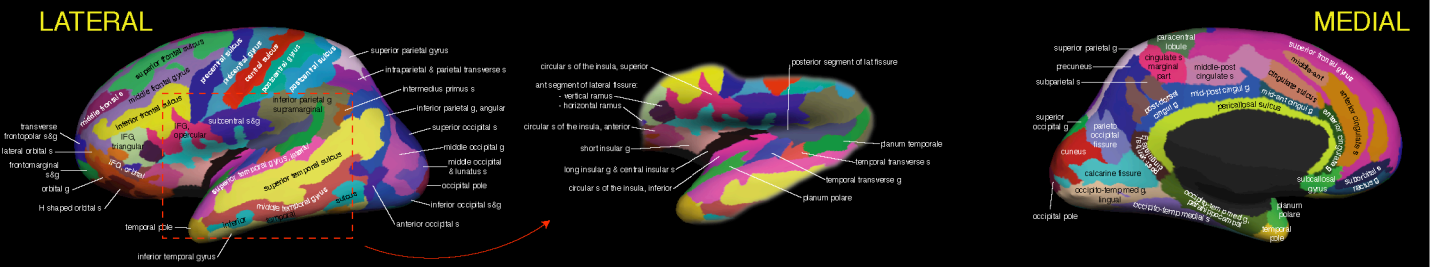
Method

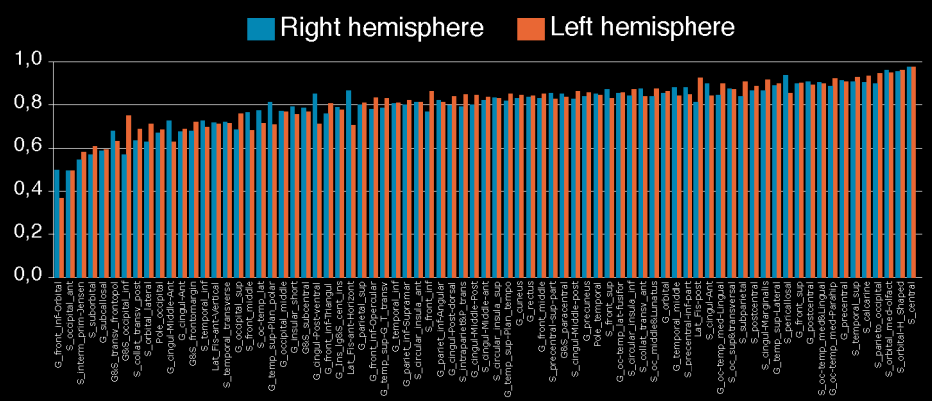
- 1- Description of anatomical rules (training set, 12 subjects)
- 2- Creation of probabilistic atlas (definitive set, 12 different subjects)
- 3- Validation & improvment of the atlas



The freesurfer package was used for cortical reconstruction and manual labelling (http://surfer.nmr.mgh.harvard.edu)
Dale, 1999; Fischl, 1999

Results





- 77 labels remained in the final atlas, distributed with freesurfer
- 85% of the surface was identically labelled by automated and manual procedures
- The concordance index varied :
  - high for central and medial regions
  - low for variable (occipital and frontal poles) or inconstant (middle frontal sulcus) regions

Support

CHRU de Tours, Tours, France; NIH NS18741 and NS44623 ; National Center for Research Resources (P41-RR14075, and the NCRR BIRN Morphometric Project BIRN002, U24 RR021382); the National Institute for Biomedical Imaging and Bioengineering (R01 EB001550, R01EB006758); the National Institute for Neurological Disorders and Stroke (R01 NS052585-01) as well as the Mental Illness and Neuroscience Discovery (MIND) Institute, and is part of the National Alliance for Medical Image Computing (NAMIC), funded by the National Institutes of Health through the NIH Roadmap for Medical Research, Grant U54 EB005149. Additional support was provided by The Autism & Dyslexia Project funded by the Ellison Medical Foundation.

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