

AAL3 User Guide

The automated anatomical parcellation AAL3 of the spatially normalized single-subject high-resolution T1 volume provided by the Montreal Neurological Institute (MNI). This includes the original parcellation provided in AAL (Tzourio-Mazoyer et al 2002), the new parcellation of the orbitofrontal cortex provided in AAL2 (Rolls, Joliot, and Tzourio-Mazoyer, 2015), but also new areas, as described in this User Guide and by (Rolls et al., 2019).

Download

AAL3, released on the 27 August 2019:

SPM12 version of AAL3 software: AAL3_for_SPM12.tar.gz

User guide

Following a first version AAL of the automated anatomical labeling atlas (Tzourio-Mazoyer et al 2002), a second version (AAL2) (Rolls, Joliot, and Tzourio-Mazoyer, 2015) was developed that provided an alternative parcellation of the orbitofrontal cortex following the description provided by Chiavaras, Petrides, and colleagues. We now provide a third version, AAL3, which adds a number of brain areas not previously defined, but of interest in many neuroimaging investigations. The new areas in the third version are subdivision of the anterior cingulate cortex into subgenual, pregenual and supracallosal parts; the thalamus; the nucleus accumbens, substantia nigra, ventral tegmental area, red nucleus, locus coeruleus, and raphe nuclei. The new atlas is available as a toolbox for SPM, and can be used with MRIcron.

As in the previous release of AAL, AAL3 is provided with isotropic voxel size 2x2x2 mm. In addition, AAL3_1mm is also provided with a 1x1x1 mm voxel sampling size. Note that only the the AAL3 added regions benefit from this finer spatial definition.

How to install the software

1) Copy the archive to the chosen location (e.g. /usr/local/soft/spm12/toolbox)

```
unix> cp AAL3_for_SPM12.tar.gz /usr/local/soft/spm12/toolbox
```

```
unix> cd /usr/local/soft/spm12/toolbox
```

2) Gunzip and untar the archive will create an aal directory

```
unix> tar -zxvf AAL3_for_SPM12.tar.gz
```

3) Add this directory to your Matlab path and copy the 4 files in your SPM12/atlas directory:

```
unix> mkdir /usr/local/soft/spm12/atlas
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3.nii /usr/local/soft/spm12/atlas
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3.xml /usr/local/soft/spm12/atlas
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3_1mm.nii /usr/local/soft/spm12/atlas
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3_1mm.xml /usr/local/soft/spm12/atlas
```

4) To install AAL3 for mricron software:

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3.nii.gz /usr/local/soft/mricron/templates
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3.nii.txt /usr/local/soft/mricron/templates
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3_1mm.nii.gz /usr/local/soft/mricron/templates
```

```
unix> cp /usr/local/soft/spm12/toolbox/aal3/AAL3_1mm.nii.txt /usr/local/soft/mricron/templates
```

(In Windows, copy the 4 files AAL3.nii.gz, AAL3.nii.txt and AAL3_1mm.nii.gz and AAL3_1mm.nii.txt into mricron/templates.)

How to use the software

1) Launch Matlab

```
unix> matlab
```

2) First option: launch AAL3 from SPM12:

```
>> spm_fmri
```

Select the desired contrast, mask, probability and extent threshold like in the regular spm_result.
In the SPM12 Menu window:

Toolbox / AAL3

Then choose a labeling procedure as below from the instructions (4).

3) An alternative is to launch AAL from the Matlab command window:

```
>> AAL3
```

Select the desired contrast, mask, probability and extent threshold like in the regular spm_result.
Then choose a labeling procedure as below from the instructions (4).

4) Choose a labeling procedure. The 3 choices are explained and documented in the paper (Tzourio-Mazoyer et al., 2002):

- Local maxima labeling
- Extended local maxima labeling
- Cluster labeling

5) For "Extended local maxima labeling" input the local maxima radius of the sphere in millimeters (default 10 mm).

6) Select the anatomical parcellation database

In /usr/local/soft/spm12/toolbox/AAL3

The file: ROI_MNI_V6.nii (2mm voxel edge, same file than AAL3)

or

The file: ROI_MNI_V6_1mm.nii (1mm voxel edge, same file than AAL3_1mm)

7) There is also a third option to get the label:

```
unix> matlab
```

```
>> spm_fmri
```

Select the desired contrast, mask, probability and extent threshold like in the regular spm_result.
In the SPM12 Results window: Atlas / Label using / AAL3

Then you get the label with a right click on the coordinates in the Graphic window.

Original references

Automated Anatomical Labeling of Activations in SPM Using a Macroscopic Anatomical Parcellation of the MNI MRI Single-Subject Brain. N. Tzourio-Mazoyer, B. Landeau, D. Papathanassiou, F. Crivello, O. Étard, N. Delcroix, B. Mazoyer, and M. Joliot. *NeuroImage* 2002.

15: 273-289.

<http://dx.doi.org/10.1006/nimg.2001.0978>

Implementation of a new parcellation of the orbitofrontal cortex in the automated anatomical labeling atlas. Rolls ET, Joliot M & Tzourio-Mazoyer N (2015) *NeuroImage* 122: 1-5.

<http://dx.doi.org/10.1016/j.neuroimage.2015.07.075>

References

Rolls, E.T., Huang, C.C., Lin, C.-P., Feng, J., Joliot, M., 2019. Automated anatomical labelling atlas 3, submitted.