ATLAS METHODS

The following paragraphs describe the methods that were used on the different version(s) of the ICBM Probabilistic Atlases.

ICBM Probabilistic Atlases

ICBM Probabilistic Tissue Atlas
All 452 ICBM subject T1-weighted scans were aligned with the atlas space, corrected for scan inhomogenities, and classified into gray matter, white matter, and cerebrospinal fluid. The 452 tissue maps were separated into their separate components and each component was averaged in atlas space across the subjects to create the probability fields for each tissue type. These fields represent the likelihood of finding gray matter, white matter,or cerebrospinal fluid at a specified position for a subject that has been linearly aligned to the atlas space.

ICBM Lobular Probabilistic Atlas
Fifty-three ICBM subjects were linearly aligned with the atlas space and each subject's lobes were manually delineated (specifically frontal, parietal, temporal, occipital, insular cortex, and cerebellum were delineated). These delineations were averaged across the subjects and used to create probability maps for the likelihood of finding the specified lobe at a given position in a young adult normal subject's brain that has been linearly aligned with the atlas.

ICBM Deep Nuclei Probabilistic Atlas
Fifty-three ICBM subjects were linearly aligned with the atlas space and each subject's caudate, thalamus, and putamen was manually delineated. Each delineation was averaged and used to create a probability map for the structure of interest in the atlas space. The probability maps represent the chances of finding the nucleus of interest at a specified location in the atlas for a subject that has been linearly aligned to the atlas space.

ICBM Sulcal Probabilistic Atlas
Fifty-nine T1-weighted MRI scans from ICBM subjects cross-matched for gender (30 males, 29 females), laterality (30 right-handed, 29 left-handed), and age (avgerage = 24.3 years) were processed to produce surface meshes representing the cerebral cortex of each subject. Twenty sulci were delineated bilaterally on each cortical mesh.* Subjects brains were then aligned with an affine transformation and a 5th-order polynomial transformation to the atlas space. The transforms were used to resample all sulci to the atlas space in a linear and a non-linear fashion and probability fields for each sulcus were created for the affine and 5th-order polynomial cases.

* Bilaterally defined sulci included: the central sulcus, precentral sulcus, postcentral sulcus, middle frontal sulcus, inferior frontal sulcus, ascending branch of the sylvian fissure, horizontal branch of the sylvian fissure, sulcus triangularis, olfactory sulcus, collateral sulcus, occipital-temporal sulcus, sylvian fissure, main branch of the superior temporal sulcus, ascending branch of the superior temporal sulcus, posterior branch of the superior temporal sulcus, inferior temporal sulcus, intraparietal sulcus, primary intermediate sulcus, secondary intermediate sulcus, and the transverse occipital sulcus for a total of 40 sulci per subject.

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