

LONI Probabilistic Brain Atlas

Individual Subject Data

This document accompanies the individual subject files that were used to compose the LPBA40 atlases. This document contains important details regarding the spaces that were used for each file, as well as the left-right convention used (i.e., neurological vs. radiological). A description of the methodology used in constructing the atlases appears in our submitted paper:

Shattuck DW, Mirza M, Adisetiyo V, Hojatkashani C, Salamon G, Narr KL, Poldrack RA, Bilder RM, Toga AW (2007) Construction of a 3D Probabilistic Atlas of Human Cortical Structures, submitted to NeuroImage.

This paper should be referenced in any works that use the data provided here.

The data may be downloaded from the website: <http://www.loni.ucla.edu/Atlases/LPBA40>.

Any feedback regarding this collection of data can be addressed to David Shattuck (shattuck@loni.ucla.edu). We encourage investigators who develop projects based on this collection to let us know about their work.

An Important Note about Orientation

In using the files provided in these data sets, caution must be used to ensure that the proper spaces and orientations are used. All image volumes are stored in Analyze Image file format, with a header file and an image volume. Except where explicitly noted, the files are stored in **neurological** convention, i.e., left is left. The files in neurological orientation were used to create the LPBA40.AIR and LPBA40.SPM5 atlases. To properly read the data in SPM5, we used the following setting in the `spm_defaults.m` file:

```
defaults.analyze.flip      = 0; % <=> Very important.  Relates to L/R
```

If you are using FLIRT to process these data, we recommend that you either flip the data or use the files contained in the LPBA40.native_space_radio.zip file. The data in these files were used to create the LPBA40.FLIRT atlas and are stored in **radiological** convention. Note that the same delineation files were used in both cases, however we have .air files that specify the mappings between each individual's delineation space and both radiological and neurological native space (see below).

File Contents

We have grouped the data into zip files based on the spaces used. All image files have been compressed using gzip to minimize storage and bandwidth. Each zip file contains a set of subdirectories, labeled S01, S02, etc., for each individual subject. For example, LPBA40.native_space.zip will uncompress to create a directory and subdirectory called LPBA40/native_space; native_space will contain the 40 subject subdirectories. In the description below, we use S__ to represent a particular subject. The delineation_space directory has been grouped into one archive for image volume data and one archive for surface data.

LPBA40subjects.native_space.zip

This file contains individual MRI data in the native space as converted from the scanner.

LPBA40/native_space/S__:

1. S__.native.mri.img.gz (16-bit integer) : the original MRI volume
2. S__.native.brain.mask.img.gz (8-bit integer) : the whole brain mask for subject S__.
3. S__.native.brain.bfc.img.gz (16-bit integer) : the bias corrected, brain only volume for subject S__ (BFC was applied in neurological orientation).

LPBA40/native_space/S__/transforms:

4. S__.delineation.to.native.air : the AIR rigid body transform file specifying the transformation from the delineation space to the S__ native space.

LPBA40/native_space/S__/tissue:

5. S__.native.tissue.img.gz (32-bit floating point) : a volume specifying the estimated tissue content at each voxel. 1 = CSF, 2 = GM, 3 = WM. Fractional values between these numbers indicate partial volumes (PVC was applied in neurological orientation).

LPBA40subjects.native_space_radio.zip

This file contains individual MRI data in the native space, but stored in radiological ordering.

LPBA40/native_space_radio/S__:

1. S__.native_radio.mri.img.gz (16-bit integer) : the original MRI volume
2. S__.native_radio.brain.mask.img.gz (8-bit integer) : the whole brain mask for subject S__.
3. S__.native_radio.brain.bfc.img.gz (16-bit integer) : the bias corrected, brain only volume for subject S__ (BFC was applied in radiological orientation).

LPBA40/native_space/S__/transforms:

4. S__.delineation.to.native_radio.air : the AIR rigid body transform file specifying the transformation from the delineation space to the S__ native space.

LPBA40/native_space/S__/tissue:

5. S__.native_radio.tissue.img.gz (32-bit floating point) : a volume specifying the estimated tissue content at each voxel. 1 = CSF, 2 = GM, 3 = WM. Fractional values between these numbers indicate partial volumes (PVC was applied in radiological orientation).

LPBA40subjects.delineation_space.zip

This file contains the labels that were created manually to annotate the brain structures in the LPBA40, as well as the MRI volumes that were rigidly aligned to the MNI305 average brain. This file also contains an xml file, lpba40.label.xml, that describes the structure ID numbers. This file can be loaded into BrainSuite.

LPBA40/delineation_space/S__:

1. S__.delineation.skullstripped.img.gz (16-bit integer) : the MRI volume for subject S01, aligned to MNI305 space using rigid body alignment.
2. S__.delineation.structure.label.img.gz (8-bit integer) : the delineation label file created to accompany S__.delineation.skullstripped.img.gz. The integer labels used are provided in the table at the end of this document and in the lpba40.label.xml file.

LPBA40subjects.delineation_space_surfaces.zip

This file contains the surface models that were used as a reference when the structure delineations were performed. The files are in the delineation space of each subject, with a model for the left and right hemispheres. The files are in MNI's .obj format.

LPBA40/delineation_space/S__ /surfaces:

1. S__.delineation.left.hemisphere.obj.gz : the left cerebral hemisphere surface model.
2. S__.delineation.right.hemisphere.obj.gz : the right cerebral hemisphere surface model.

LPBA40subjects.ICBM452_transforms.zip

This file contains the transforms used to create the LPBA40/AIR atlas.

LPBA40/ICBM452/S__ /transforms:

1. S01.delineation.to.icbm452.warp (5th order AIR warp file) : the mapping from the subject S__'s delineation space to the ICBM452 5th order warp atlas.
2. S01.native.to.icbm452.warp (5th order AIR warp file) : the mapping from the subject S__'s native space to the ICBM452 5th order warp atlas

LPBA40subjects.FLIRT_transforms.zip

This file contains the transforms used to create the LPBA40/FLIRT atlas.

LPBA40/FLIRT /S__ /transforms:

1. S__.native_radio.flirtreg_2mm.mat (FLIRT registration file) : the affine mapping from native_radio space to the FSL version of the ICBM152 atlas.
2. S__.native_radio.to.fsl152.air (AIR file) : the conversion of the above file into an AIR transform.
3. S__.delineation.to.fsl152.air (AIR file) : the mapping from the delineation space (in neurological ordering) to the FSL152 atlas (in radiological ordering).

LPBA40subjects.SPM5_transforms.zip

This file contains the transforms used to create the LPBA40/SPM5 atlas.

LPBA40/SPM5 /S__ /transforms:

1. S__.native.mri_seg_sn.mat (SPM5 transformation file) : the SPM5 mapping from native space of subject S__ to the SPM5 version of the ICBM152 atlas.
2. S__.native.mri_seg_inv_sn.mat (SPM5 transformation file) : the SPM5 mapping from the SPM5 version of the ICBM152 atlas to the native space of subject S__.

LPBA40 Delineation Labels

21	L superior frontal gyrus	81	L superior temporal gyrus
22	R superior frontal gyrus	82	R superior temporal gyrus
23	L middle frontal gyrus	83	L middle temporal gyrus
24	R middle frontal gyrus	84	R middle temporal gyrus
25	L inferior frontal gyrus	85	L inferior temporal gyrus
26	R inferior frontal gyrus	86	R inferior temporal gyrus
27	L precentral gyrus	87	L parahippocampal gyrus
28	R precentral gyrus	88	R parahippocampal gyrus
29	L middle orbitofrontal gyrus	89	L lingual gyrus
30	R middle orbitofrontal gyrus	90	R lingual gyrus
31	L lateral orbitofrontal gyrus	91	L fusiform gyrus
32	R lateral orbitofrontal gyrus	92	R fusiform gyrus
33	L gyrus rectus		
34	R gyrus rectus	101	L insular cortex
		102	R insular cortex
41	L postcentral gyrus	121	L cingulate gyrus
42	R postcentral gyrus	122	R cingulate gyrus
43	L superior parietal gyrus		
44	R superior parietal gyrus	161	L caudate
45	L supramarginal gyrus	162	R caudate
46	R supramarginal gyrus	163	L putamen
47	L angular gyrus	164	R putamen
48	R angular gyrus	165	L hippocampus
49	L precuneus	166	R hippocampus
50	R precuneus	181	cerebellum
		182	brainstem
61	L superior occipital gyrus		
62	R superior occipital gyrus		
63	L middle occipital gyrus		
64	R middle occipital gyrus		
65	L inferior occipital gyrus		
66	R inferior occipital gyrus		
67	L cuneus		
68	R cuneus		