Note these protocols are the "raw" material used in the lab for the manual segmentations of the adult datasets which were used as priors/classifiers in the creation of the 33 atlases of 2-year olds. They are temporarily hosted on this web page following a reviewer's request but are being prepared for publication together with the latest version of the adult atlases (paper in internal review). Once published, we will provide a citable reference on this page.

Structures 50 and 51: Precentral gyrus (left, right).

- *Cave:* For all of the following, use new "split module" (appears after pressing the edit button, make sure to define new object). The precentral sulcus is usually interrupted [Ono, 1990 #1157], and therefore the boundary sometimes needs to cross a gyrus to regain the sulcus. An important help for the precentral gyrus, especially for the decision when to cross a gyrus, is the Display -> Volume Render -> Generate -> Rotation -> Named View -> Right/Left -> Change View tool (Figure 5051-1)
- *Orientation of slices:* first transverse, then sagittal; *Viewing size:* double; quadruple may be necessary for the superiormost slices.
- *Anterior border:* superior to inferior: Precentral sulcus. Draw a line from the medial end of the precentral sulcus to the paracentral sulcus [Duvernoy, 1999 #1190] (Figure 5051-2). This is usually the first clear sulcus anterior of the posterior boundary of the frontal lobe on the medial surface, but check on sagittal that this is indeed the paracentral sulcus (Figure 5051-3) (as shown in [Duvernoy, 1999 #1190]; other authors sometimes define sulci arising from inferiorly as the paracentral sulcus [Ono, 1990 #1157]). On the medial wall, the frontal part of the paracentral lobule is thus included. See also superior and inferior border.

  Further inferiorly, where the paracentral sulcus has disappeared, draw a horizontal line from the medial end of the precentral sulcus to the medial border (Figure 5051-4). This means there will often be a big step on the medial wall inferior of the end of the quite variable paracentral sulcus. The medial end of the precentral sulcus is typically far more posterior than its lateral end, giving the resulting structure a hooked appearance. In its upper to middle third, the medial end of the precentral gyrus will end quite laterally. As long as the superior frontal sulcus is visible (clearly visible running from the anterior to the posterior part of the frontal lobe, roughly halfway between lateral and medial border), do not include the white matter belonging to the superior frontal gyrus but continue the line from the medial end of the precentral gyrus to the posterior end of the superior frontal sulcus, and then cross to the medial border (Figure 5051-5)
- *Posterior border:* superior to inferior: Central sulcus as previously defined
- *Medial border:* Medial border of frontal lobe as previously defined (structure 28 and 29; superior to inferior: Midline/CSF -> cingulate gyrus -> corpus callosum -> lateral ventricle -> caudate nucleus-> putamen -> insula
- *Lateral border:* CSF
- *Superior border:* CSF. Use sagittal slice to help with definition of anterior part.
- *Inferior border:* End of frontal lobe as previously defined; use Volume Render or sagittal slice to

help with definition of anterior part. The precentral gyrus typically peters out in the posterior part of the frontal operculum (the anterior part of the frontal operculum is the pars opercularis of the inferior frontal gyrus) (Figure 5051-6).

- *Number of slices:* Approximately 70.

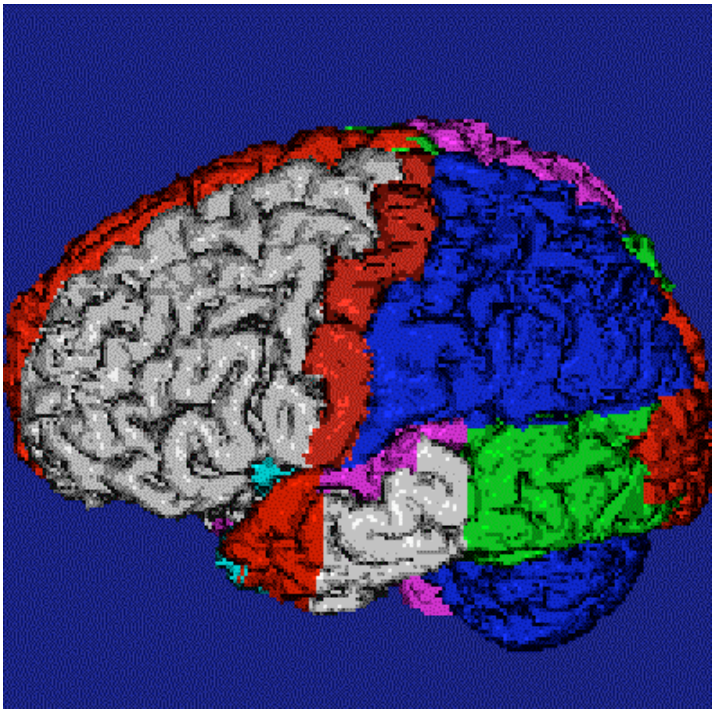

Figure 5051-1

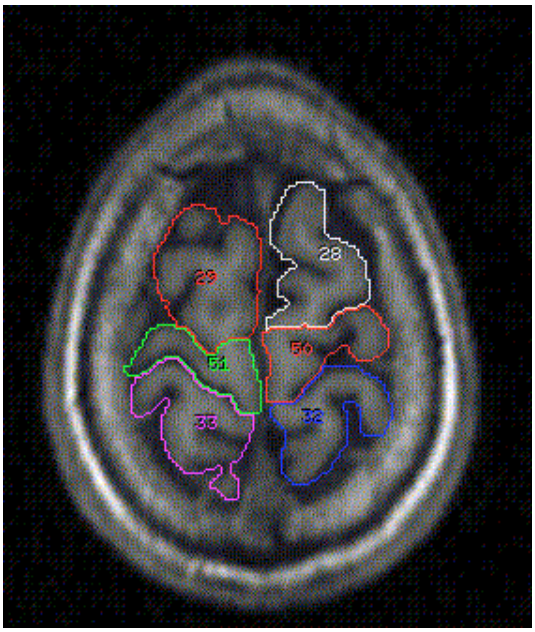

Figure 5051-2

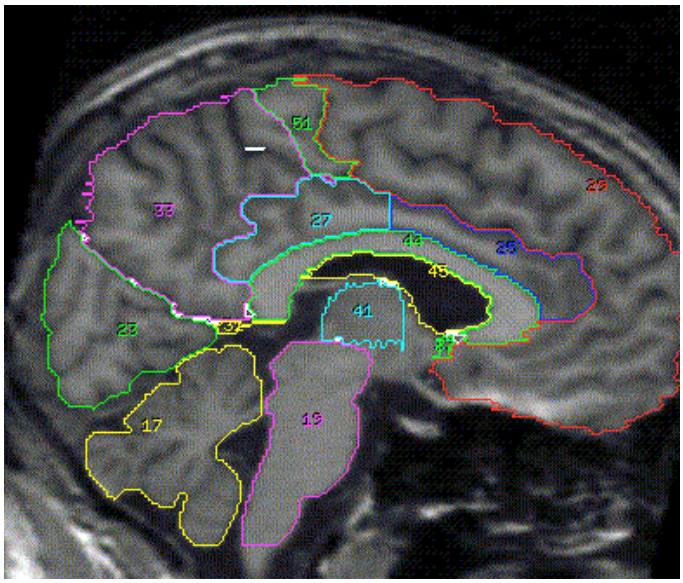

Figure 5051-3

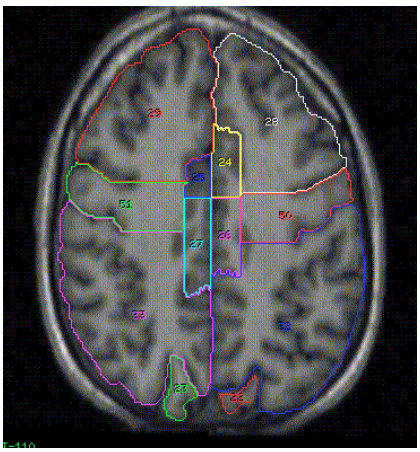

Figure 5051-4

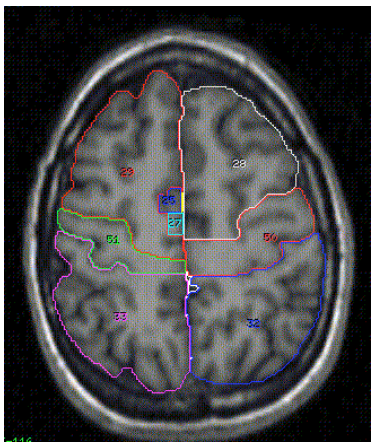

Figure 5051-5

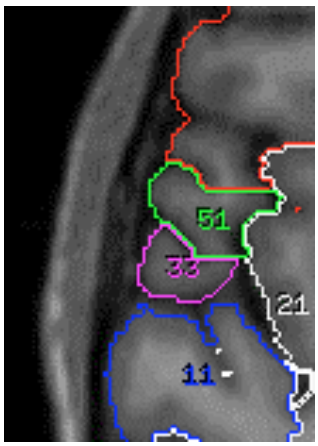

Figure 5051-6

Structures 52 and 53: Straight gyrus (gyrus rectus) (left, right)

- *Orientation of slices:* transverse; *Viewing size:* Double
- *Anterior border:* inferior to superior: CSF -> coming from posteriorly, draw a horizontal line from the anterior end of the olfactory sulcus (sulcus olfactorius) to the midline (Figure 5253-1)
- *Posterior border:* Posterior end of frontal lobe as previously defined (Figure 5253-1)
- *Medial border:* Midline/CSF (Figure 5253-1)
- *Lateral border:* Olfactory sulcus. If it is briefly interrupted, create continuity. Posteriorly, use straight line in the middle of the triangle (Figure 5253-1) unless straight gyrus is clearly separated from the rest of orbitofrontal cortex.
- *Superior border:* Include last slice on which olfactory sulcus still seen
- *Inferior border:* CSF/inferior end of frontal lobe as previously defined
- *Number of slices:* Approximately 15

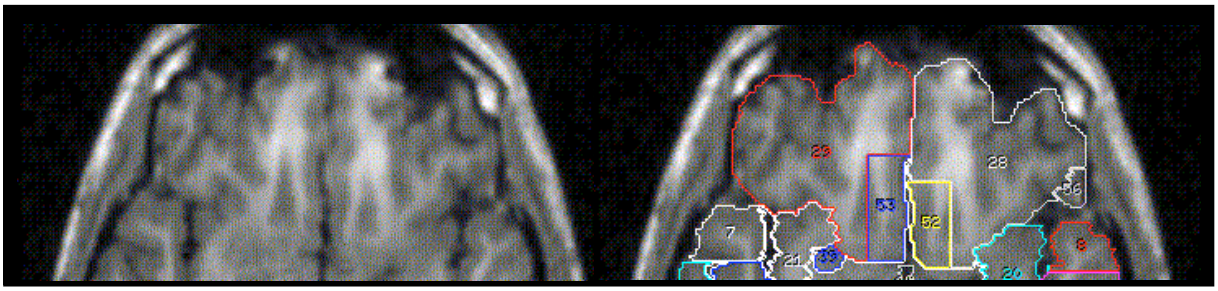

Figure 5253-1

Structures 54 and 55: Orbitofrontal cortex (left, right)

- *Orientation of slices:* coronal
- *Anterior border:* start measuring when the frontomarginal sulcus is visible
- *Posterior border:* posterior end of frontal lobe as previously defined
- *Medial border:* anterior to posterior: Superior rostral sulcus (supraorbital sulcus) -> straight gyrus as previously defined when this extends more superior than the superior rostral sulcus
- *Lateral border:* anterior to posterior: frontomarginal sulcus -> lateral orbital sulcus. Posteriorly, use sagittal view to determine pars opercularis of inferior frontal gyrus. The lateral orbital sulcus is here defined as the one inferior to the horizontal (anterior) branch (ramus horizontalis sive anterior) of the lateral sulcus. To define the laterosuperior border, it is connected to the inferior part of the circular sulcus of the insula.
- *Superior border:* draw a line, from the deepest point of the sulci defining the lateral border, to the deepest point of the sulci defining the medial border (posteriorly, to the superior limit of the straight gyrus as previously defined). Always leave ~2mm of white matter superior to the deep end of any intermediate sulci; this may mean giving the superior border the shape of a dome ***(figure -eg. brain 14, reg 55, around slice 160)***

- *Inferior border:* CSF
- *Number of slices:* Approximately 65

Structures 58 and 59: Superior frontal gyrus (left, right)

- *Cave:* After these structures have been outlined, structures 28 and 29 correspond to the left and right middle frontal gyrus, respectively.
- *Orientation of slices:* coronal; start in the middle and continue anteriorly and posteriorly from there
- *Anterior border:* Continue outlining anteriorly so that the medial surface of the hemisphere is always included up to the frontal pole.
- *Posterior border:* Precentral gyrus as previously defined
- *Medial border:* anterior to posterior: medial border of the hemisphere (medial border of frontal lobe as previously defined), posteriorly interrupted by the anterior cingulate gyrus as previously defined.
- *Lateral border:* posterior to anterior: Superior frontal sulcus. From the deepest point of the superior frontal sulcus, draw a line to the most superior and lateral point of the ipsilateral lateral ventricle -> to the deepest point of the olfactory sulcus (superior intersection of the straight gyrus region and the orbitofrontal cortex region, as previously defined) -> when it cannot be reached as the orbitofrontal cortex region overlies it, draw a line into that direction until it hits the boundary of the orbitofrontal cortex region as previously defined -> when the olfactory sulcus has disappeared, draw a vertical line down to either orbitofrontal cortex or CSF. The superior frontal sulcus can be segmented. In this case, choose the most prominent one in coronal slices. If there are two candidates which are equally prominent, choose the more lateral one. In the anteriormost slices, when the superior frontal sulcus is not discernible, all of the frontal pole is defined as superior frontal gyrus. *Note:* In the anterior 10-20 slices, the superior frontal sulcus may not be present [Ono, 1990 #1157]. In this case, other sulci are chosen which follow its general course (check on other orientations).
- *Superior border:* CSF
- *Inferior border:* posterior to anterior: Inferior border of frontal lobe as previously defined -> straight gyrus/orbitofrontal cortex -> CSF
- *Number of slices:* Approximately 100

Structures 60 and 61: Postcentral gyrus (left, right)

- *Orientation of slices:* transverse
- *Anterior border:* superior to inferior: Central sulcus as previously defined
- *Posterior border:* superior to inferior: Postcentral sulcus. This is frequently interrupted into two or three segments in which case the intersecting gyral crowns are cut across. Similarly, inferiorly the postcentral sulcus frequently does not reach the sylvian fissure in which case its course is continued over the gyral crowns until the sylvian fissure is reached. The deepest point of the postcentral sulcus is

connected with the deepest point of the marginal branch of the cingulate sulcus (ramus marginalis sulci cinguli) from the most superior slices to the point where the cingulate gyrus appears; from then on, it is connected with a horizontal line to the medial border (see below).

- *Medial border:* superior to inferior: midline -> posterior cingulate gyrus -> ventricle -> caudate nucleus -> putamen -> insula
- *Lateral border:* CSF
- *Superior border:* CSF
- *Inferior border:* End of parietal lobe as previously defined (see structures 32 and 33)
- *Number of slices:* Approximately 70

Structures 62 and 63: Superior parietal gyrus (left, right)

- *Orientation of slices:* coronal
- *Cave:* Start in the middle and work anteriorly and posteriorly. The tridemensional view is necessary throughout to confirm the course of the intraparietal sulcus.
- *Anterior border:*Postcentral sulcus as previously defined
- *Posterior border:* Posterior border of parietal lobe as previously defined
- *Medial border:* superior to inferior: Midline -> posterior cingulate gyrus
- *Lateral border:* posterior to anterior: Draw a line from the deepest end of the intraparietal sulcus to the border with the occipital lobe -> to the deepest end of the parieto-occipital fissure -> to the deepest end of the anterior calcarine sulcus. Anteriorly, the anterior calcarine sulcus may be included in the posterior temporal lobe structure as previously defined. The line from the deepest end of the intraparietal sulcus is then continued to the most superior part of the lateral ventricle. Any separate parts belonging to the parietal lobe and lying on the medial surface are renamed to be included into the superior parietal gyrus structure.
- *Superior border:* CSF
- *Inferior border:* Inferior border of parietal lobe as previously defined
- *Number of slices:* Approximately 55

Structures 64 and 65: Lingual gyrus (left, right)

- *Orientation of slices:* coronal
- *Anterior border:* anterior border of occipital lobe as previously defined
- *Posterior border:* posterior border of occipital lobe as previously defined unless the collateral sulcus turns medially more anteriorly (check on transverse)
- *Medial border:* medial border of occipital lobe as previously defined
- *Lateral border:* collateral sulcus (see superior border). Use the transverse orientation to help with the identification of the collateral sulcus. The collateral sulcus will run towards the occiptal horn of the lateral ventricle (when visible). If the collateral sulcus is segmented, choose the more lateral one.

- *Superior border:* calcarine sulcus. From the deepest end of the calcarine sulcus, draw a line to the deepest end of the collateral sulcus.
- *Inferior border:* CSF
- *Number of slices:* Approximately 70

Structures 66 and 67: Cuneus (left, right)

- *Cave:*
- *Orientation of slices:* coronal
- *Anterior border:* anterior border of occipital lobe as previously defined
- *Posterior border:* end outlining when neither parieto-occiptal sulcus not calcarine sulcus are visible any more. Continue as long as either is visible, extrapolating the course of the sulcus that has disappeared from the previous slices.
- *Medial border:* medial border of occipital lobe as previously defined
- *Lateral border:* draw a line from the deepest end of the sulcus defining the superior border (see below; anteriorly the parieto-occipital sulcus) to the deepest end of the calcarine sulcus
- *Superior border:* anterior to posterior: parieto-occipital sulcus as previously identified; when this disappears use a sulcus in similar location - the sulcus closest to the Mantelkante (rim of the medial hemispheric wall). This will usually be on the medial surface.
- *Inferior border:* calcarine sulcus as previously identified
- *Number of slices:* Approximately 50

Structures and: (left, right)

- *Cave:*
- *Orientation of slices:* transverse
- *Anterior border:* superior to inferior:
- *Posterior border:* superior to inferior:
- *Medial border:* superior to inferior:
- *Lateral border:* superior to inferior:
- *Superior border:*
- *Inferior border:*
- *Number of slices:* Approximately

Orbitofrontal Sulci in Standardized Stereotaxic Space

SOP to define H Split

This step by step procedure outlines the subdivision of the orbitofrontal cortex [OFC] into eight segments [i.e. Four each bilaterally] using Analyze 5.0.

The OFC is currently defined by the Left Orbitofrontal Cortex [Object 54] and Right Orbitofrontal Cortex [Object 55]

The newly defined segments will be labelled as -

Left Anterior Orbital Gyrus	[AOG]	[Object 54]
Right Anterior Orbital Gyrus	[AOG]	[Object 55]
Left Medial Orbital Gyrus	[MOG]	[Object 68]
Right Medial Orbital Gyrus	[MOG]	[Object 69]
Left Lateral Orbital Gyrus	[LOG]	[Object 70]
Right Lateral Orbital Gyrus	[LOG]	[Object 71]
Left Posterior Orbital Gyrus	[POG]	[Object 72]
Right Posterior Orbital Gyrus	[POG]	[Object 73]

1 Loading the Render and Crop images superimposed with the Object Maps

Files required
- crop.obj
- crop.img
- crop_extr.img

Start Analyze in a terminal window -

[In Analyze 5.0 Window]

Load atlas*extr*.img

[This is an extracted image with the skull stripped. It is used to obtain the render image.]

⊙ Render [Head object button]

[In Volume Render Window]

⊙ Rotation

[In Rotation – Volume Render Window]

⊙ Named
⊙ Bottom
⊙ Change View
⊙ Right Click → Size → Select double

[In Volume Render Window]

⊙ File → Load Object Map… → Select *.obj → Open
[This step opens the Objects - Volume Render Window]

⊙ Done [To get rid of Objects - Volume Render Window]

[In the Volume render Window]

⊙ Generate → Render Type…

[In Render Types – Volume Render Window]

- ⊙ Volume Compositing
- ⊙ Render
- ⊙ Done

The coloured object maps should now appear overlayed on the extracted image in both the Volume Render Window and the Rotation – Volume Render Window [See Figure 1].

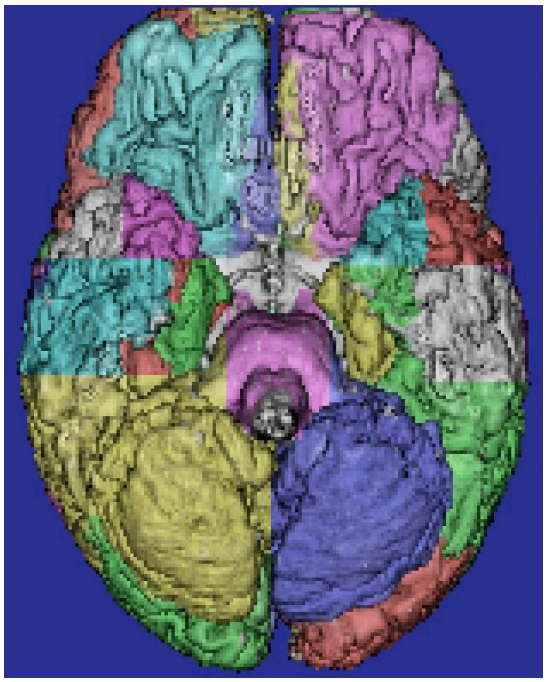

Figure 1 – Object Map superimposed on the Volume Rendered Image

TIP - Shortcut to update render to included latest object map changes

[In Volume Render Window]

- ⊙ *File → Load Object Map… → Select *.obj → Open*

[In Render Types – Volume Render Window]

- ⊙ *Render*

[This should now re-render the selected object map on the extracted image.]

[In Analyze 5.0 Window]

Load ** crop.img [This is done to define the regions.]

⊙ Truck symbol

[In Load As 5.0 Window]

⊙ File → *crop.img → Open → Load

[In Analyze 5.0 Window]

⊙ ROI

[In Region Of Interest Window]

Adjust intensity [i.e. Decrease maximum to approximately 120]

⊙ View → Intensities → Loaded Volume…

[In Intensity Loaded Volume – Region Of Interest Window]

Change maximum to 120 → Done

[In Region Of Interest Window]

⊙ File → Load Object Map… → *.obj → Open

Select Coronal first [i.e. ⊙ C button/cube]

Start by looking at the posterior orbits initially [i.e. about slice 155] at about the emergence of the corpus callosum [defined by Object 44 bilaterally – See Figure 2]

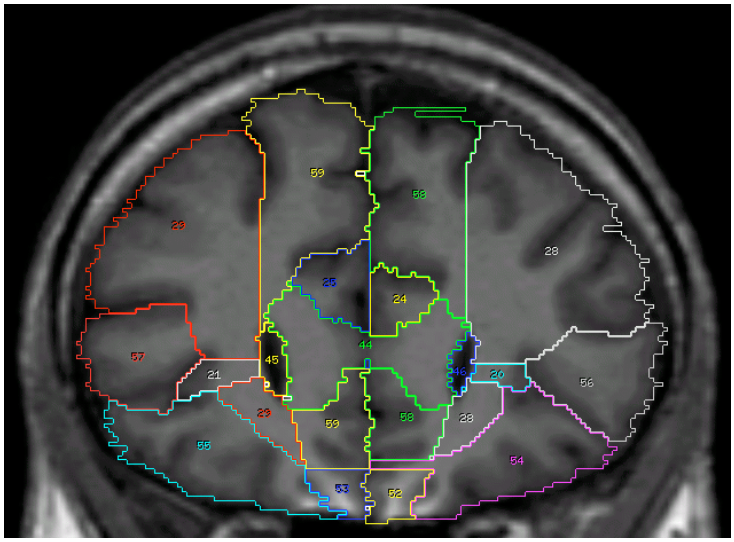

Figure 2 – Coronal Slice demonstrating Medial and Lateral Orbital sulci

⊙ Generate → Slice…

[In Slice – Region Of Interest Window]

Select slice using slide bar or by typing in the slice number. Anterior, middle and posterior slices are demonstrated in Figures 3 – 5.
The OFC has two deep sulci bilaterally and are represented by Objects 54 [Left] and 55 [Right].

Other Objects present include –

Straight Gyrus [Objects 52 and 53] which goes straight up to the superior frontal gyrus
Frontal Lobe [Objects 28 and 29]

The appearance of the following objects may indicate that you are too posterior –

Emergence of lateral ventricles [Objects 45 and 46]
Emergence of insula [Objects 20 and 21]

The emergence of the caudate nucleus [Objects 34 and 35] indicates that you are extremely posterior.

2 Editing the Orbitofrontal lobes [Objects 54 and 55]

The first task is to divide the medial portion of the orbitofrontal lobes to define the left and right medial orbital gyri [Objects 68 and 69].

[In Region Of Interest Window]

Magnify the *crop.img to a size suitable to edit the OFC objects [i.e. Double].

- ⊙ Edit
- ⊙ Split

From the Object To Define: drop down menu select ***New***

The LEFT side must be defined first as new Objects are assigned new numbers sequentially.

In Object 54 the most medial deep sulcus should be the medial orbital sulcus and this should be traced along. Start near the inferior border of Object 54 [Take care not to touch already defined borders.] and trace up the sulcus [Left mouse to trace a line]. When brain matter is reached trace vertically until the superior border is almost reached [Again, take care not to touch or overshoot this border]. The new Object boundary will be completed automatically.

The new Object will be tagged as 68 and should define approximately 25% of the object in this plain.

Progress to the next anterior slice and repeat the above procedure. Take care when defining the Object in a new slice that it is selected in the Object Define menu [i.e. 68 not **new**].

After a few slices, save the object map and check the divisions by re-rendering the *crop.img with the newly saved object map to ensure the division is in the correct sulcus.

There is some variation of this gyrus; it is often boot shaped [Like the map of Italy] and a small sulcus may appear in the middle of it [The fragmentary sulcus]. On some brain the heel and toe of the boot may become distinct and the division should then be made to divide these two areas [This is usually the case anteriorly - See Figure 4.].

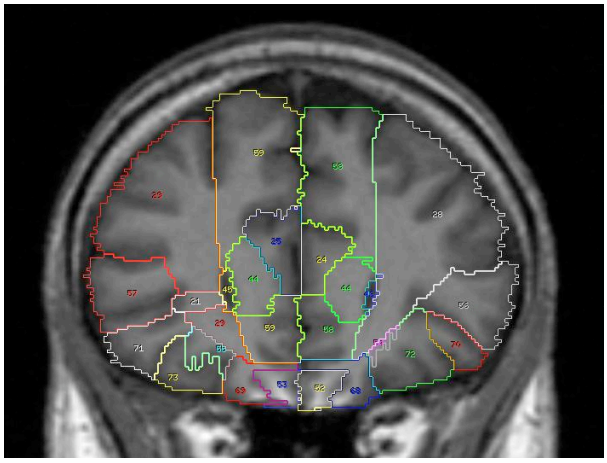

Figure 3 – Mid Coronal slice at the posterior orbits

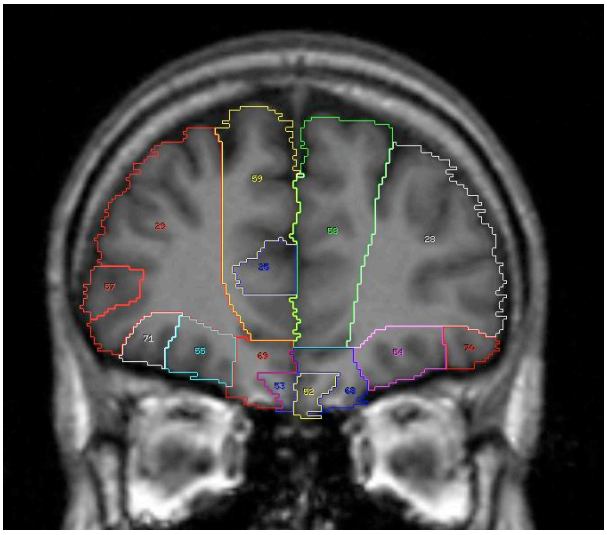

Figure 4 – Anterior Coronal slice at the mid-orbits

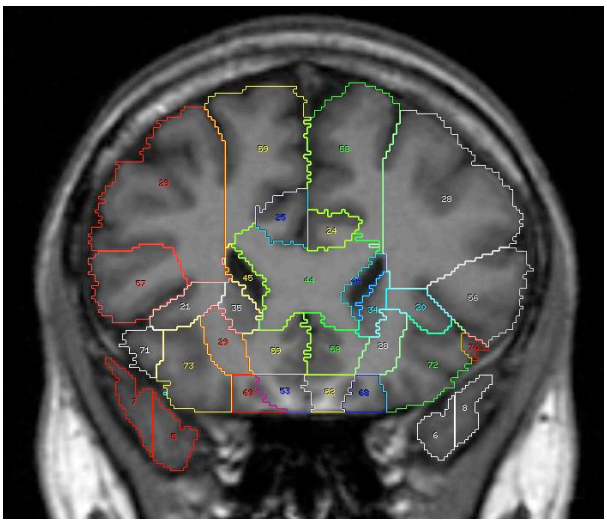

Figure 5 – Posterior Coronal slice demonstrating Temporal Lobes

If the sulcus becomes indistinct, again check by re-rendering. In some cases the division should continue in line with the previous slices until the sulcus becomes distinct again. This division should continue until the anterior border of the already defined orbitofrontal cortex is reached. The gyrus often ends in a bit of a bulge anteriorly so the dividing line may move a little laterally at this point.

Return to the original mid slice and now work posteriorly. The division becomes less easy to define when the sulcus disappears from view on the surface render as it is obscured by the temporal lobes. Continue the division posteriorly in line with previous divisions as the cortex becomes less distinct near the posterior tip.

TIP – Changing the colour of the Object borders

The border colour for the new Object may not be distinct from the original area.

We found it useful to define the three new Objects on each side first and then adjust the border colours of the surrounding Objects [See Table 1 below].

To adjust outline colour -

- *View*
- *Objects*
- *Select Object Number*
- *Colour*
- *Adjust colour using the sliding scale*
- *Done*

Table 1 – Object border colours

Object Number	*Selected Colour*	*Structure*
68	*Blue*	*Left MOG*
70	*Red*	*Left LOG*
6	*White*	*Left Temporal*
8	*White*	*Left Temporal*
5	*Red*	*Right Temporal*
7	*Red*	*Right Temporal*

71	*White*	*Right LOG*
69	*Red*	*Right MOG*

The colours allocated for Objects 72 and 73 should be okay.

This process is then repeated for the opposite side [RIGHT].

From the Object To Define: drop down menu select ***New*** to define the new object which will now be tagged as Object 69 or select Object 69 if it has been predefined.

Objects 70 and 71

The next Objects to define are Objects 70 and 71 [i.e. Left Lateral Orbital Gyrus (70) and the Right Lateral Orbital Gyrus (71)]. This is achieved by dividing the lateral portion of the orbitofrontal lobes. The technique used is similar to that outlined above.

[In Region Of Interest Window]

Magnify the *crop.img to a size suitable to edit the OFC objects [i.e. Double].

Start at a mid-coronal slice [i.e. slice 155 – see Figures 2 & 3]

- ⊙ Edit
- ⊙ Split

From the Object To Define: drop down menu select ***New*** or select Object 70 if this has already been defined.

Again the LEFT side must be defined first.

In Object 54 the most lateral deep sulcus should be the lateral orbital sulcus and this should be traced along. Start near the inferior border of Object 54 [Take care not to touch already defined borders.] and trace up the sulcus [Left mouse to trace a line].

When brain matter is reached trace vertically until the superior border is almost reached [Again, take care not to touch or overshoot this border]. The new Object boundary will be completed automatically.

The new Object will be tagged as 70 and should define approximately 25% of the object in this plain.

Progress to the next anterior slice and repeat the above procedure. Take care when defining the Object in a new slice that it is selected in the Object Define menu [i.e. 70 not **new**].

After a few slices, save the object map and check the divisions by re-rendering the *crop.img with the newly saved object map to ensure the division is in the correct sulcus.

The lateral orbital gyrus is the most variable in the orbito-frontal cortex. Consequently the lateral orbital sulcus (LOS) can be difficult to trace along. In many cases the LOS do not continue anteriorly and disappears laterally into the medial frontal gyrus. In this case there is only a small gyrus to define. Continuing posteriorly, the gyrus usually ends as the insula comes into view. The lateral orbital gyrus may be completely split from the middle gyrus posteriorly.

TIP – Ensuring the new object corresponds to the correct structure

When splitting an object in Analyze 5.0 the smaller portion is given the newly defined Object number. Therefore start by creating a smaller new Object and slowly increase its size until the boundary lies in the correct sulcus.

TIPS – Miscellaneous

There are often double sulci medially and laterally leaving a central part [slices 54 & 55].

Keep render visible to help check which sulci are being traced.

Keep edit line away from edges of other areas.

Analyze will bridge the shortest gap.

Review progress regularly with render to try and identify any sulci jumps.

Objects 72 and 73

The Left Posterior Orbital Gyrus [POG] and the Right Posterior Orbital Gyrus [POG] are now defined with Objects 72 and 73 respectively. Figure 6 shows the left hemisphere of the brain with AOG and POG defined as Objects 54 and 72 respectively.

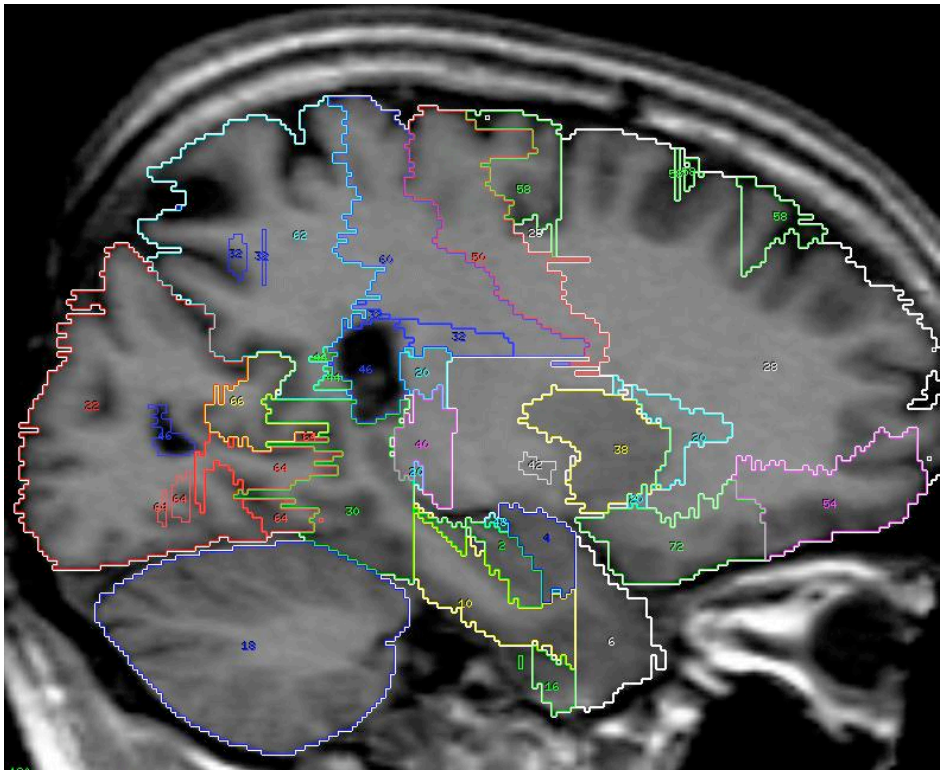

Figure 6 – Left Mid-Sagittal slice demonstrating the Object 54 (AOG) and Object 72 (POG)

Once again commence on the LEFT side but this time in a sagittal view. Again start on a slice in the middle of the existing object and one where the sulcus is clearly visible.

Again using the techniques developed in the earlier sections divide the remaining orbitofrontal lobe along the middle orbital sulcus. Retain the original object number [i.e. 54] for the AOG with the POG being defined as Object 72.

The gyrus is usually the deepest gyrus visible and usually divides the existing object 50:50. However, as the gyrus runs posteriorly as the slices progress medially this percentage may change. Some variation exists and in some cases there may be 2 or 3 sulci to choose from. It is best to check with the render image as to which sulcus gives the clearest division. At the medial and lateral margins of this division the lateral orbital or medial orbital gyri may have already divided the object. In this case the posterior portion should be re-numbered to the correct object (72 and 73).

The new definition of the objects should be then checked on all views.

5 Naming convention

Save object map as	crop.obj
	crop_OFCL.obj (the two uprights of the H)
	crop_OFCL_cross.obj (when defining the crossbar)

Structures 76 and 77: Subgenual frontal cortex (left, right)

- *Cave:* start anteriorly in coronal cuts and then sagittal. Keep open the sagittal frame to check if all the FL is renamed. Also, when working in sagittal cuts, make sure that in coronal cuts the shape of the SFC is slightly V-shaped.
- *Orientation of slices:* coronal, to rename the areas of the superior frontal gyrus (SFG), posteriorly to the anterior border, that correspond to the SFC and the SA and then sagittal.
- *Viewing size:* quadruple.

Coronal cuts

- *Anterior border:* according to Drevets et al. (1997) protocol, the anterior most slice where the genu of the CC is visible (Figure II-1).
- *Posterior border:* end of FL as previously defined. This way we include the SA, which will be separated and orientated in sagittal cuts.
- *Medial border:* CFS.
- *Lateral border:* middle frontal gyrus as previously defined.
- *Superior border:* CC as previously defined.
- *Inferior border: gyrus rectus* as previously defined.
- *Number of slices:* 20 approximately.

Sagittal cuts

- *Anterior border:* SFG, according to the implementation of the Drevets' protocol in coronal cuts.
- *Posterior border:* APS (Figure II-2). If not visible (e.g. more laterally or APS of C type (Ono et al. 1990)), we draw the border tangential to the edge of the internal surface of the CC (Figure II-3). In more lateral slices the border is CN.
- *Medial border:* CSF.
- *Lateral border:* middle frontal gyrus as previously defined.
- *Superior border:* CC as previously defined.

- *Inferior border: gyrus rectus* as previously defined (Figure II-4). However, according to Drevets' protocol we include only the first full gyrus. If the region is bigger than a full gyrus, after renaming SFG in coronal cuts, we delineate the anterior part of the inferior border of the SFC with the CS (Figure II-5). This affects mainly the lateral parts, where the CS extends from medio-inferior to latero-superior (coronal cuts). If the CS does not extend inferio-posteriorly enough to reach the *gyrus rectus*, we delineate the aforementioned border with the extension of the CS. Besides, if the CS does not extend that far anterio-inferiorly, we delineate the SFC with the superior rostral sulcus, which then becomes the anterior part of the inferior boundary (Figure II-6). Also, if needed, in order to get the full gyrus, we include part of the straight gyrus (SG). This way we refine the previous artificial border, between the SG and the FL (Figure II-7).
- *Number of slices:* 35 approximately.

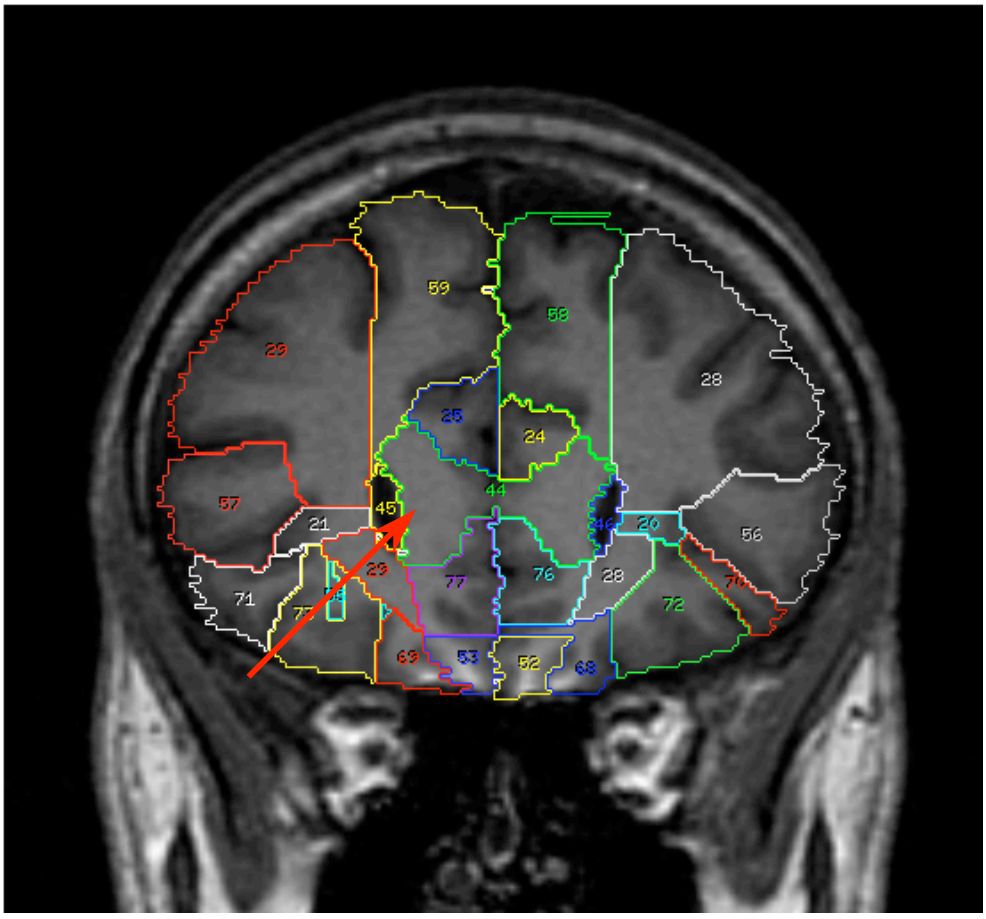

Figure II-1. *Region 44 (CC). Anterior most slice where the genu of the CC is visible.*

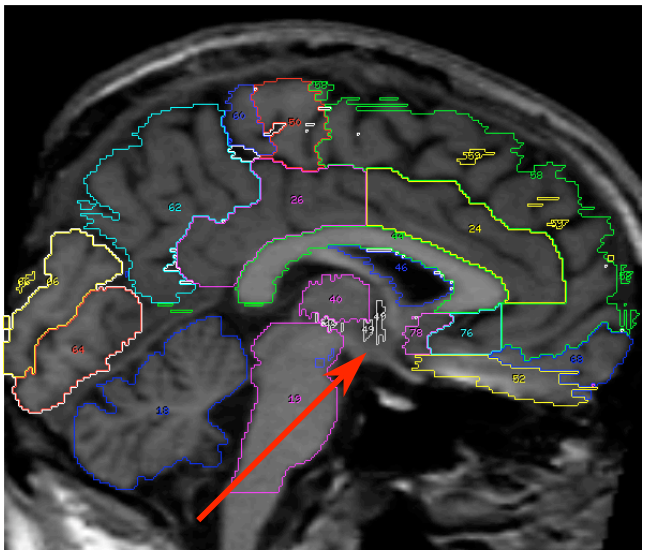

Figure II-2. *Region 78 (SA). APS is the anterior border of the SA.*

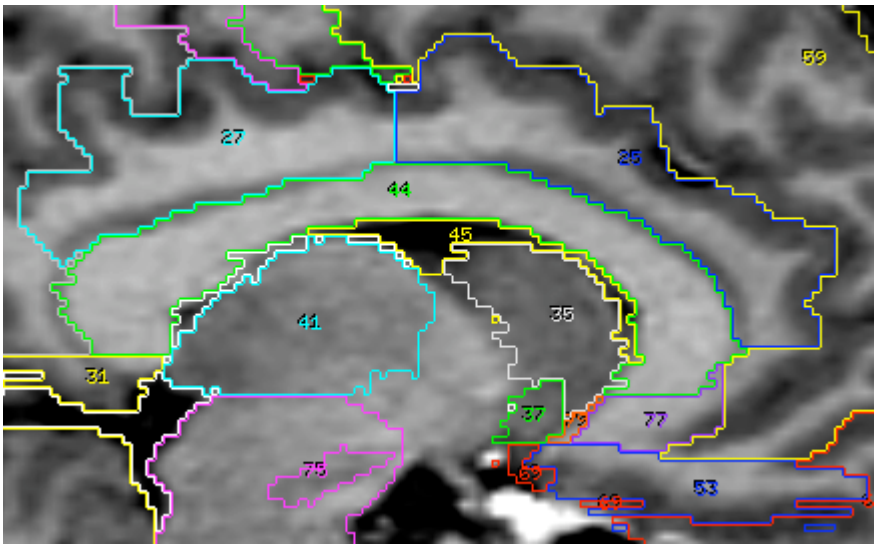

Figure II-3. *Region 77 (SFC). The posterior border is drawn tangentially to the internal surface of the CC.*

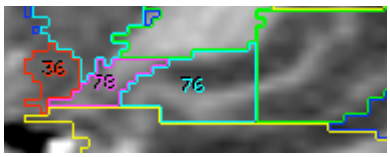

Figure II-4. *Region 76 (SFC). The inferior border of SFC is gyrus rectus.*

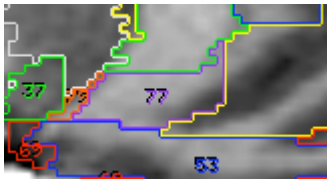

Figure II-5.*Region 77 (SFC). Delineation of the anterior part of the inferior border of the SFC with the CS.*

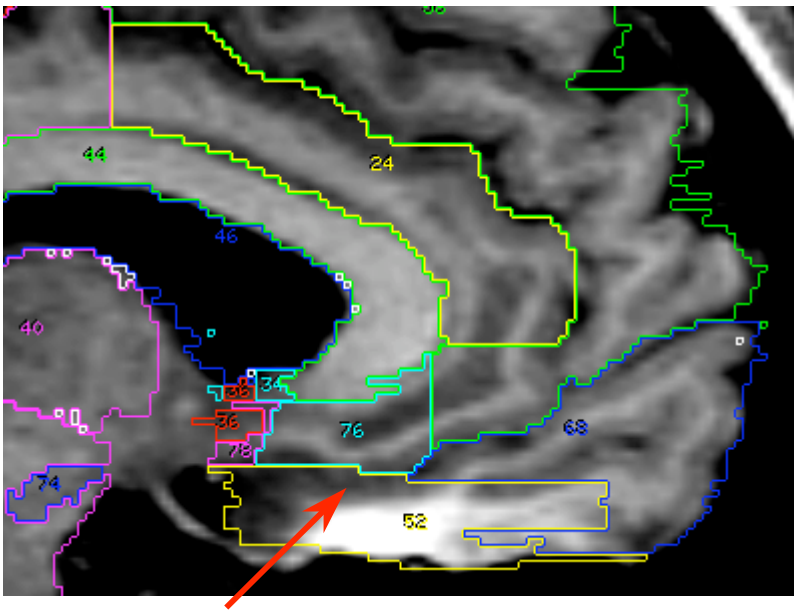

Figure II-6. *Region 76 (SFC). Superior rostral sulcus becomes the anterior part of the inferior border of the SFC in cases where the CS does not extend far anterior-inferiorly.*

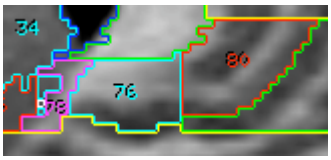

Figure II-7*. Region 76 (SFC). Refinement of the artificial border between the SG and the FL.*

Structures 78 and 79: Subcallosal area (left, right)

- *Cave:* Keep open the coronal frame to verify that the whole SA is included.
- *Orientation of slices:* coronal, to rename the SFG, then sagittal.
- *Viewing size:* quadruple.

Coronal cuts

- *Anterior border:* SFC as previously defined.
- *Posterior border:* end of FL as previously defined.
- *Medial border:* CSF.
- *Lateral border:* (anteriorly) CN superiorly, FL inferiorly, (posteriorly) CN superiorly, NA inferiorly.
- *Superior border:* (anteriorly) CC as previously defined (posteriorly) superior border of FL as previously defined.
- *Inferior border:* (anteriorly) SFC as previously defined (posteriorly) *gyrus rectus* as previously defined.
- *Number of slices:* 15 approximately.

Sagittal cuts

- *Anterior border:* SFC as previously defined.
- *Posterior border:* (superiorly) NA, (inferiorly) end of FL as previously defined.
- *Medial border:* CSF.
- *Lateral border:* FL as previously defined.
- *Superior border:* CC as previously defined. If the SA extends far posteriorly the superior border is CN as previously defined.
- *Inferior border: gyrus rectus* as previously defined.
- *Number of slices:* 30 approximately.

Structures 80 and 81: Pre-subgenual frontal cortex (left, right)

- *Cave:* be sure of the type of the CG and the position of the CS (Vogt et al. 1995)(Ono et al. 1990), which should be in accordance with the protocol for the SFC.
- *Orientation of slices:* sagittal.
- *Viewing size:* quadruple.
- *Anterior border:*CS. If the CS does not extend inferio-posteriorly enough to reach the SFC, we delineate the aforementioned border with the extension of the CS. If the CS does not extend that far anterio-inferiorly, we delineate the PFC with the superior

rostral sulcus, which then becomes the anterior border.

- *Posterior border:* (medial slices) SFC as previously defined, (more lateral slices) CC superiorly as previously defined, SFC inferiorly.
- *Medial border:* CSF.
- *Lateral border:* follow CS between the anterior CG and the SFC. If interrupted (usually the more dorsal parts are visible) follow the aforementioned parts and finish with a horizontal line that extends posteriorly to the SFC or the CC (Figure II-8).
- *Superior border:* anterior part of CG as previously defined.
- *Inferior border:* (anteriorly) superior frontal cortex as previously defined, (posteriorly) *gyrus rectus* as previously defined.
- *Number of slices:* 25 approximately.

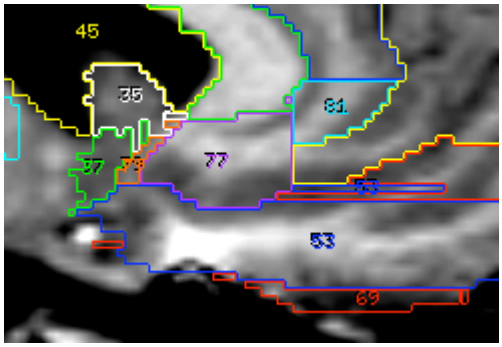

***Figure II-8**. Region 81 (PFC). Inferior border is a horizontal line that extends posteriorly to the SFC, when CS is interrupted.*

Structures 82 and 83: Superior temporal gyrus, anterior part (left, right)

- *Cave:* Always keep open and check every 4-5 slices the volume render, as to be sure that you follow the STS (Figure II-9) (Figure II-10). Also, start posteriorly delineating the lateral border first then the inferior border and lastly the medial border.
- *Orientation of slices:* coronal.
- *Viewing size:* triple.
- *Anterior border:* temporal pole. This is checked in volume render and it is of high importance because we cannot indicate it from the coronal cuts. Also, corrections can be made in transverse cuts by renaming small bits of the lateral part of the anterior temporal lobe (TL), when the only posterior border is the posterior part of the STG

(Figure II-11).

- *Posterior border:*STG, posterior part, as previously defined (Figure II-12).
- *Medial border:* medial border of anterior TL, lateral part, as previously defined (superiorly), anterior TL, medial part, as previously defined (inferiorly). However, in cases where we make corrections to the artificial vertical line between the medial part of the anterior TL and the STG, aiming to include gyri which are split in half, then the medial border superiorly becomes the sulcus medial to previously split gyrus (Figure II-13) (Figure II-14).
- *Lateral border:* lateral border of anterior TL, lateral part, as previously defined (superiorly), STS (inferiorly).
- *Superior border:* superior border of anterior TL, lateral part, as previously defined..
- *Inferior border:* follow STS till its deep end including the GM. When WM reached draw a horizontal line to match with the artificial boundary between the medial and the lateral part of the anterior TL. Extend the line far enough to reach to the middle of the WM (Figure II-15). Follow the STS till its end, even in cases where the artificial border is more laterally than the end of the sulcus (Figure II-16). However, is the end of the sulcus is far laterally and superiorly than the WM follow the WM of the STG alongside and draw the horizontal line in the end of it (Figure II-17).
- *Number of slices:* 25 approximately.

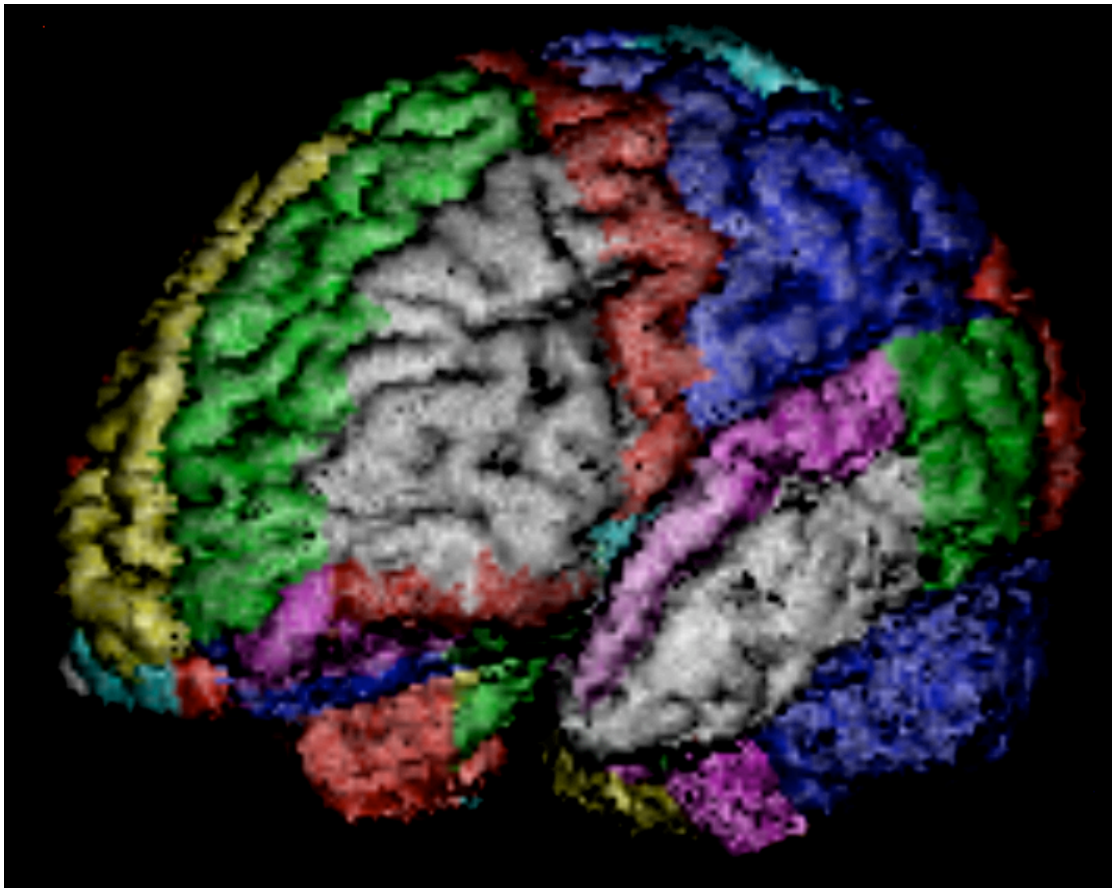

Figure II-9. *STS in volume render.*

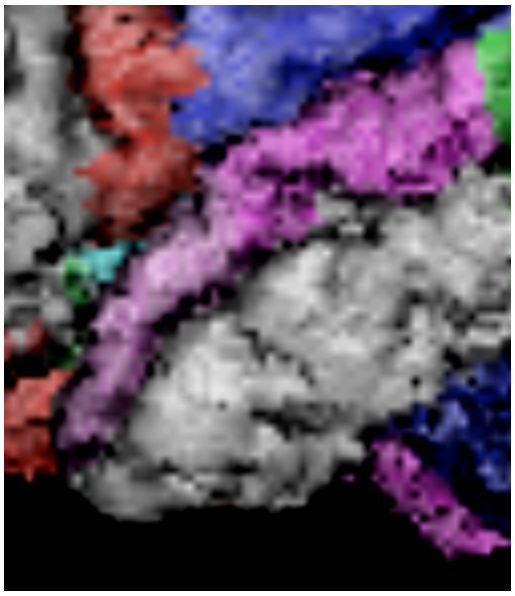

Figure II-10. *Anterior and posterior part of the STG.*

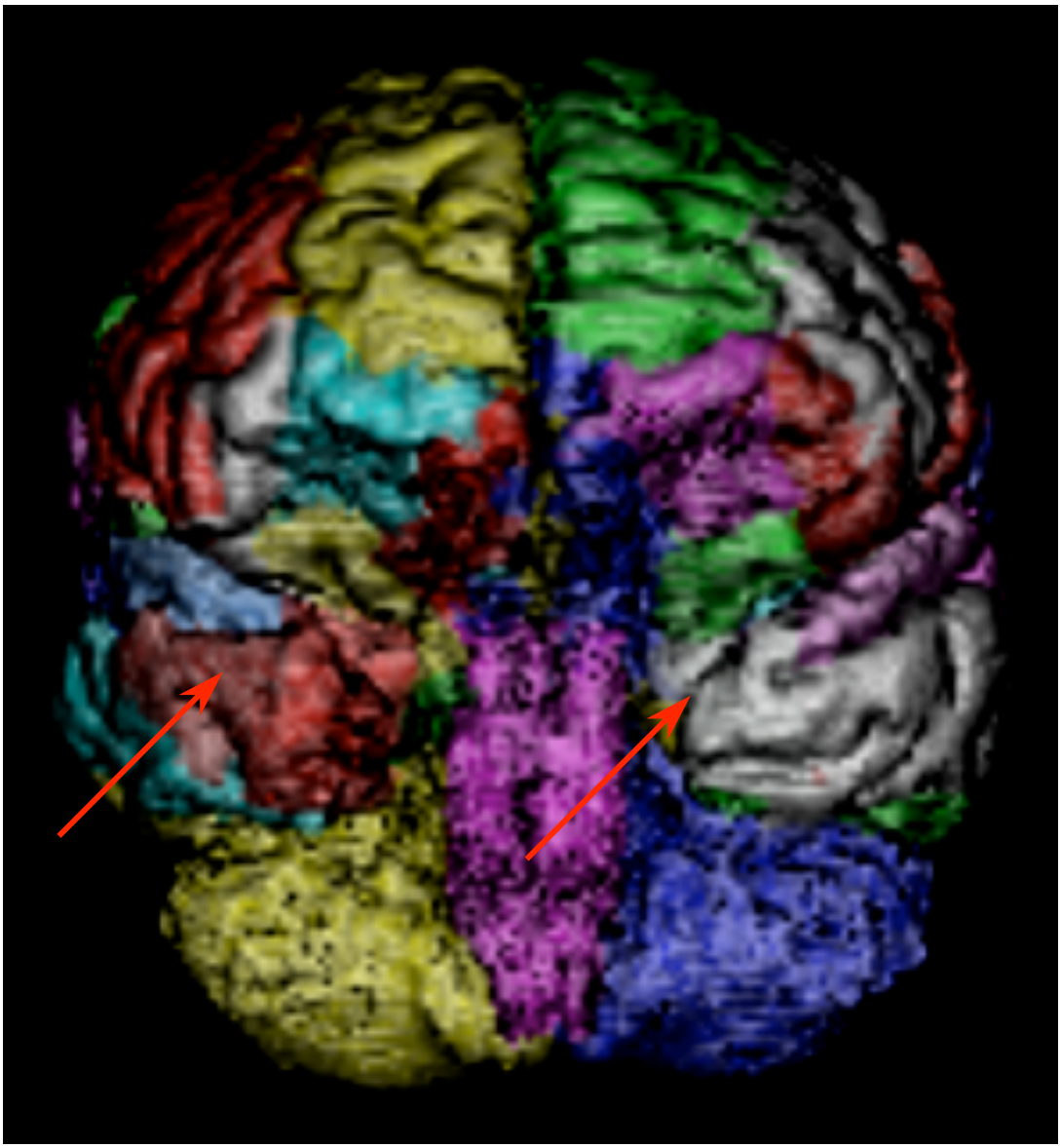

Figure II-11. *Temporal pole.*

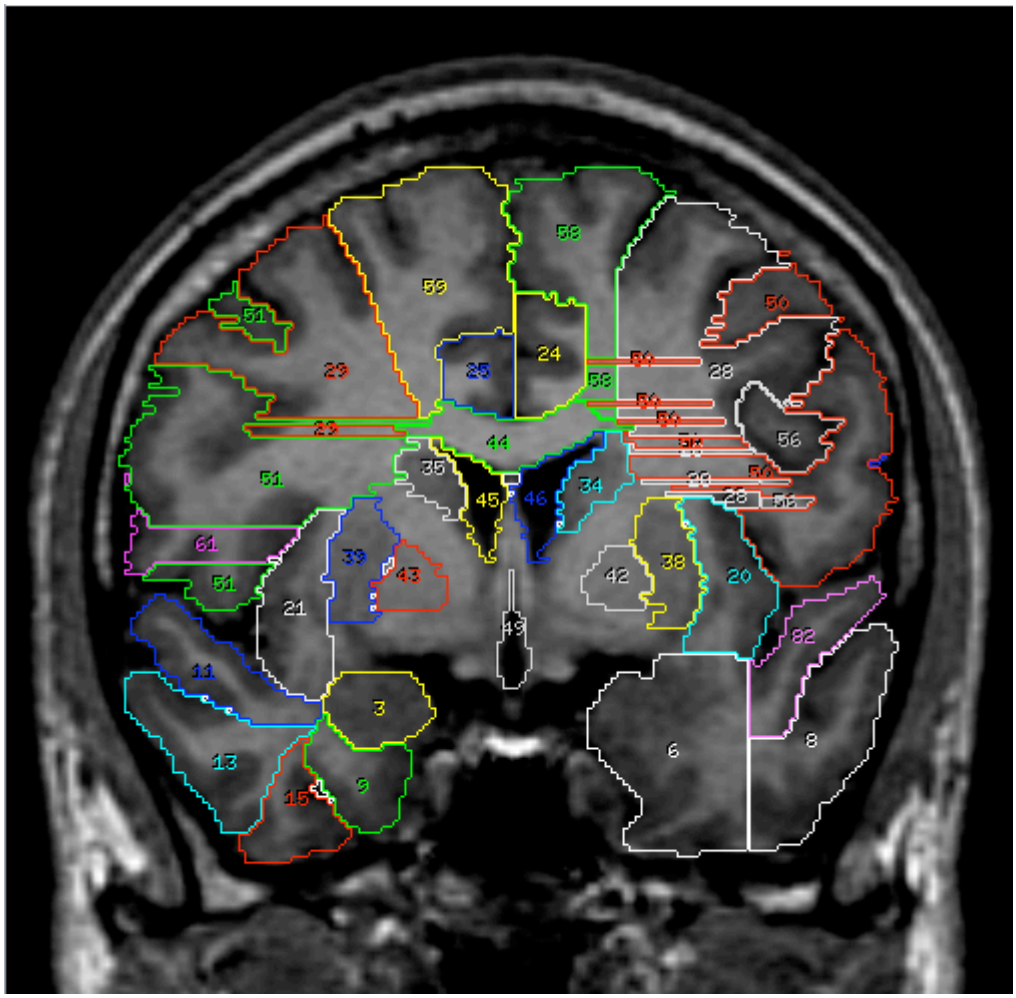

Figure II-12. *Posterior border of the region 82 (aSTG) is the region 12 (pSTG). This can be seen if we move posteriorly on coronal plane. Region 11 (aSTG in right hemisphere) can still be seen because right hemisphere is slightly more anteriorly than the left hemisphere.*

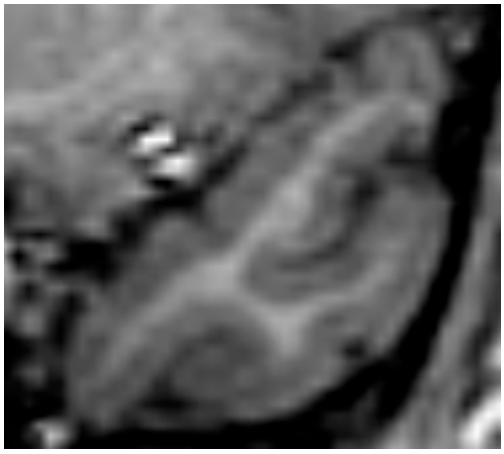

Figure II-13. *Clear coronal view of the STG.*

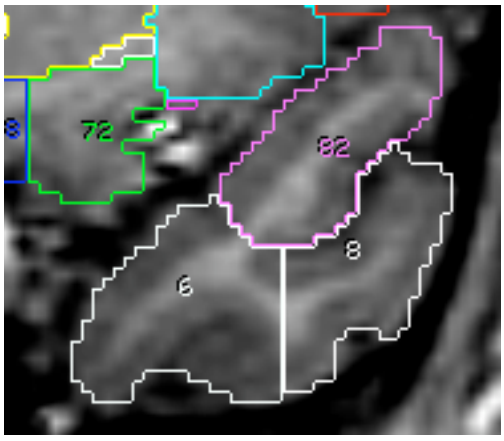

Figure II-14. *Region 82 (STG). Medial sulcus becomes the medial border superiorly.*

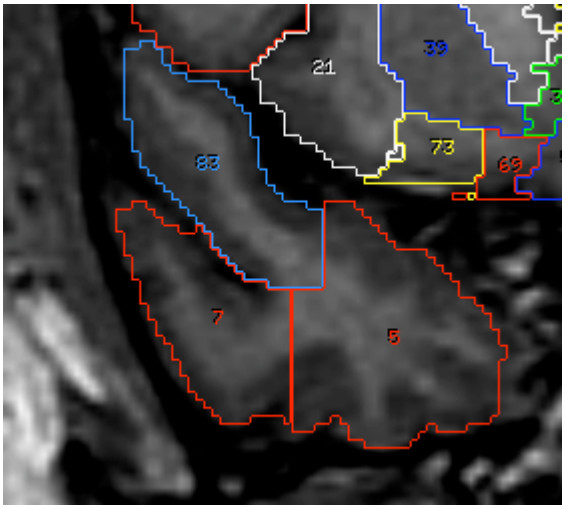

Figure II-15. *Extension of the inferior border of the STG till the middle of the WM.*

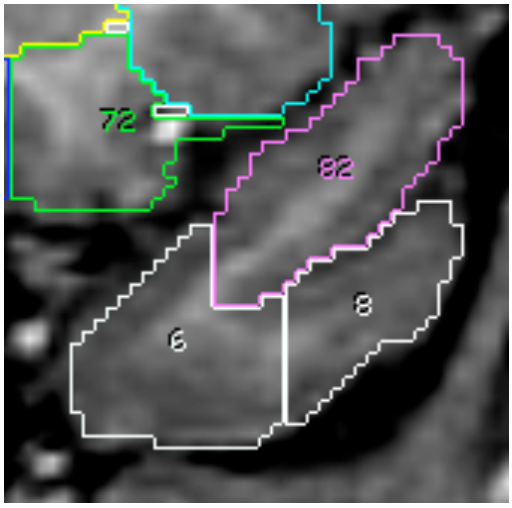

Figure II-16. *Region 82 (STG). Case where the artificial border between medial and lateral part of TL is more laterally than the end of the STS.*

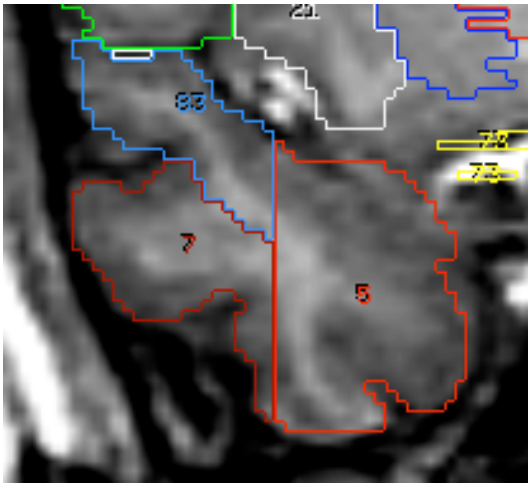

Figure II-17. *Region 83 (STG). When the end of the sulcus is far laterally and superiorly than the WM we follow the WM of the STG alongside.*