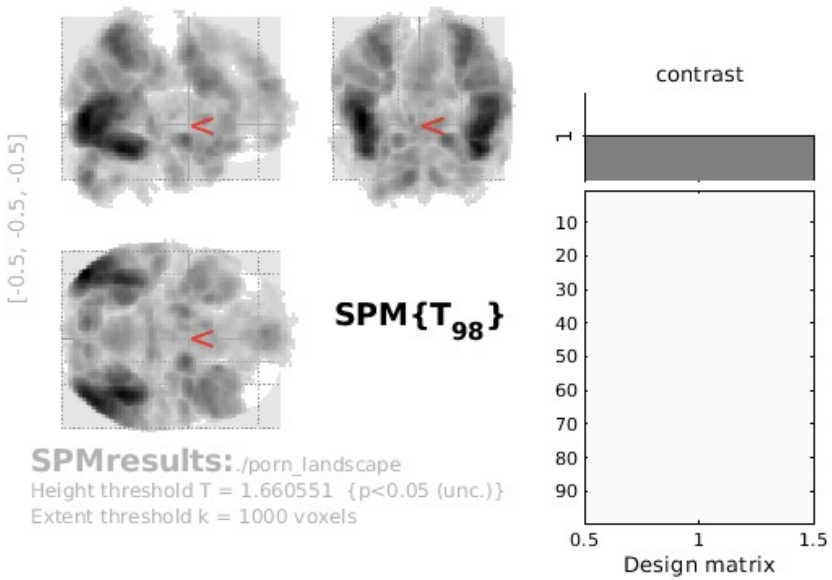
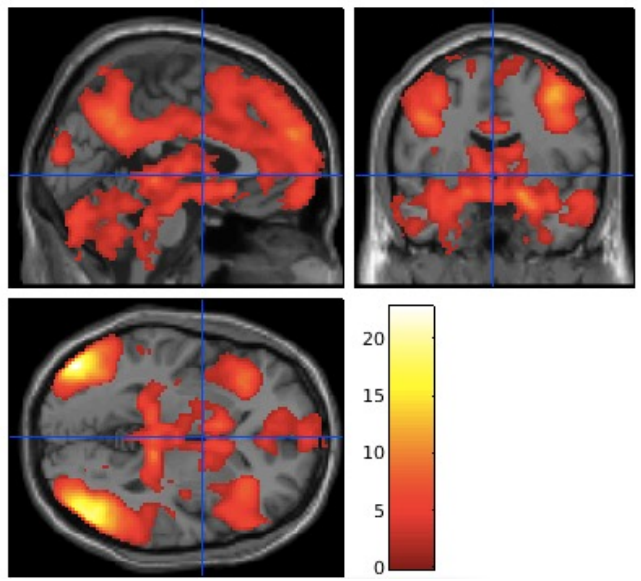
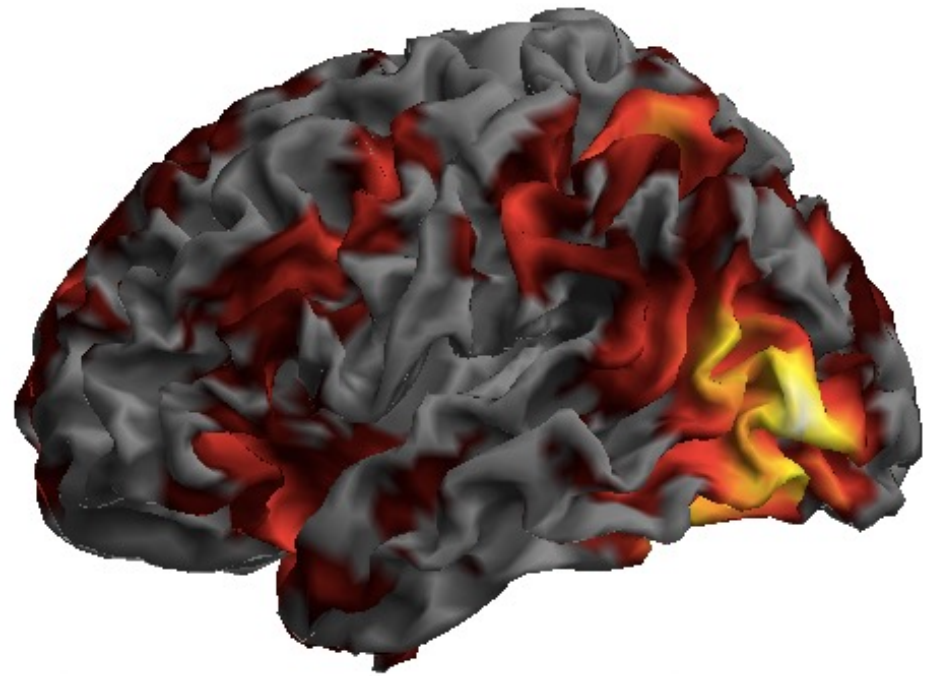
# Data visualization

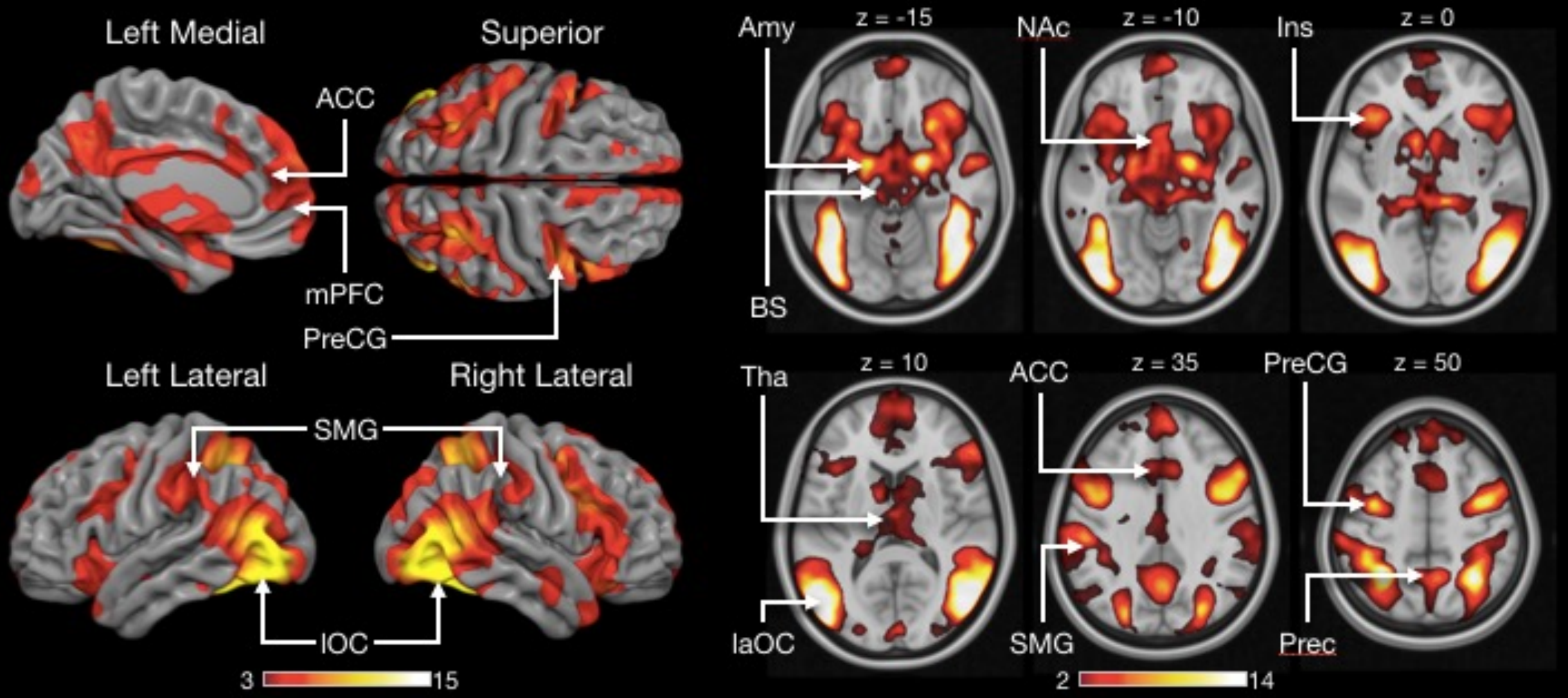
Vesa Putkinen

PhD


[-0.5, -0.5, -0.5]
SPM{T98}
SPMresults: ./porn_landscape
Height threshold T = 1.660551 {p<0.05 (unc.)}
Extent threshold k = 1000 voxels
contrast
1
10
20
30
40
50
60
70
80
90
0.5
1
1.5
Design matrix


20
15
10
5
0



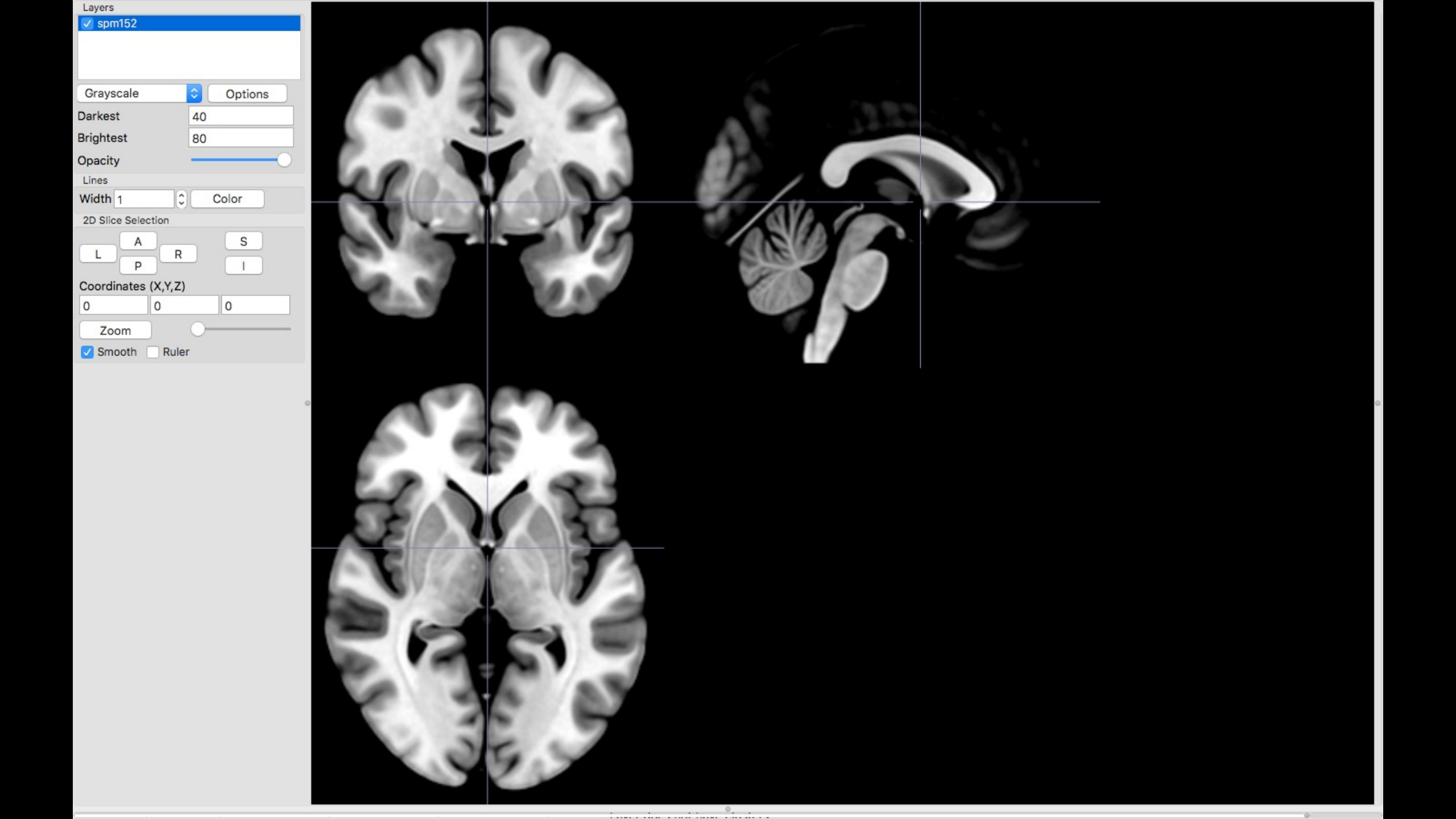


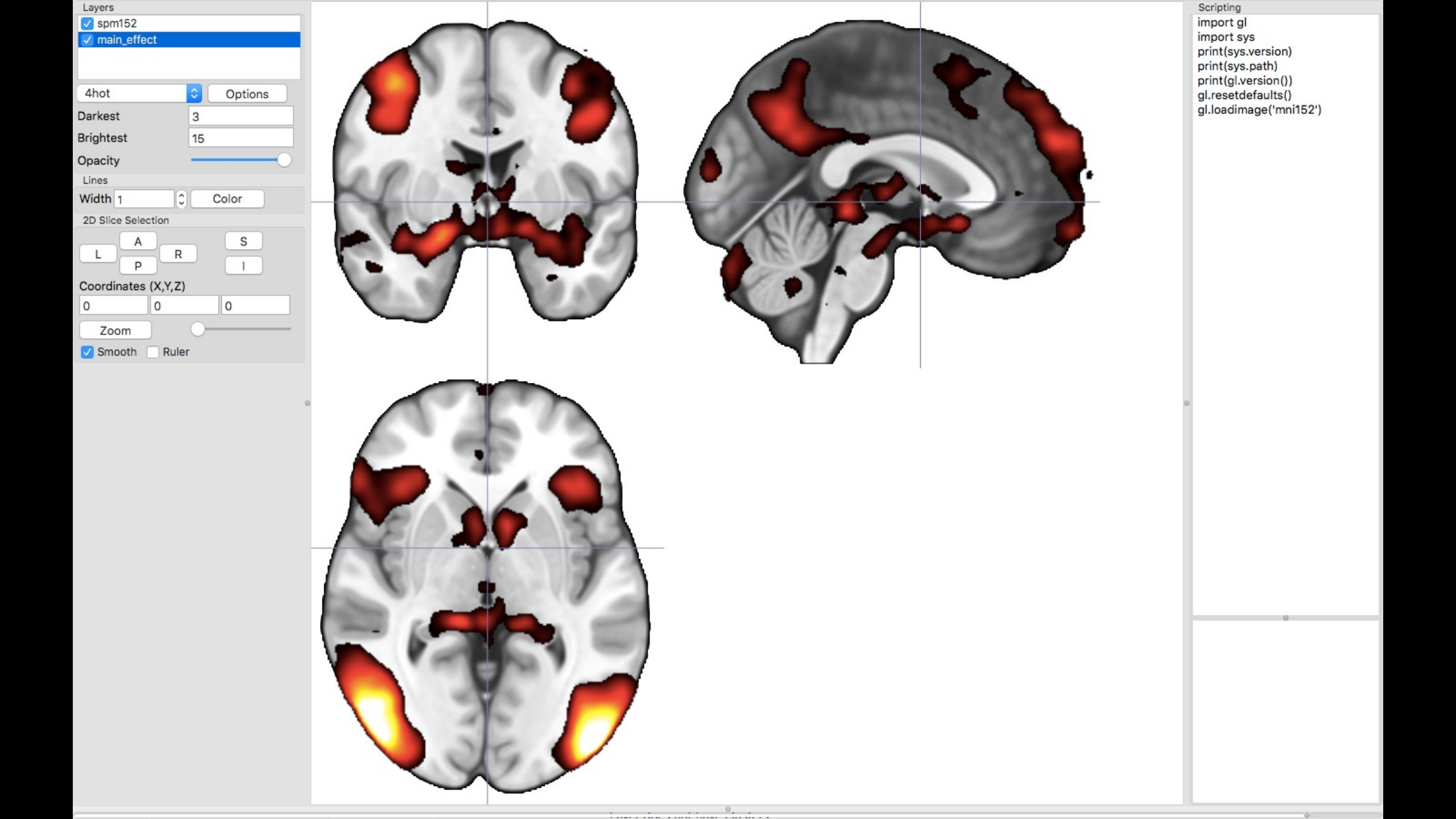

Putkinenen et al. in preparation

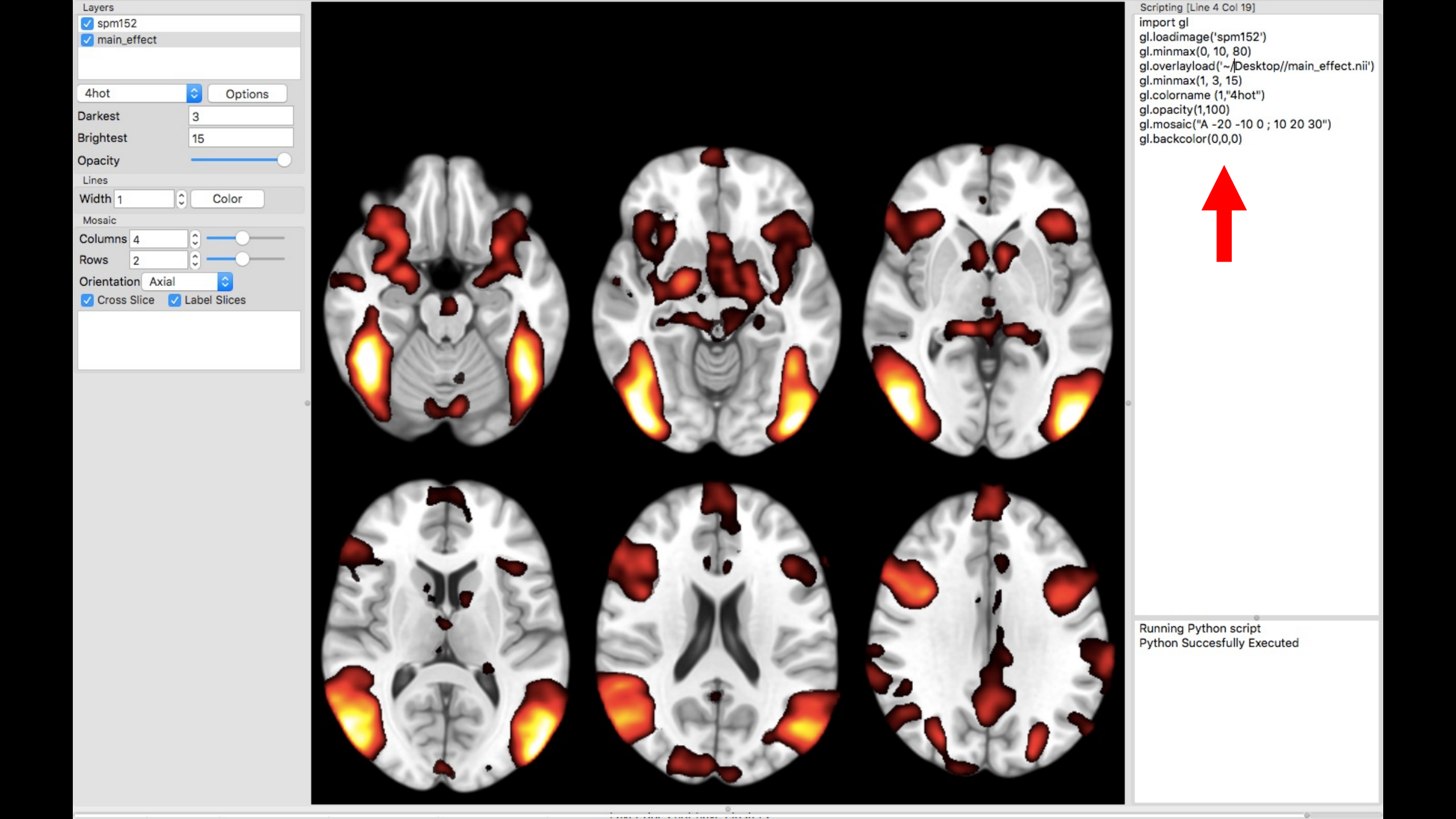
# MRIcroGL

# MRICroGL

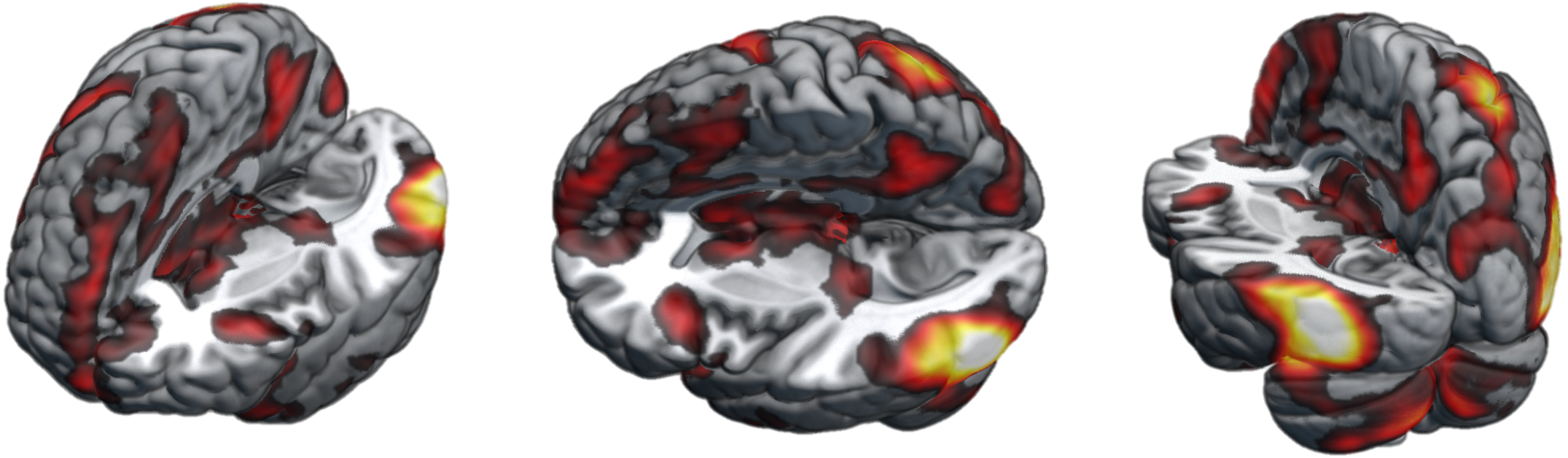

- Open source medical image viewer
- Can be downloaded for free from www.nitrc.org/
- Runs on Mac, Windows and Linux
- Includes a a graphical interface and scripting
- Scripts can be run from the GUI or invoked from the command line
- (Can do DICOM to NifTI conversion)

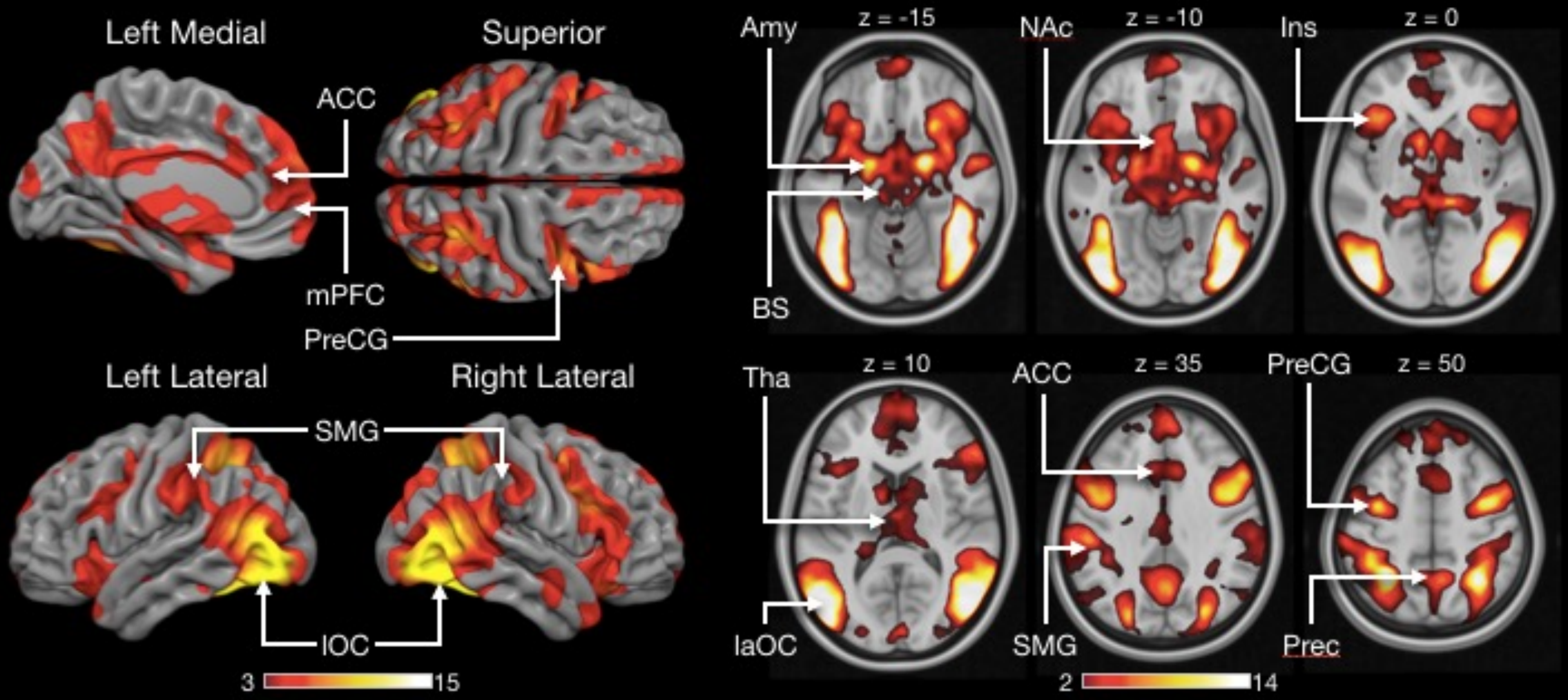

Layers
spm152
Grayscale
Options
Darkest
40
Brightest
80
Opacity
Lines
Width
1
Color
2D Slice Selection
A
L
R
P
S
I
Coordinates (X,Y,Z)
0
0
0
Zoom
Smooth
Ruler


Layers
spm152
main_effect
4hot
Options
Darkest
3
Brightest
15
Opacity
Lines
Width
1
Color
2D Slice Selection
A
L
R
P
S
I
Coordinates (X,Y,Z)
0
0
0
Zoom
Smooth
Ruler
Scripting
import gl
import sys
print(sys.version)
print(sys.path)
print(gl.version())
gl.resetdefaults()
gl.loadimage('mni152')


Layers
spm152
main_effect
4hot
Options
Darkest
3
Brightest
15
Opacity
Lines
Width
1
Color
Mosaic
Columns
4
Rows
2
Orientation
Axial
Cross Slice
Label Slices
Scripting [Line 4 Col 19]
import gl
gl.loadimage('spm152')
gl.minmax(0, 10, 80)
gl.overlayload('~/Desktop//main_effect.nii')
gl.minmax(1, 3, 15)
gl.colorname (1,"4hot")
gl.opacity(1,100)
gl.mosaic("A -20 -10 0 ; 10 20 30")
gl.backcolor(0,0,0)
Running Python script
Python Succesfully Executed

# Volume Rendering with MRIcroGL




Left Medial
Superior
ACC
mPFC
PreCG
Left Lateral
Right Lateral
SMG
lOC
3
15
Amy
z = -15
BS
NAc
z = -10
Ins
z = 0
Tha
z = 10
laOC
ACC
z = 35
SMG
PreCG
z = 50
Prec
2
14

# Surf Ice

- A surface renderer closely related to MRIcroGL
- Can also be downloaded for free from www.nitrc.org/
- Similar scripting capabilities as MRIcroGL

Clipping

Depth

Azimuth

Elevation

Background Mesh

XRay

Shader For Background Only

Render

Minimal AO

Light

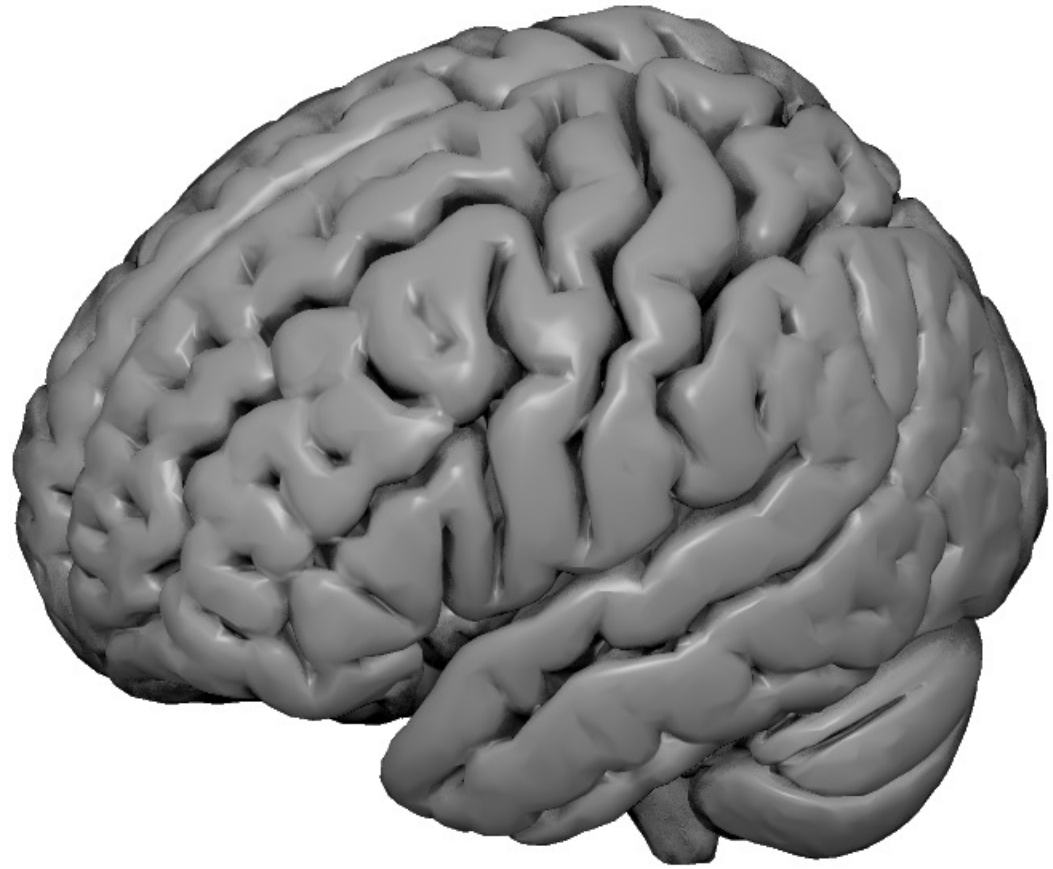
Ambient

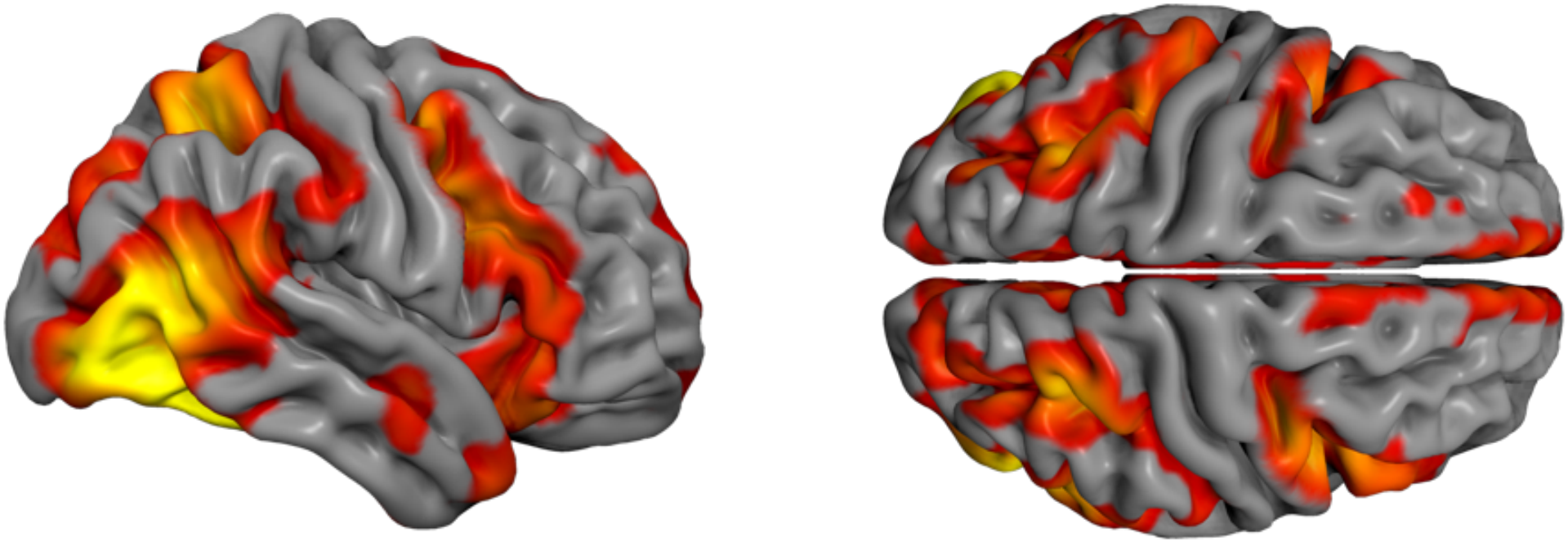
Diffuse

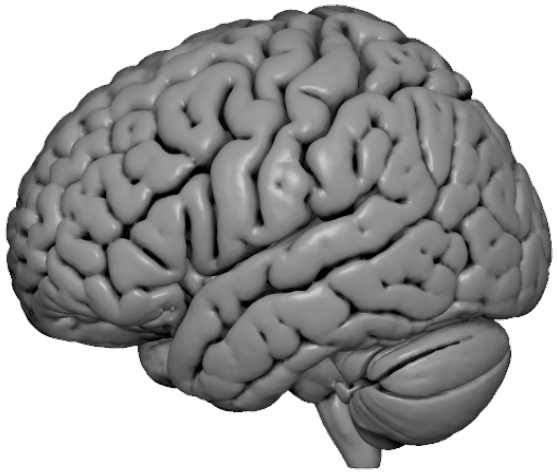
Specular

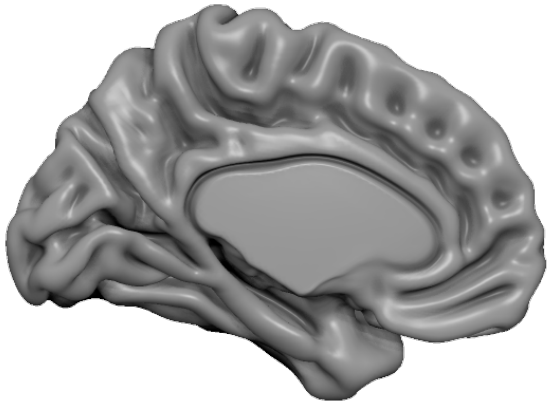
Shininess

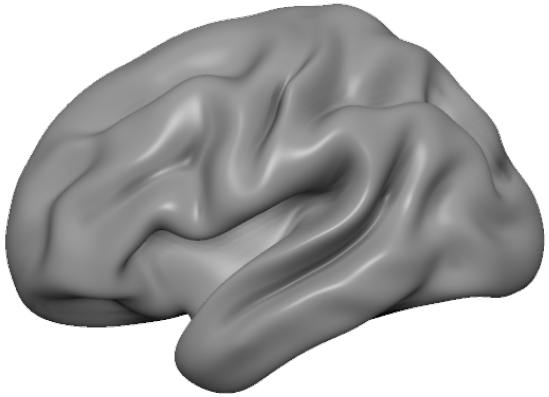
Blinn-Phong shading with Lambertian dif



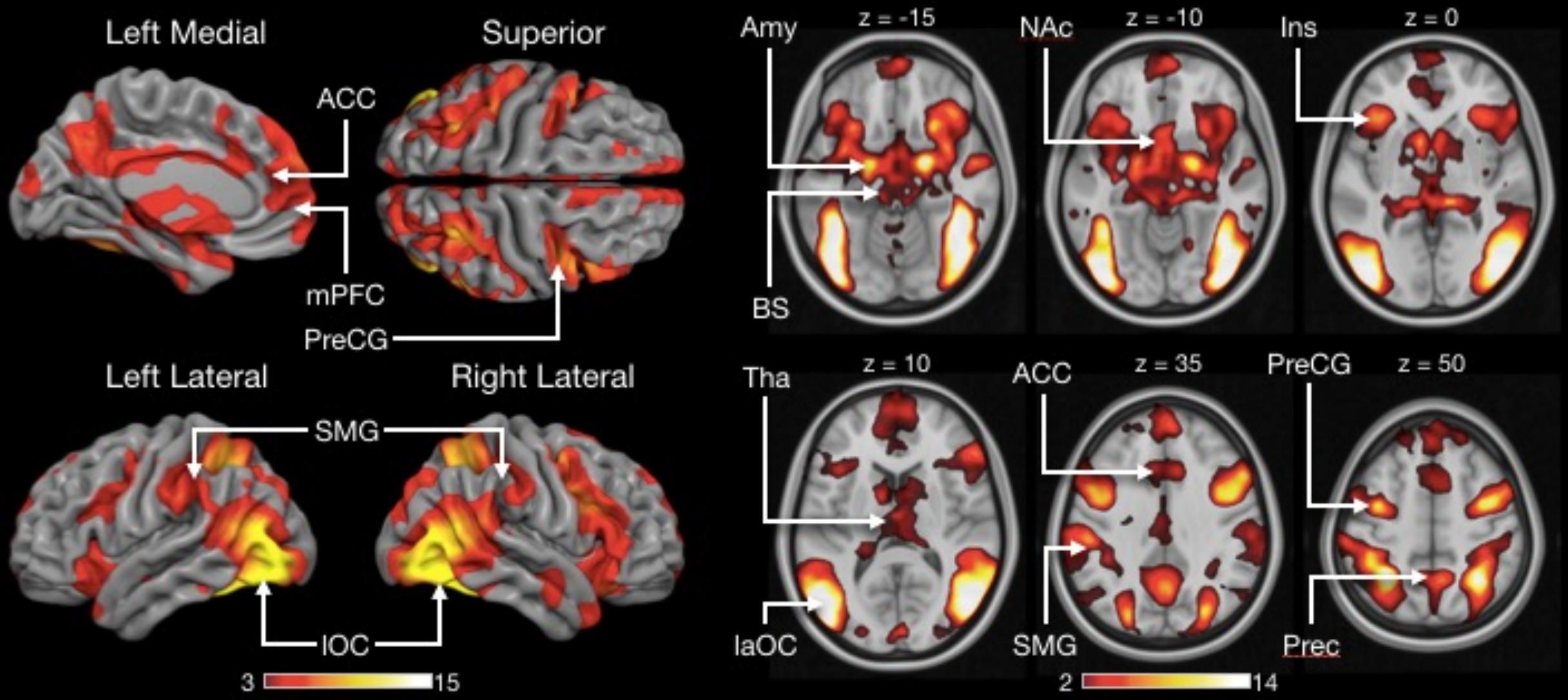


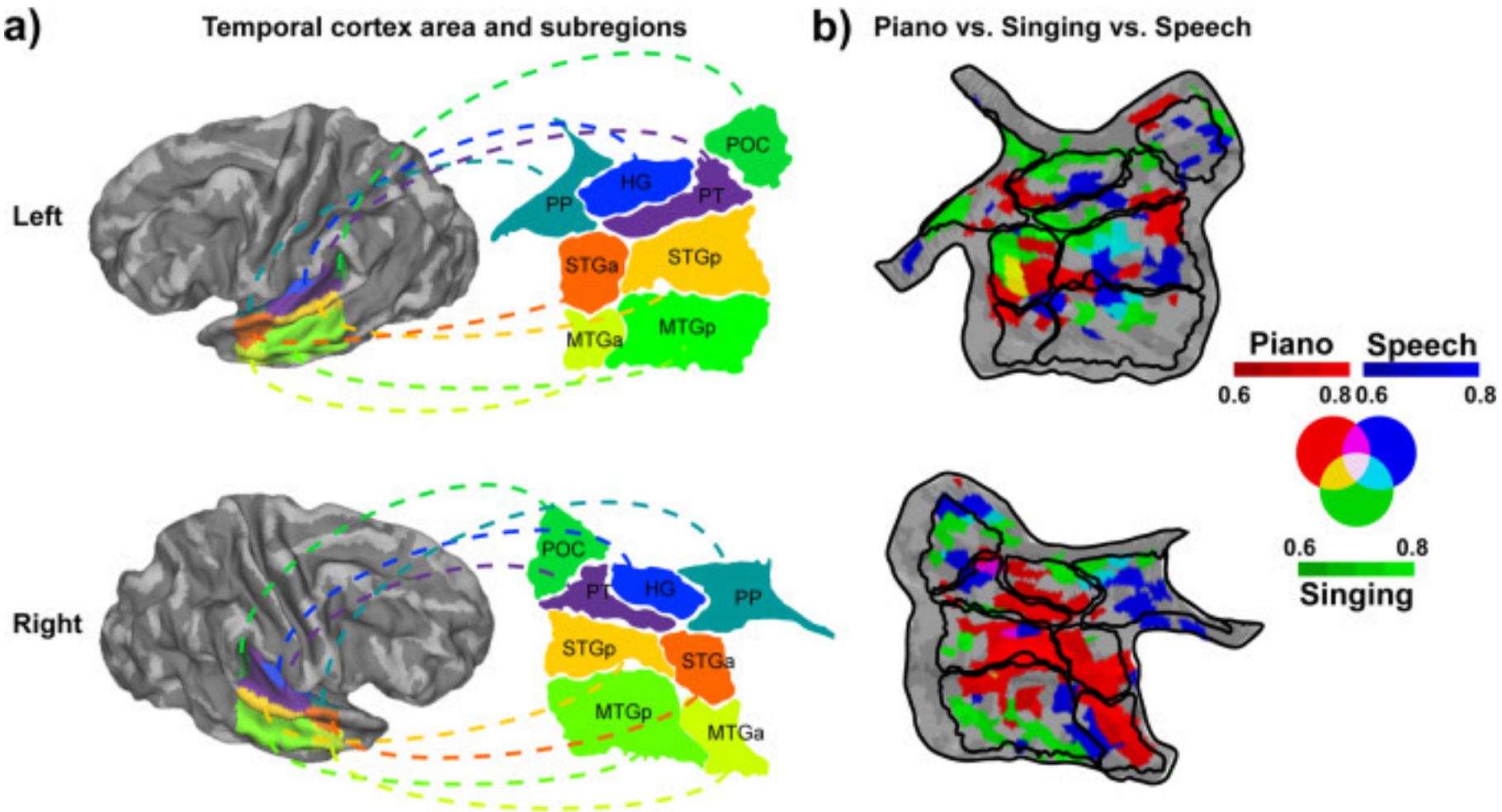




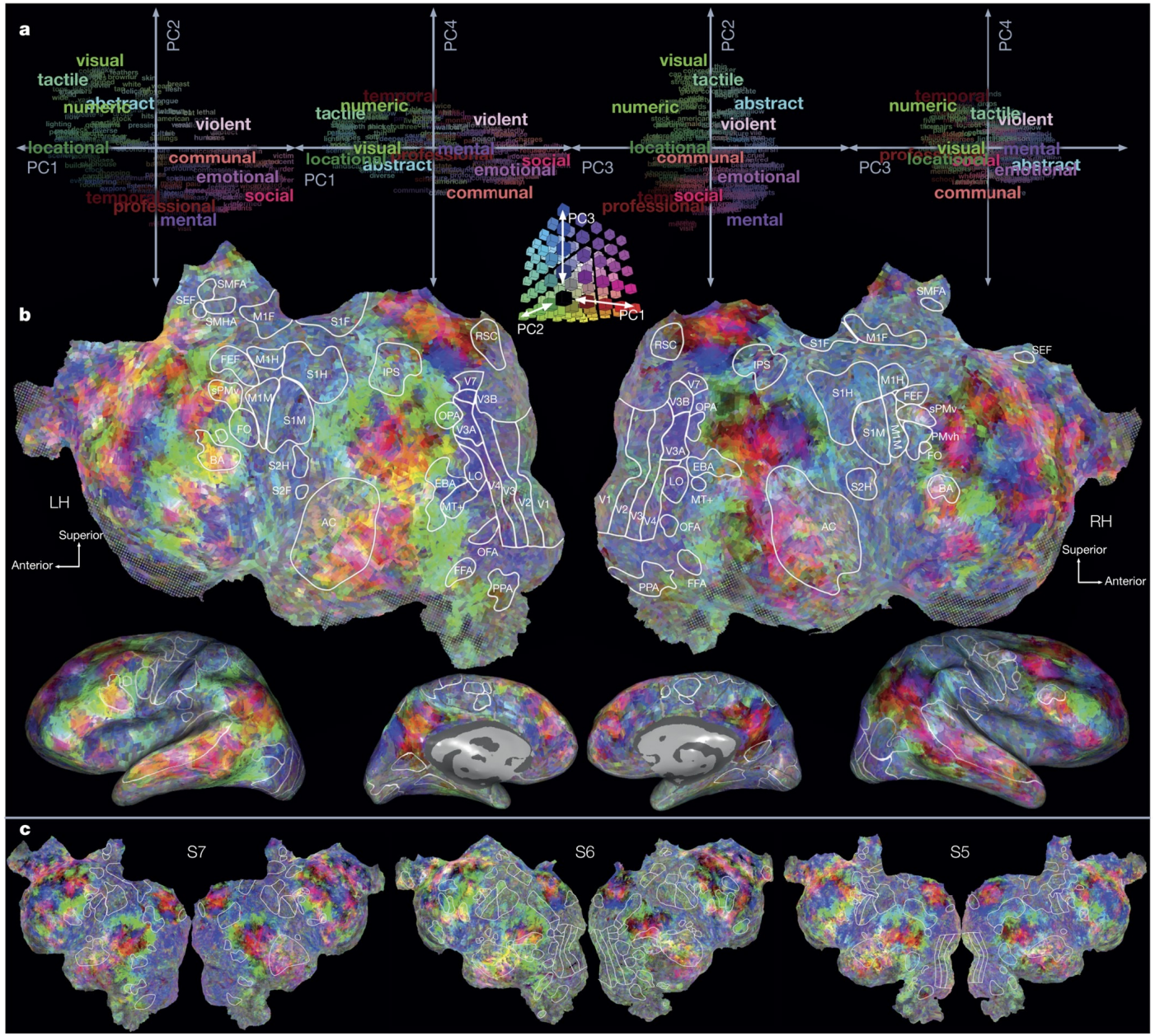


```
import gl
gl.resetdefaults()
gl.meshload('BrainMesh_ICBM152.rh.mz3')
gl.overlayload('motor_4t95mesh.rh.mz3')
gl.overlaycolorname(1, 'red')
gl.shaderxray(1.0, 0.3)
gl.azimuthelevation(110, 15)
gl.meshcurv()
```


Left Medial
Superior
ACC
mPFC
PreCG
Left Lateral
Right Lateral
SMG
lOC
3
15
Amy
z = -15
BS
NAc
z = -10
Ins
z = 0
Tha
z = 10
laOC
ACC
z = 35
SMG
PreCG
z = 50
Prec
2
14



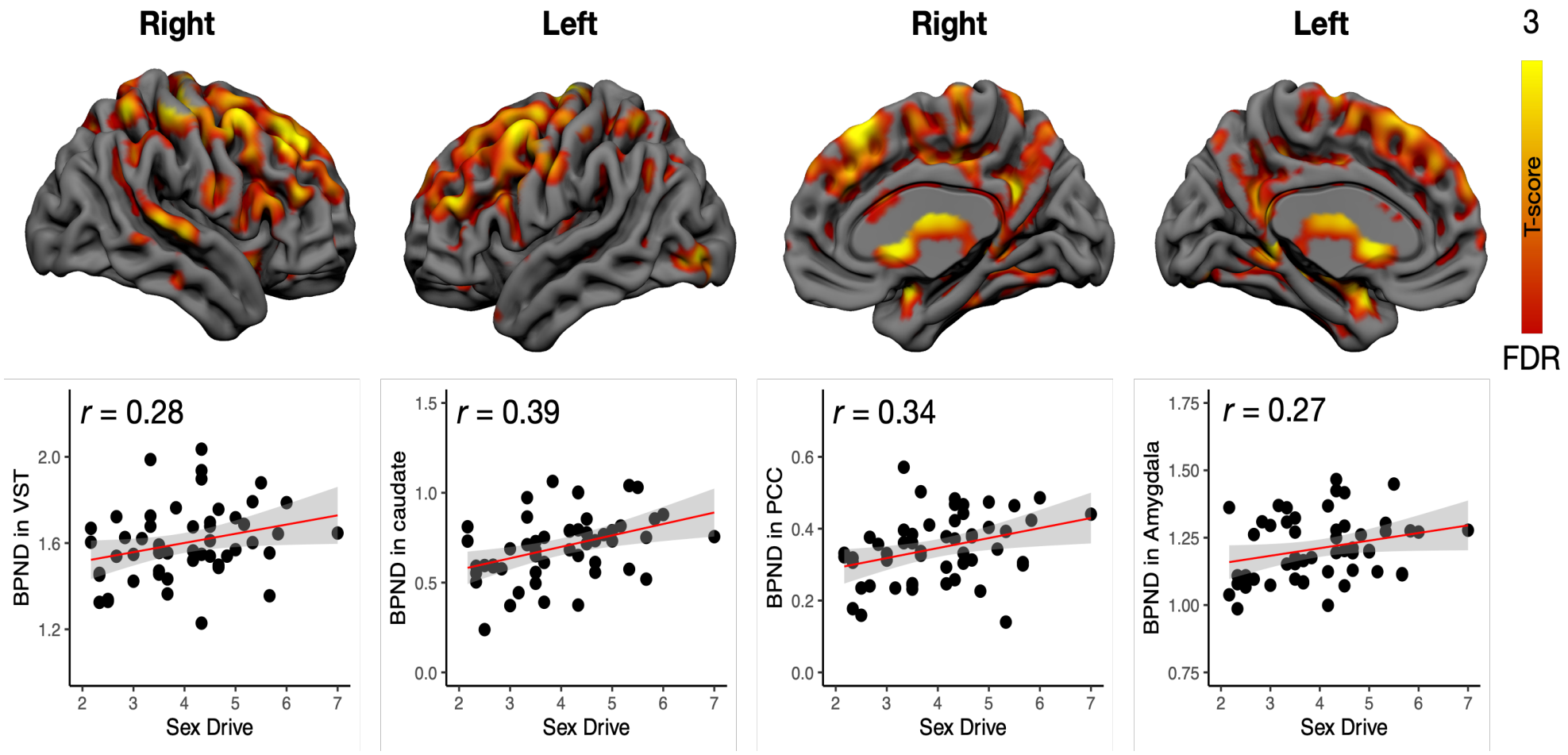

Salmi, et al., NeuroImage, 2017




Huth, et al. Nature, 2016

# Other rendering tools

- Caret
- Fsleyes
- Freeview
- ParaView
- PyCortex
- See links in the course web page

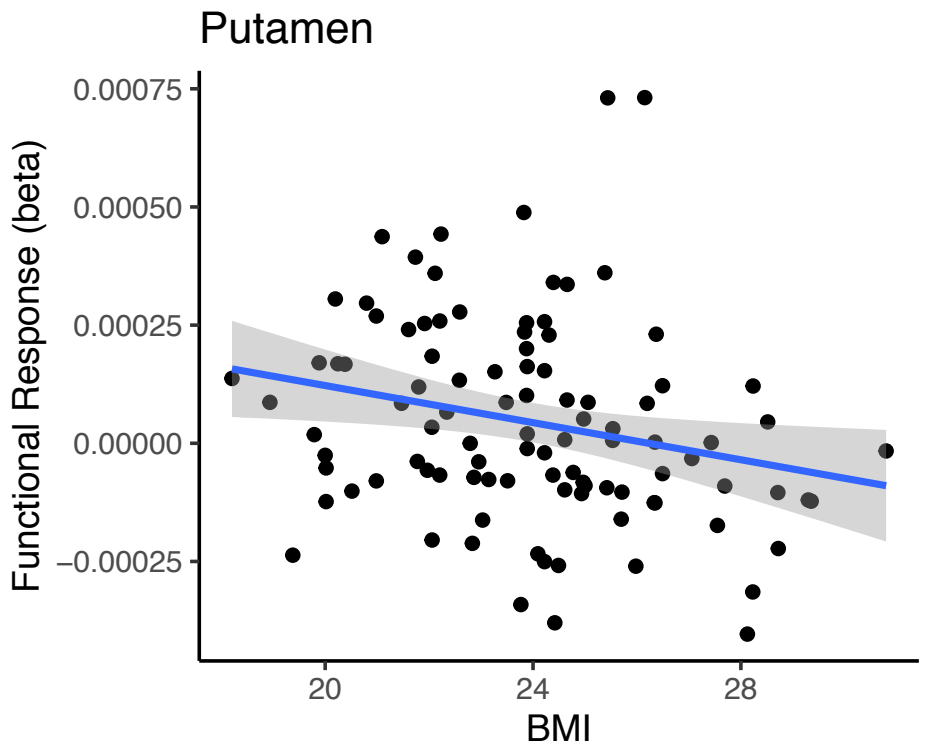



Nummenmaa et al, under revision


R
Studio®


ggplot2
www.rstudio.com

```
ggplot(df,aes(bmi,beta))+
  geom_point()+
  geom_smooth(method = 'lm')+
  theme_classic()+
  xlab('BMI')+ # x axis label
  ylab('Functional Response (beta)')+
  ggtitle('Putamen')
```



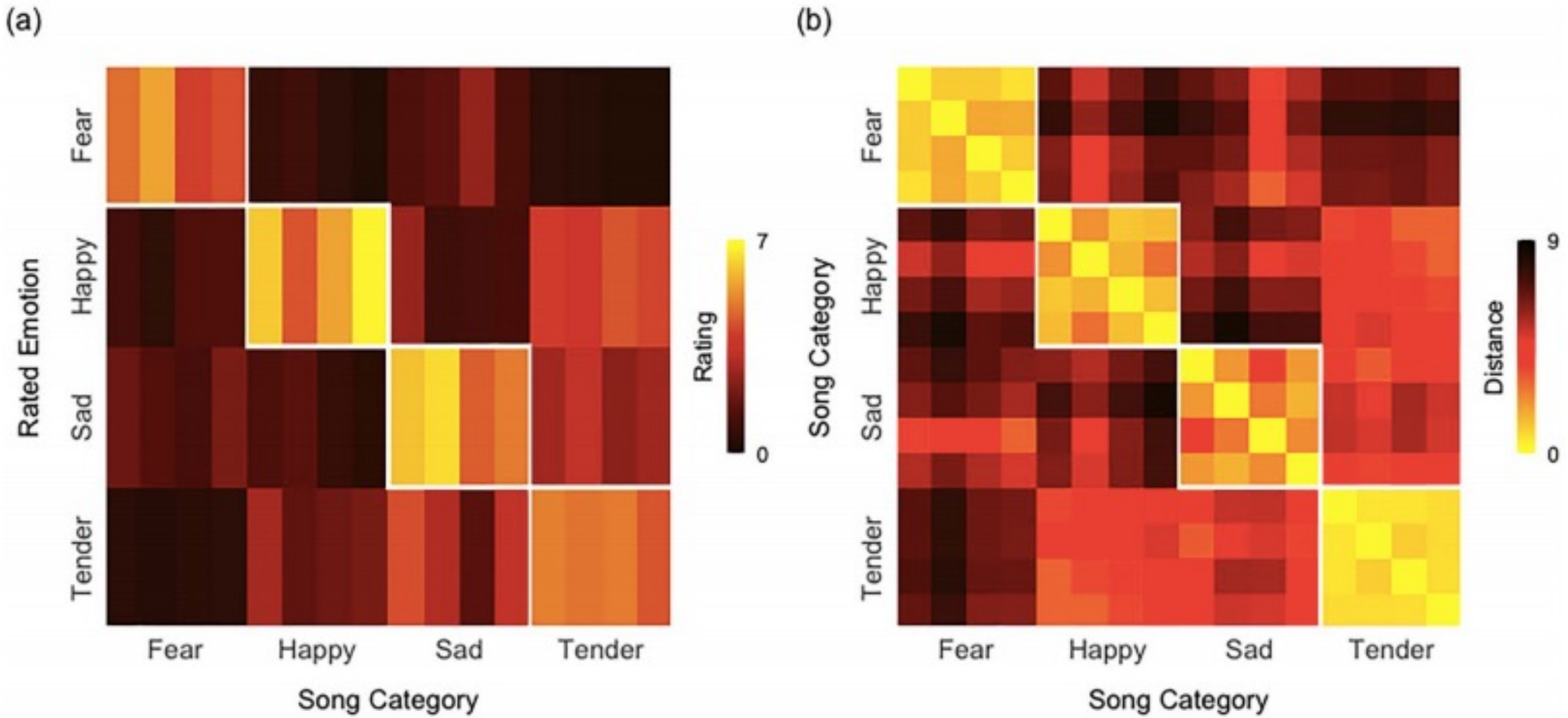



**Figure 1.** (*a*) Mean ratings for the intensity of each emotion for each musical excerpt. (*b*) Rating dissimilarity matrix (Euclidean distance) for each song pair.

Putkinen et al., Cerebral Cortex, 2021

https://www.rstudio.com/

https://ggplot2.tidyverse.org/