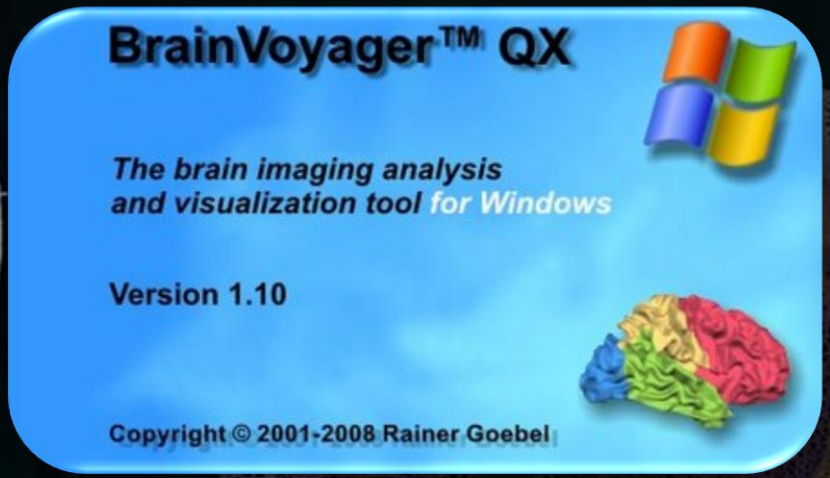

BrainVoyager™ QX
The brain imaging analysis
and visualization tool for Windows
Version 1.10
Copyright © 2001-2008 Rainer Goebel

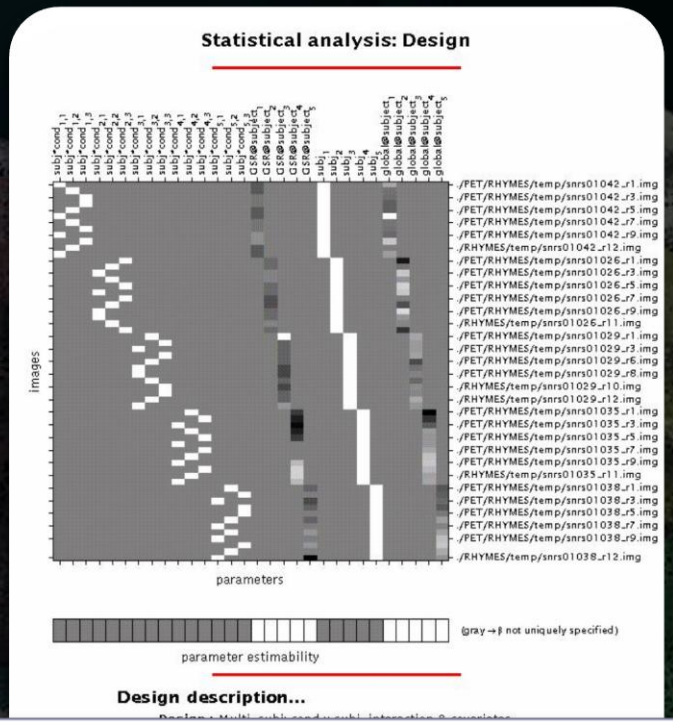

SPM CENTRAL

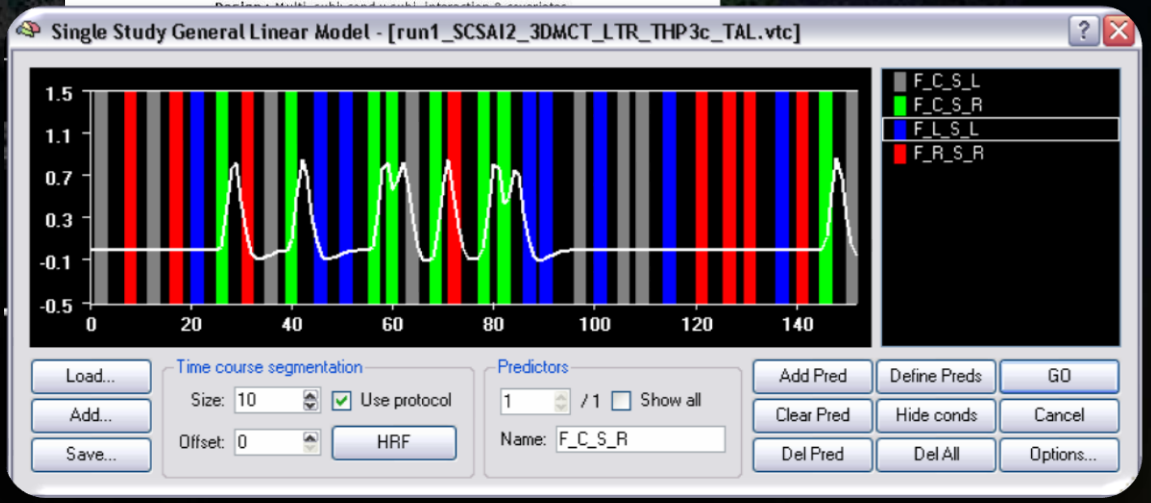

FSL

Matt Wall

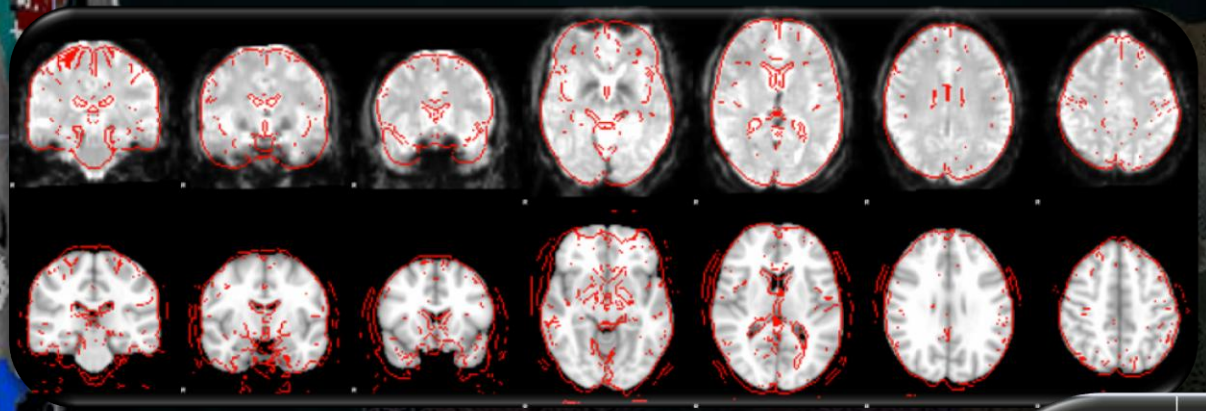
Modelling

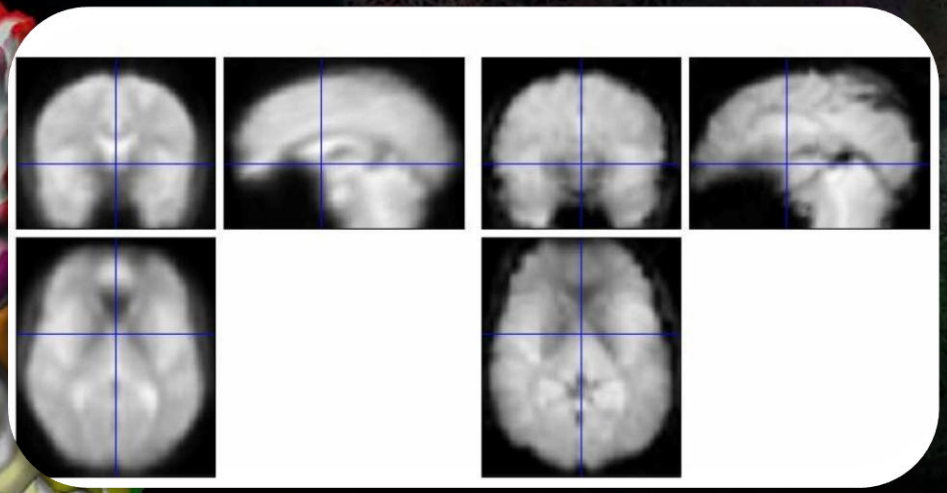

C1
1
0

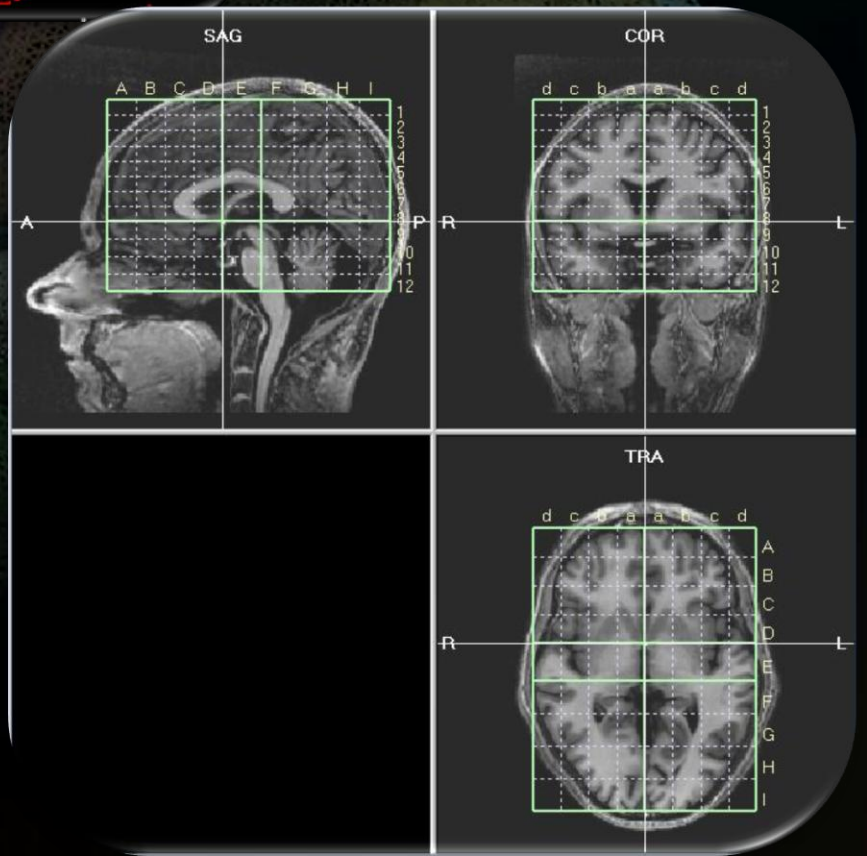

Statistical analysis: Design
images
parameters
parameter estimability
(gray → β not uniquely specified)
Design description...


Single Study General Linear Model - [run1_SCSAI2_3DMCT_LTR_THP3c_TAL.vtc]
1.5
1.1
0.7
0.3
-0.1
-0.5
0
20
40
60
80
100
120
140
F_C_S_L
F_C_S_R
F_L_S_L
F_R_S_R
Load...
Add...
Save...
Time course segmentation
Size: 10
Use protocol
Offset: 0
HRF
Predictors
1
/ 1
Show all
Name: F_C_S_R
Add Pred
Define Preds
GO
Clear Pred
Hide conds
Cancel
Del Pred
Del All
Options...

Spatial Normalisation

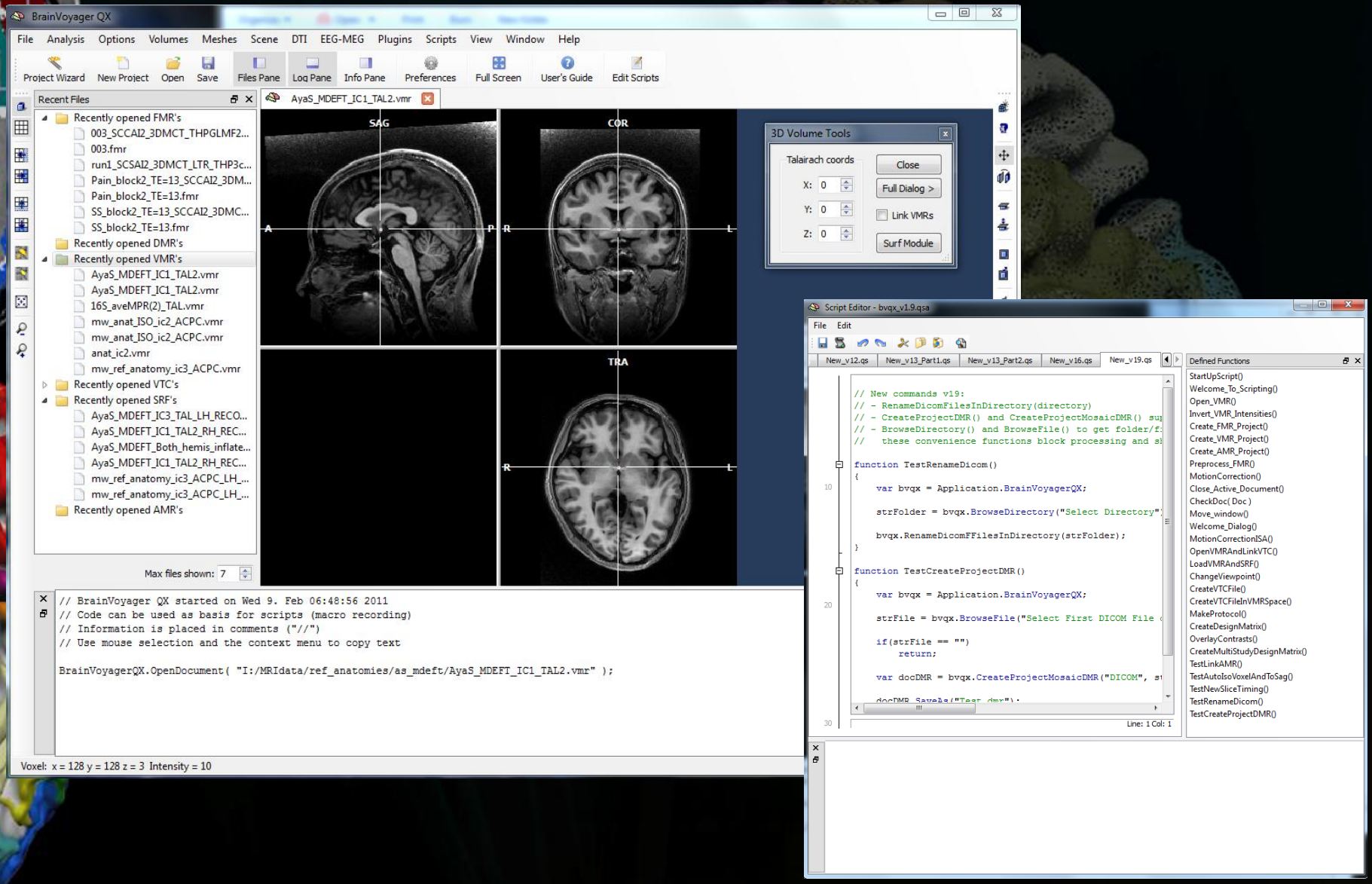






	BV	SPM	FSL
Platform	All	All	Unix
Cost	$$$	Free ($)	Free
Interface	GUI/script	GUI/Matlab	GUI/Shell
Norm.	Talairach	MNI	MNI
Documentation	Good(ish)	Improving	Non-existent
Speed	V. Fast	Slow(ish)	Fast
Visualisation	Great	OK (add-ons)	Good
Advanced Features	Built-in	Add-on Toolboxes	DIY
Development	Agile	Cathedral	KISS/WIS

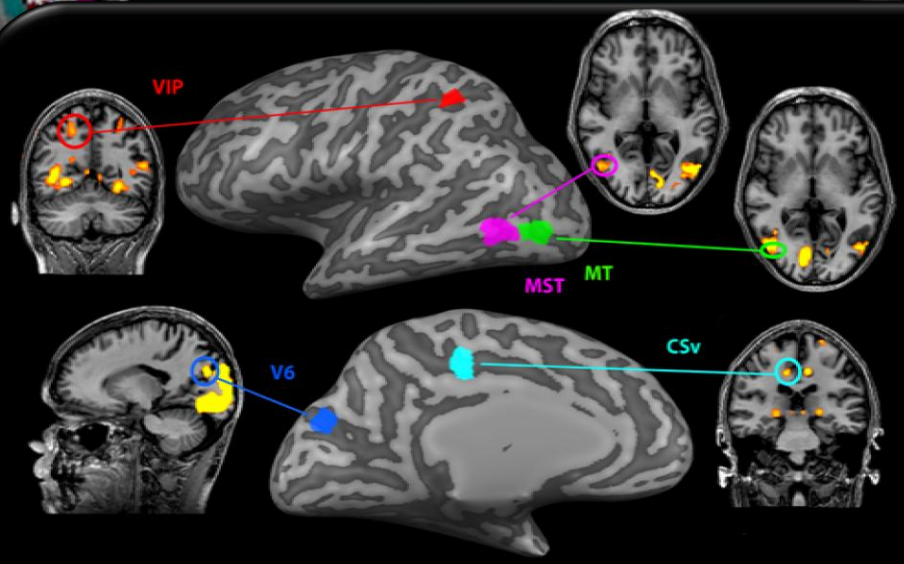
BV: Interface

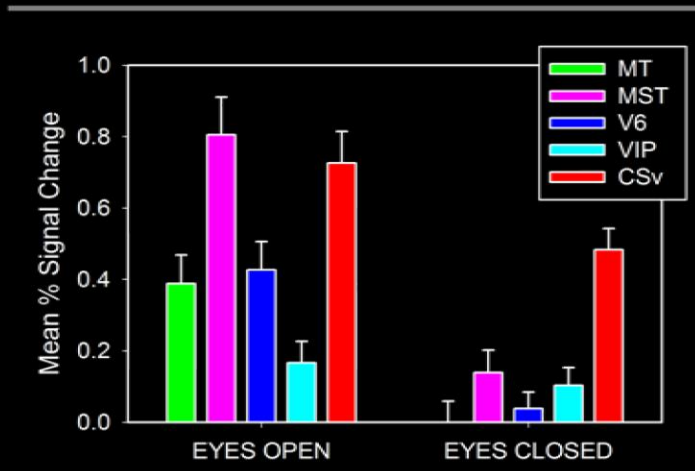


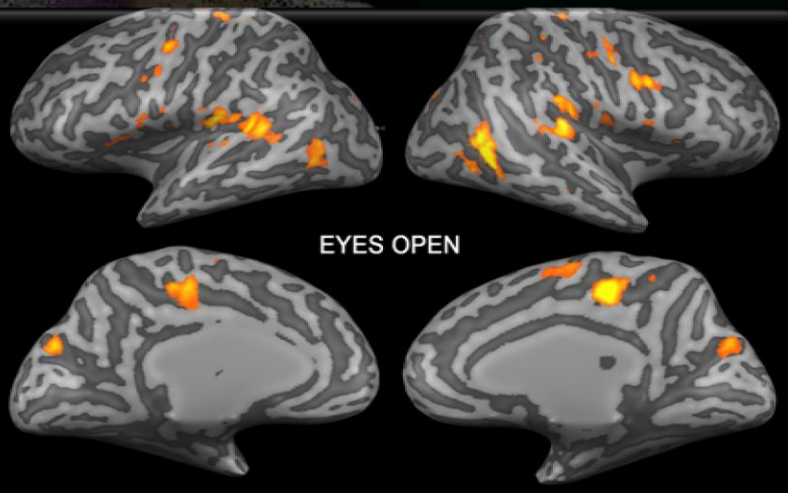
BV Key Features

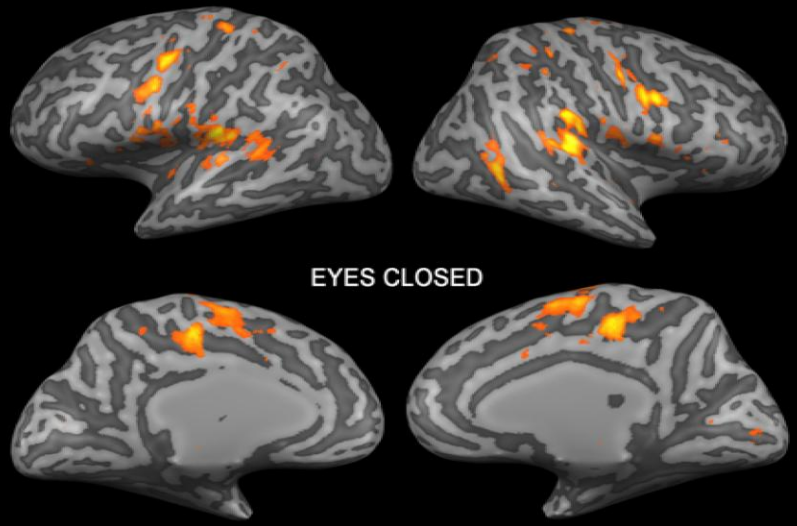
- Modalities: (f)MRI, DTI, EEG, MEG, TMS Navigation
- Extremely fast – highly optimized (multi-core support)
- Automated cortical segmentation, reconstruction, flattening
- Model (GLM) and data (ICA) based analyses in volume and surface spaces
- Advanced ROI/time-course tools
- Connectivity Analyses (GCM), MVPA analyses.
- Proprietary file formats
- Movie Studio!

ROI Analyses

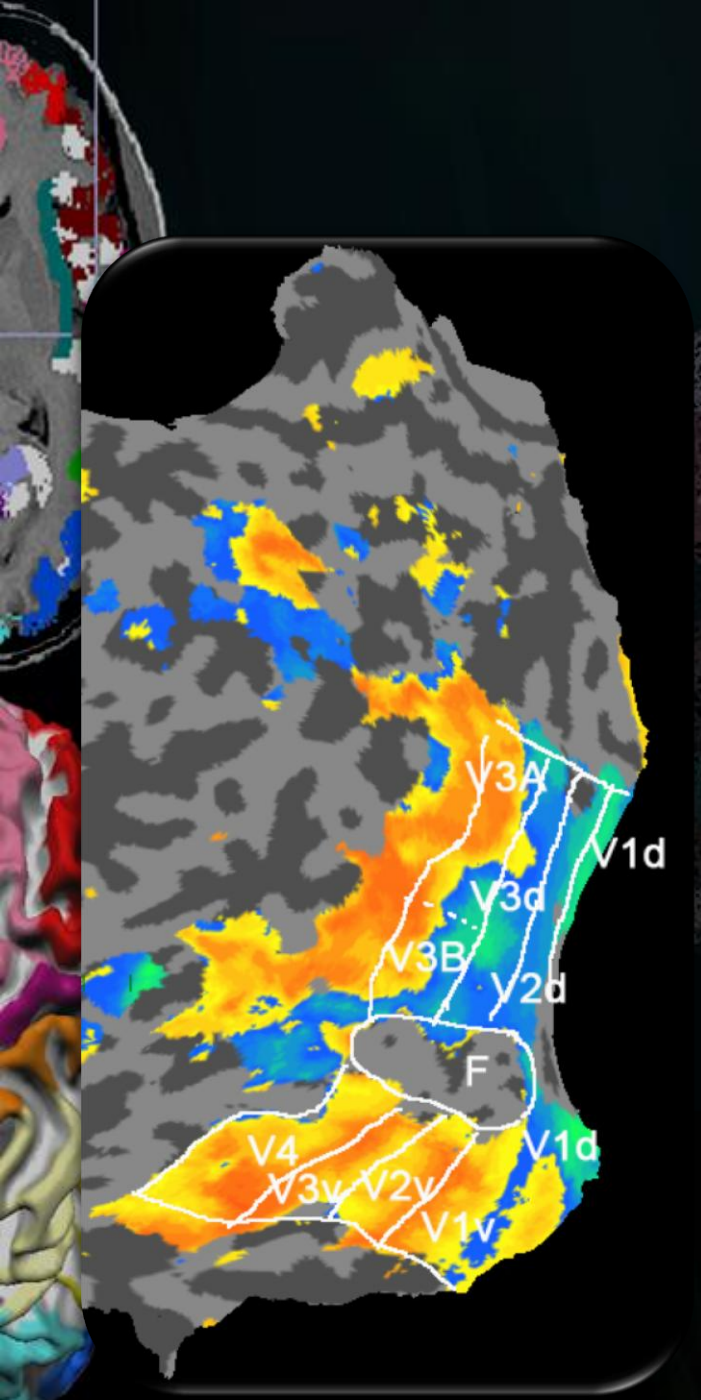


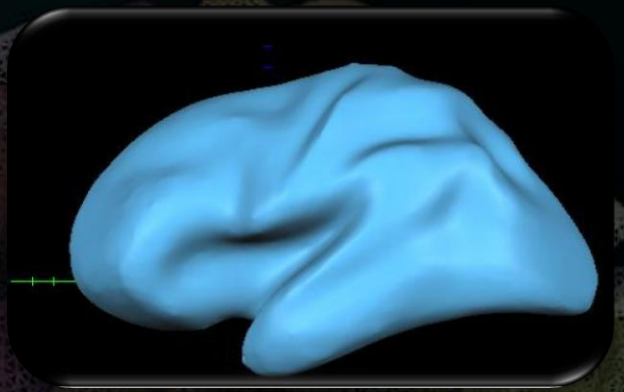


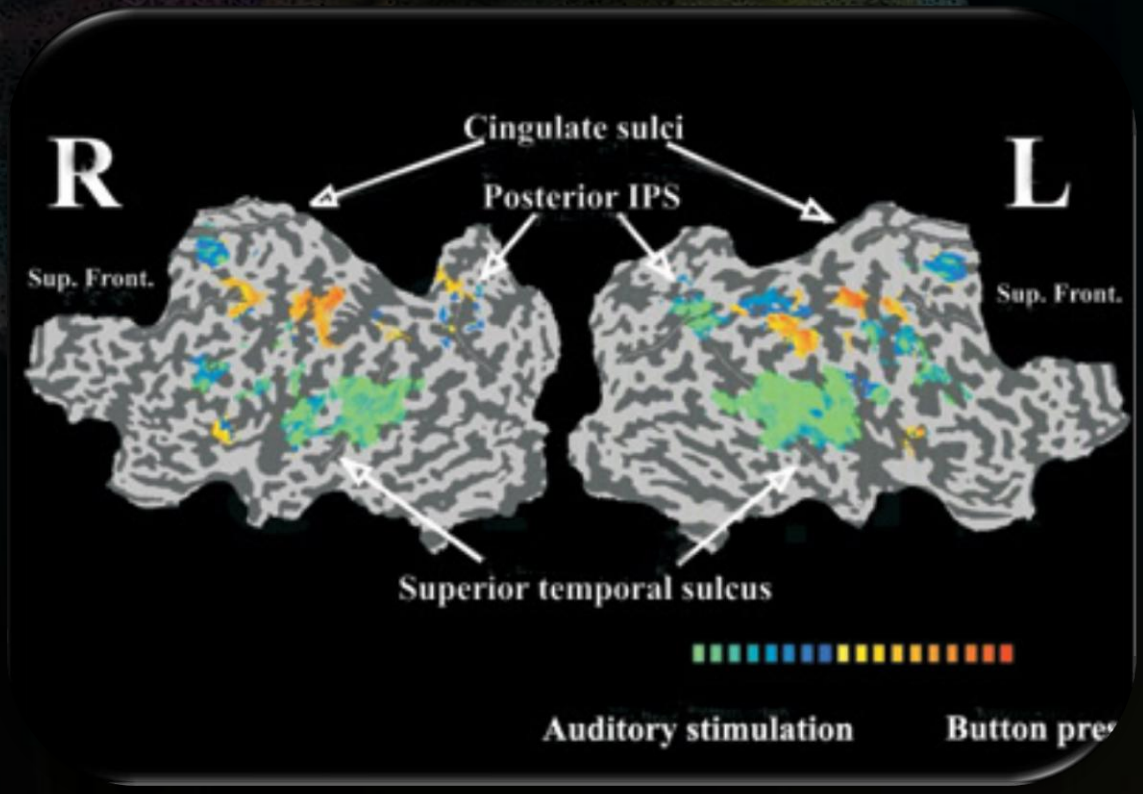




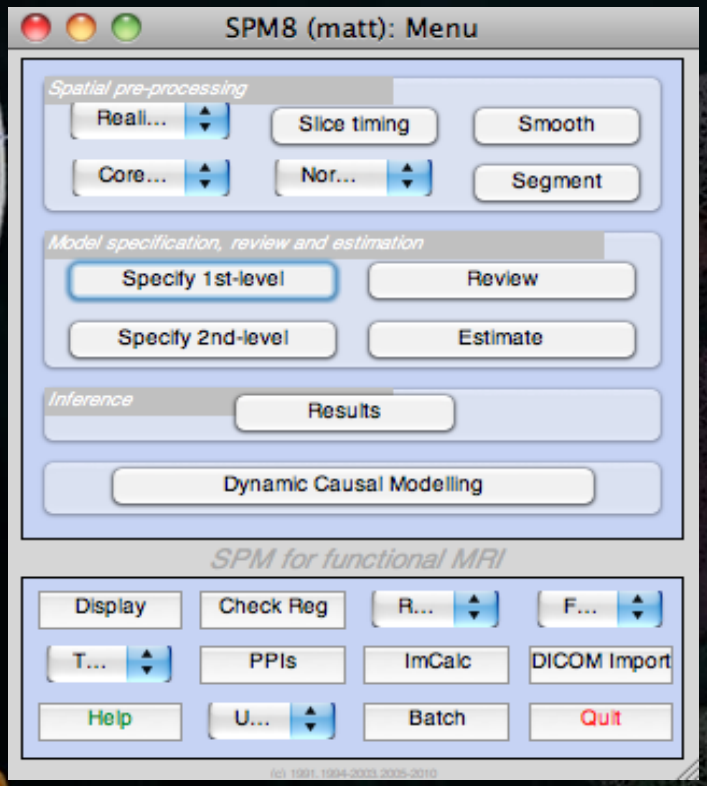
Cortical Inflation/Flattening

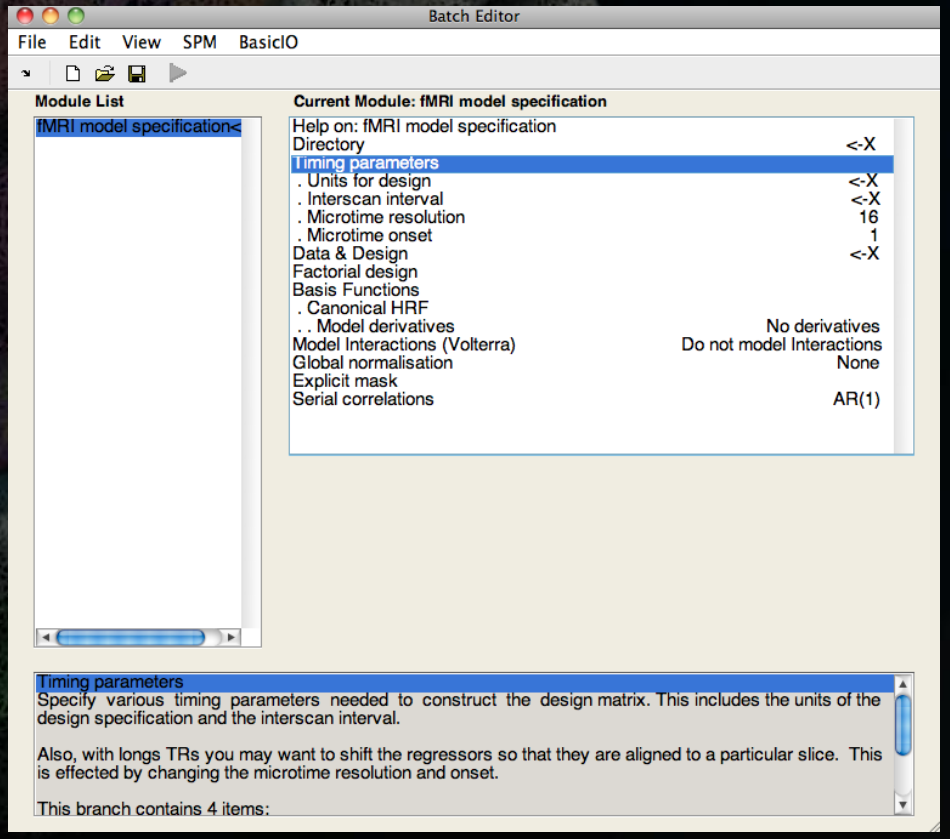


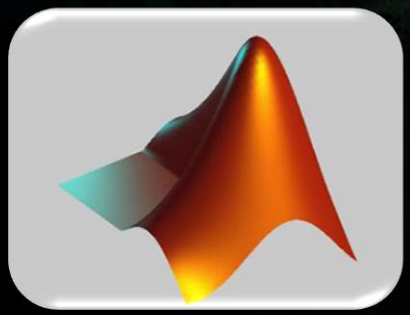




SPM8 Interface



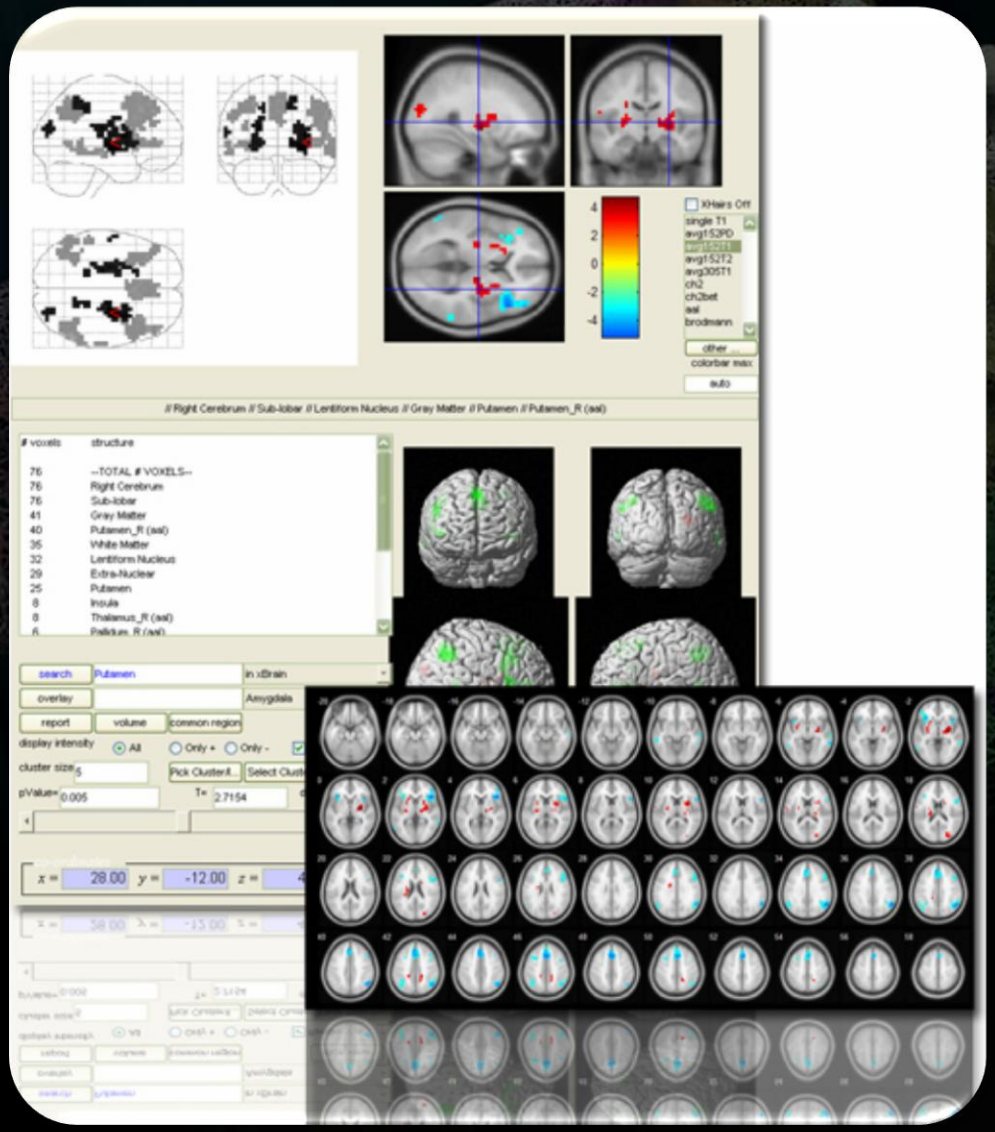




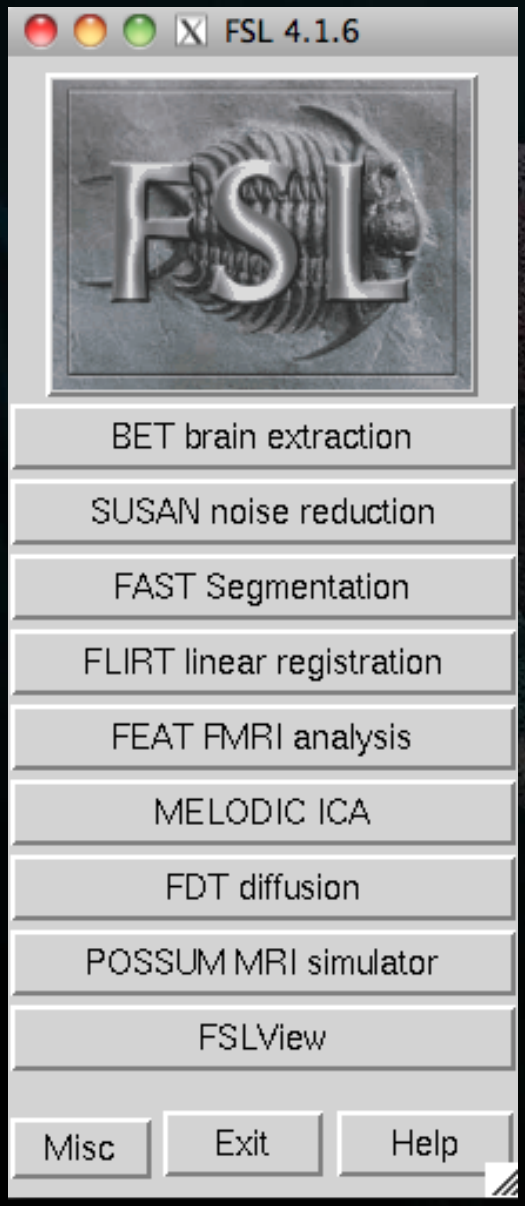
SPM Key Features

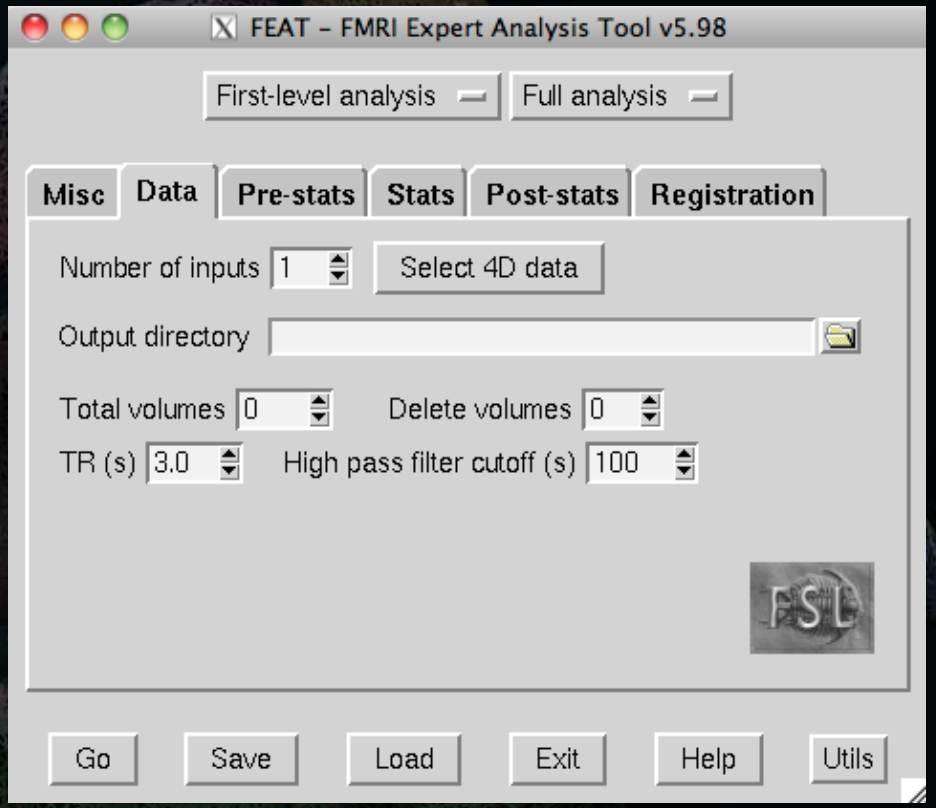
- Modalities: fMRI, PET, SPECT, EEG, MEG
- Built-in Batching Tool
- In-line help system
- ROI/time-course analyses (using MarsBar)
- Hundreds of add-ons available
- Connectivity Analyses (DCM)
- Innovative methods (Multivariate Bayes, Canonical Variates analysis, Topological FDR... Etc.)
- Open file formats

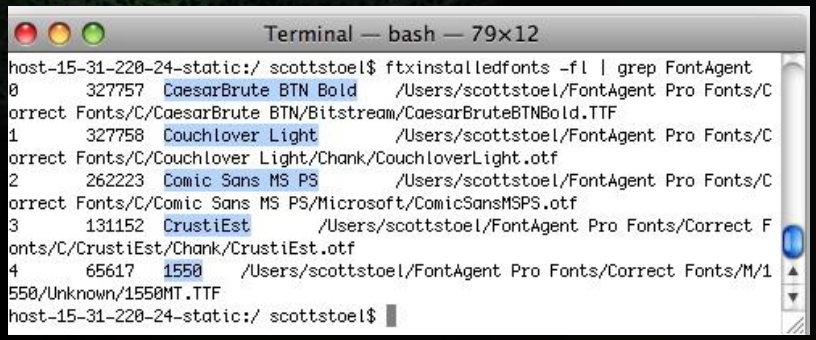
XJView for SPM



FSL Interface







FSL Key Features

- Modalities: (f)MRI, DTI
- Very clean interface
- Fast (runs native on Unix)
- Stand-alone viewer program (FSLView)
- Suite of tools for low-level data manipulation
- Easy connectivity analyses (P-ICA)
- Surface-based features (using FreeSurfer)
- Open file formats

FSLView


Ortho view
100%
Min 3000
Max 8000
S
R
L
I
P
A
Overlay Information Dialog
Basic image information
Name: avg152T1_brain
Filename: /usr/local/fsl/data/standard/avg152T1_brain
Voxels: 91 x 109 x 91
Dimensions: 2 x 2 x 2 mm
Volumes: 1
Data type: Signed short (16 bpp)
Image type: Unknown
Lookup table options
Greyscale
Greyscale
DTI display options
Display as: None
Modulation: None
Help
Close
X 45
Y 54
Z 45
0.00
-18.00
18.00
Volume 0
Intensity 5391
Coordinate space: MNI_152
avg152T1_brain 1

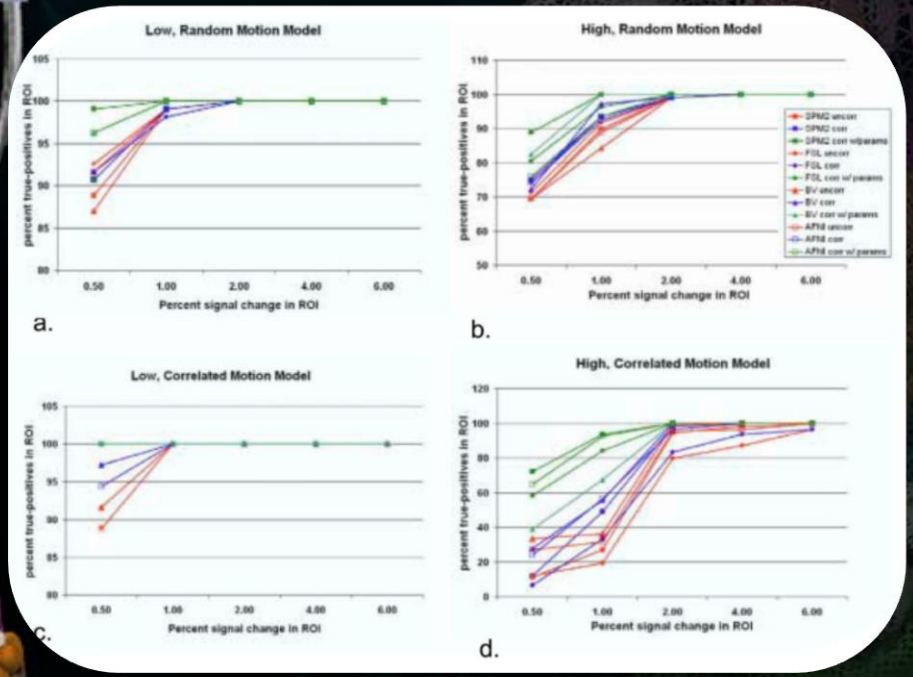
FSL Tools

- **fsl2ascii** - convert image files to ASCII text file (or files if data is 4D).
- **fslcc** - run cross-correlations between every volume in one 4D data set with every volume in another (for investigating similarities in ICA
- **fslchfiletype** - used to change the file type of an image (e.g. from ANALYZE_GZ to NIFTI). The first argument is the desired file type (or given then the input file is converted in place. This in place conversion removes the original files: e.g. for an Analyze file called stdimg the an image with the same basename and different filetypes (e.g. stdimg.nii.gz and stdimg.hdr and stdimg.img) creates many problems fo
- **fslcomplex** - a utility that allows 3D or 4D complex image files to be split or constructed from corresponding real components (either C first and last 3D volumes to be processed when the input is 4D (default is to do all volumes).
- **fslcpgeom** - copy certain parts of the header information (image dimensions, voxel dimensions, voxel dimensions units string, image o properly. Copying from different files will result in loss of information or potentially incorrect settings.
- **fslcreatehd** - creates a new image header along with a zero intensity data image. There are two forms of input: one takes a list of minir version is: x/y/z/tsize for image dimensions, x/y/zvoxsize for voxel dimensions (eg in mm), tr in seconds for time between volumes (for 3D type (the commonest are: 1=binary, 2=unsigned char, 4=signed short, 8=signed int, 16=float). Note that this is ***different*** from the previou
- **fsledithd** - allows the header information in and image to be edited in a text-based xml-style format (like the output of `fslhd -x` but with specified by the second argument.
- **fslfft** - outputs the Fast-Fourier Transform (or inverse) for a complex input volume.
- **fslhd** - report every field of an Analyze or Nifti header (note that the fields are different although some are common, e.g. pixdims). The o internally in FSL programs and are sometimes different from the raw values stored in the file to avoid incorrect settings (e.g. dimN has a
- **fslinfo** - report a basic subset of an Analyze or Nifti header.
- **fslinterleave** - interleave two inputs to form a combined image.

...and many more!

Comparison of fMRI statistical software packages and strategies for analysis of images containing random and stimulus-correlated motion

Victoria L. Morgan, Ph.D.[1], Benoit M. Dawant, Ph.D.[1,2], Yong Li, M.S.[2], and David R. Pickens, Ph.D.[1]



- 2007, *Computerized medical imaging and graphics*
- Compared SPM, BV, FSL and AFNI

	Friedman P	UNCORR mean rank	CORR mean rank	CORR WITH PARAMS mean rank
SPM2	0.002	1.40	2.00*	2.60**
AFNI	0.014	1.45	1.95*	2.60**
BV	0.393	1.70	2.10	2.20
FSL	0.368	1.75	1.95	2.30

Functional Imaging Analysis Contest

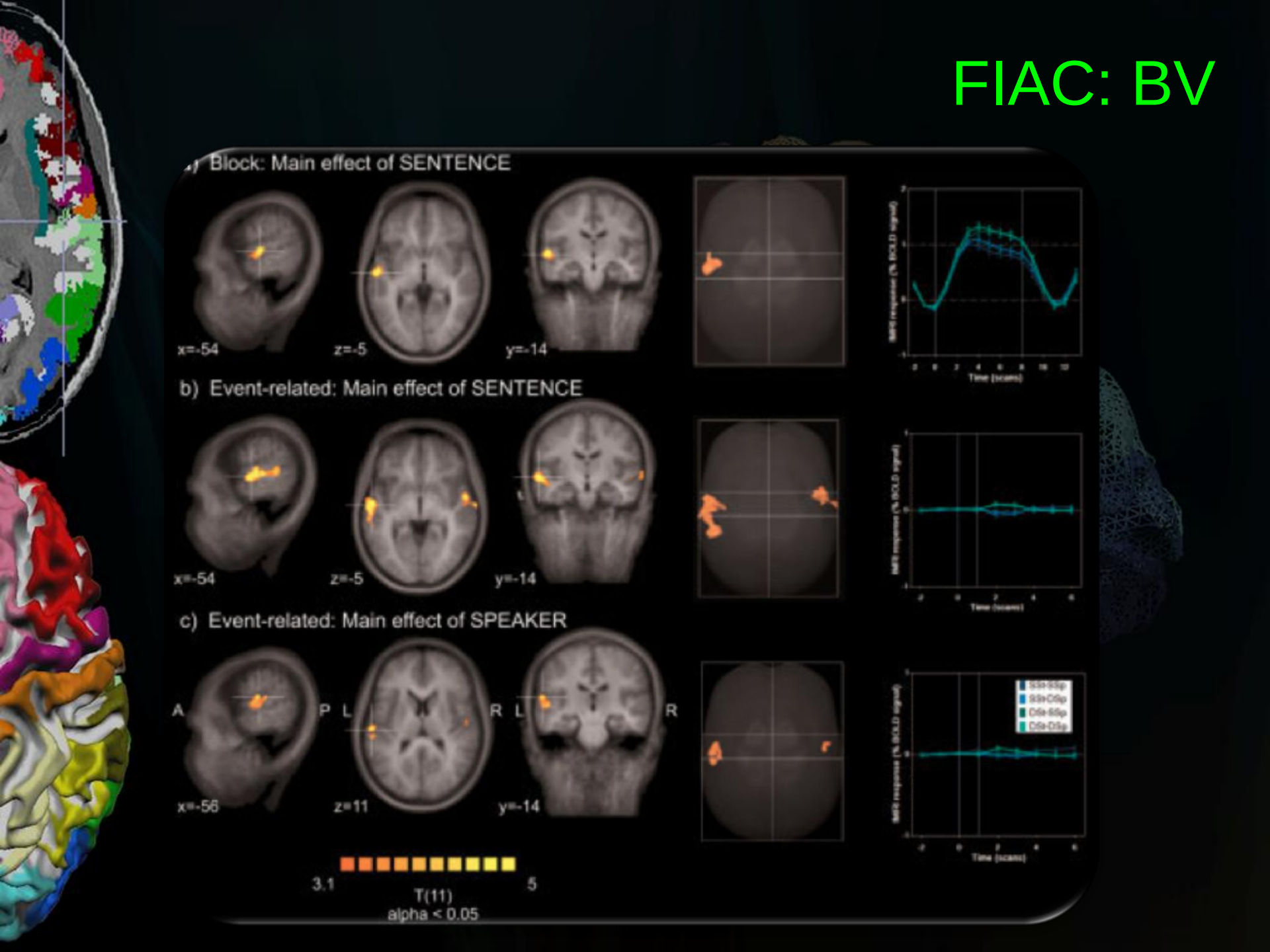
- Special issue of *Human Brain Mapping* (27)

Dataset:

- Experiment 1: subjects heard the same sentence 2-4 times (E-R design, ITI=14.4s)

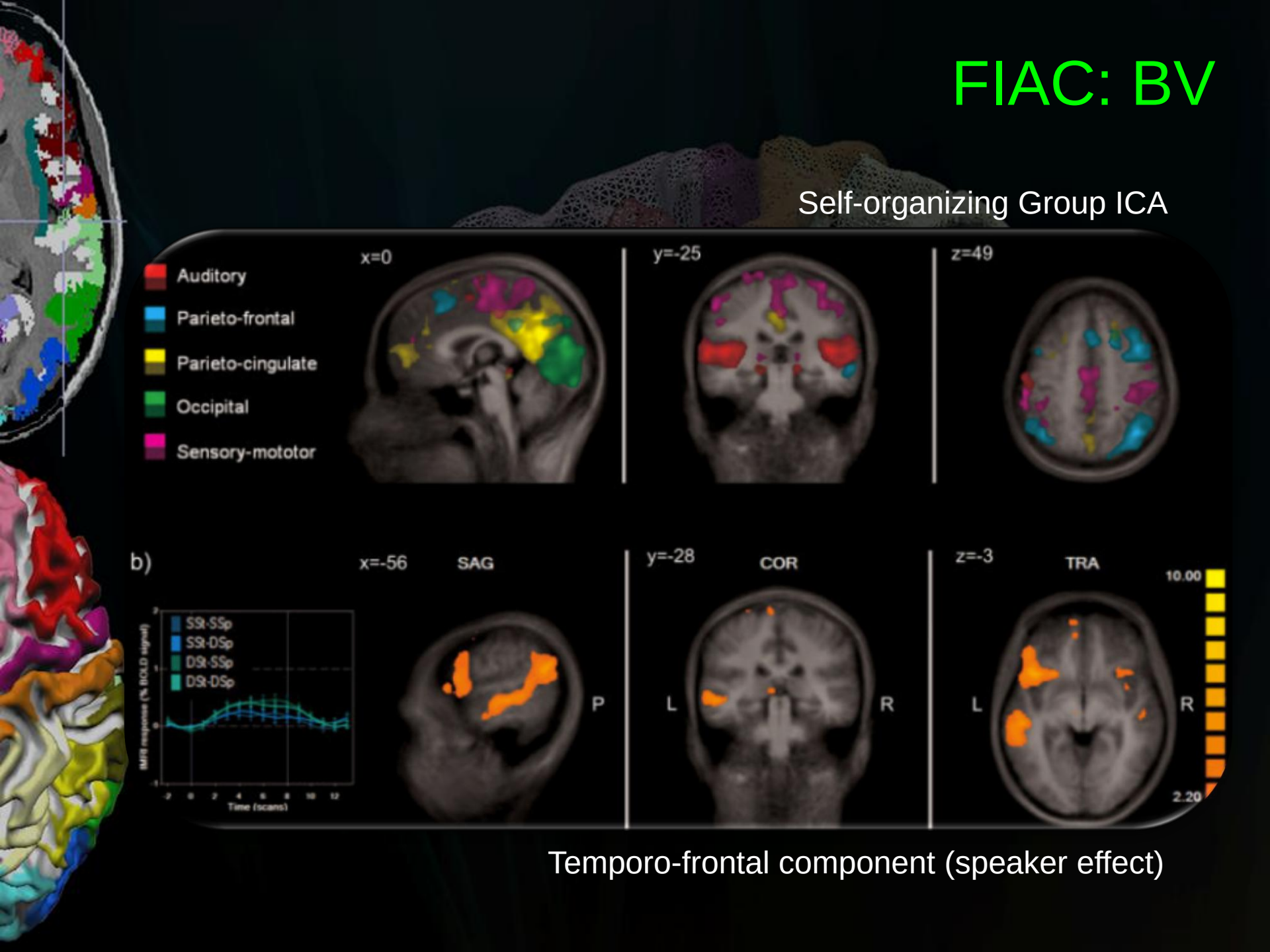
- Experiment 2
  - Block Design – 6 sentences to a block, same/different sentences or same/different speaker
  - E-R design – one sentence presented every 3333ms (?). Same conditions.

FIAC: BV


Block: Main effect of SENTENCE
x=-54
z=-5
y=-14
b) Event-related: Main effect of SENTENCE
x=-54
z=-5
y=-14
c) Event-related: Main effect of SPEAKER
A
P
L
R
L
R
x=-56
z=11
y=-14
3.1
5
T(11)
alpha < 0.05
Time (scans)
Time (scans)
Time (scans)

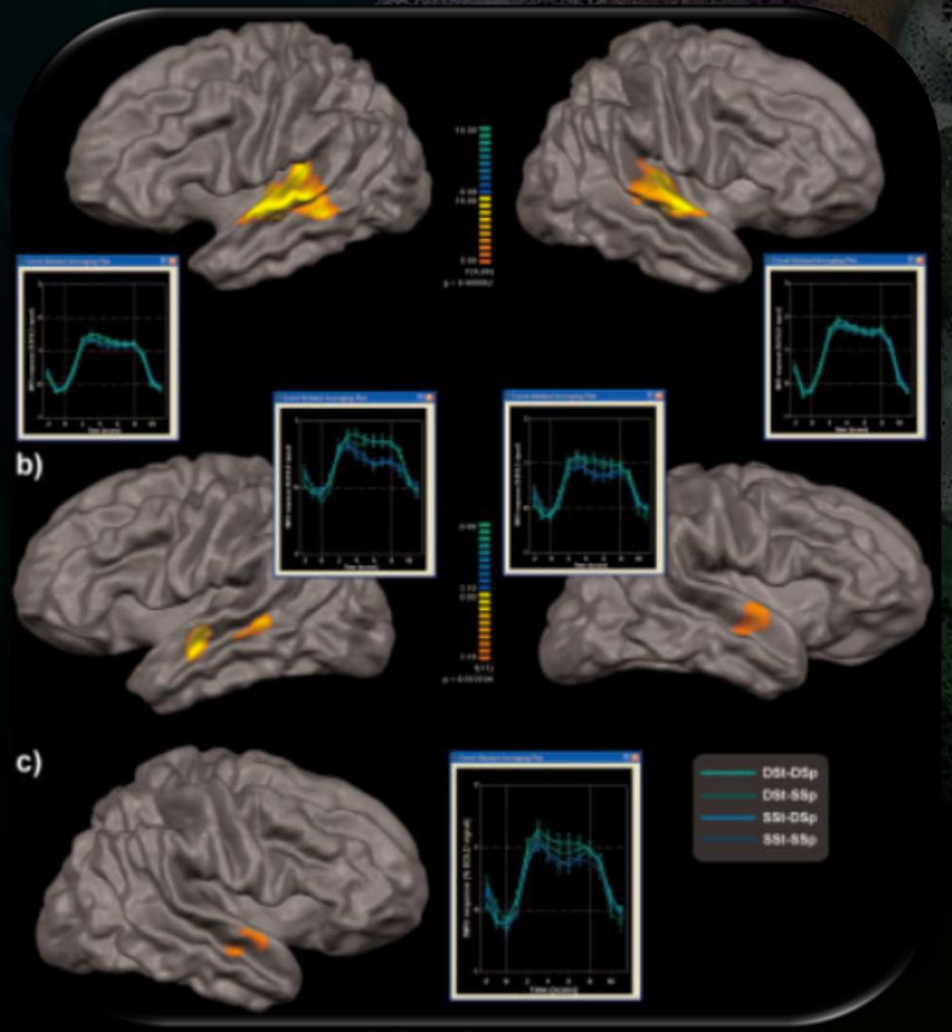
FIAC: BV

Self-organizing Group ICA



Temporo-frontal component (speaker effect)

FIAC: BV

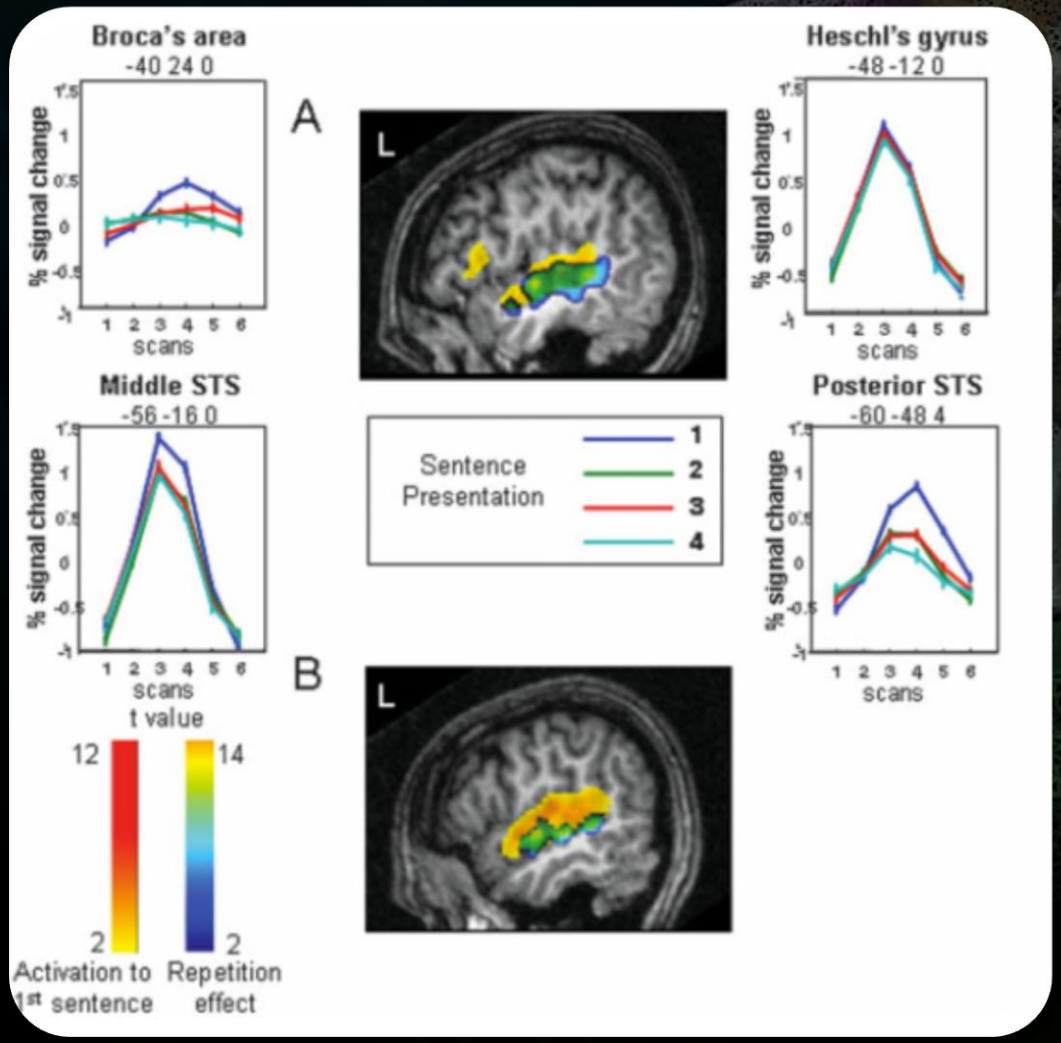


All Stimuli

Sentence Repetition

Speaker Repetition

FIAC: SPM

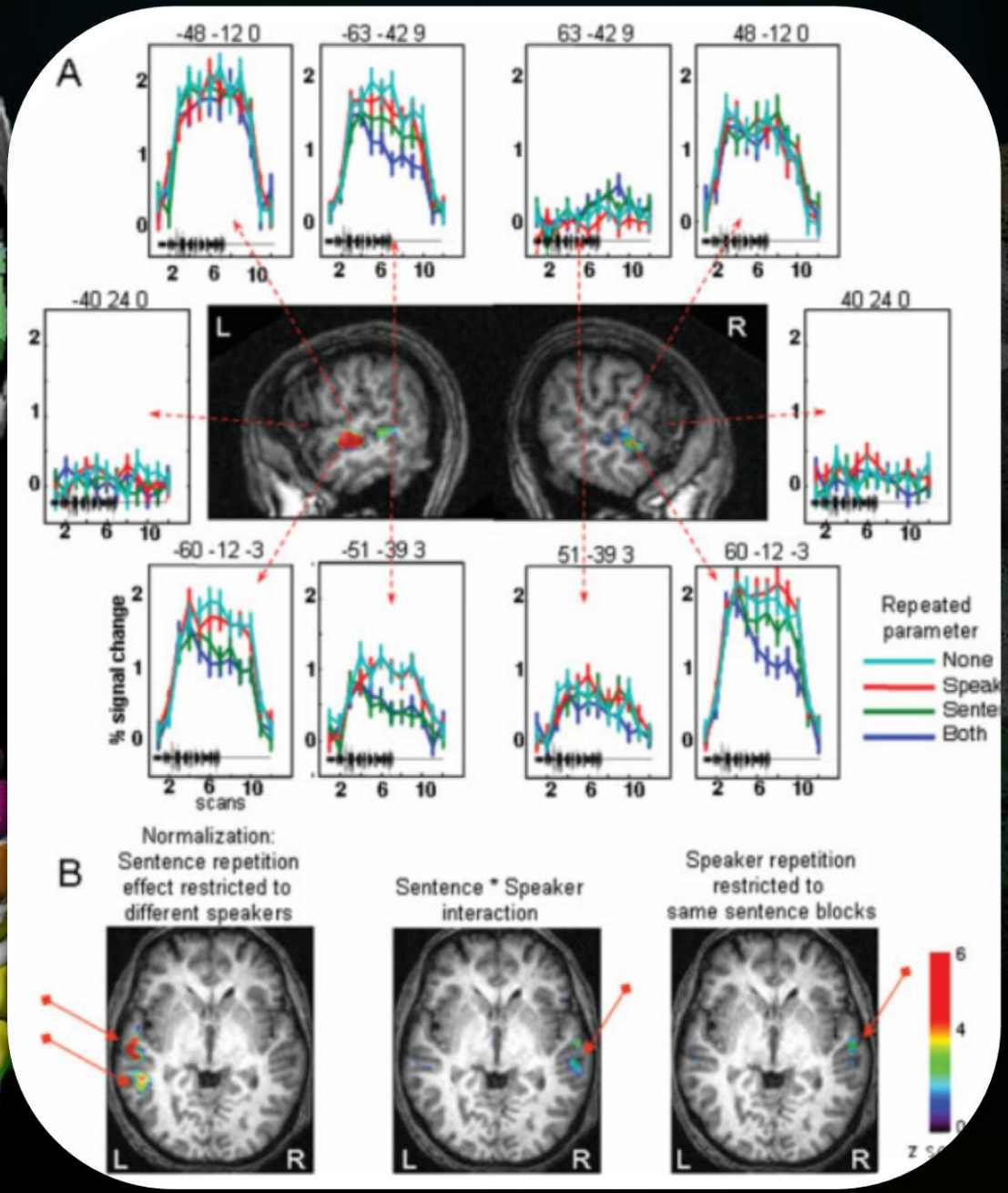


Experiment 1

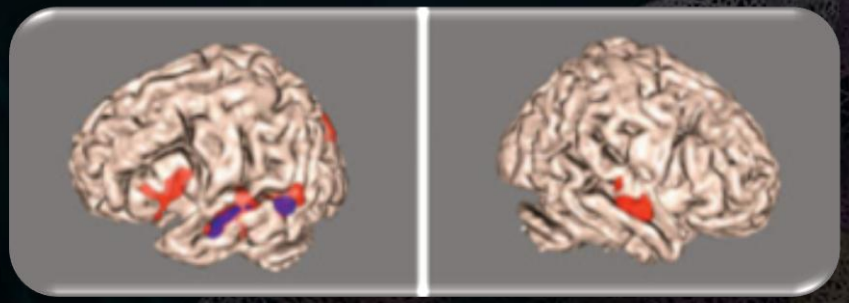
Experiment 2

FIAC: SPM

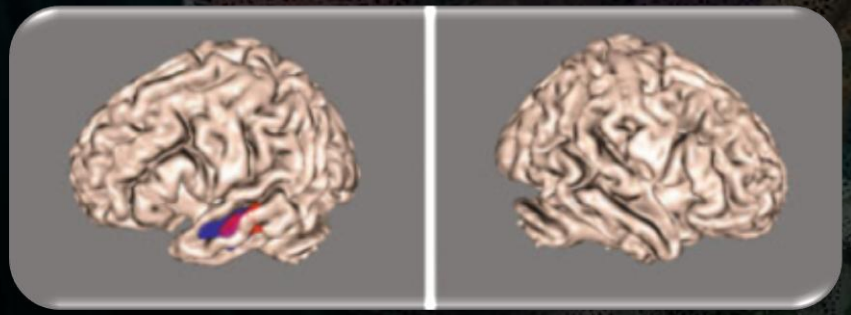
Experiment 2



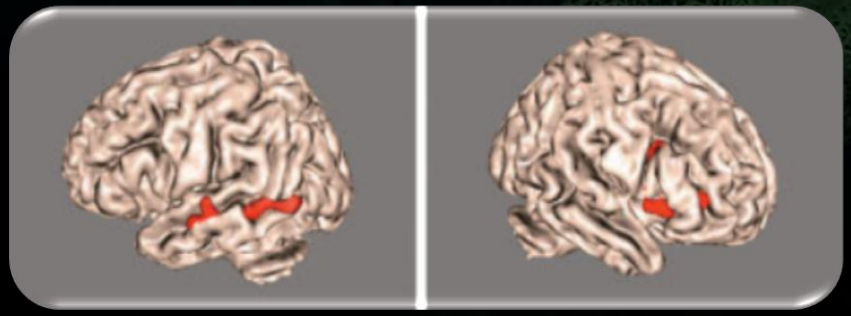
FIAC: FSL



Different Sentence and Speaker



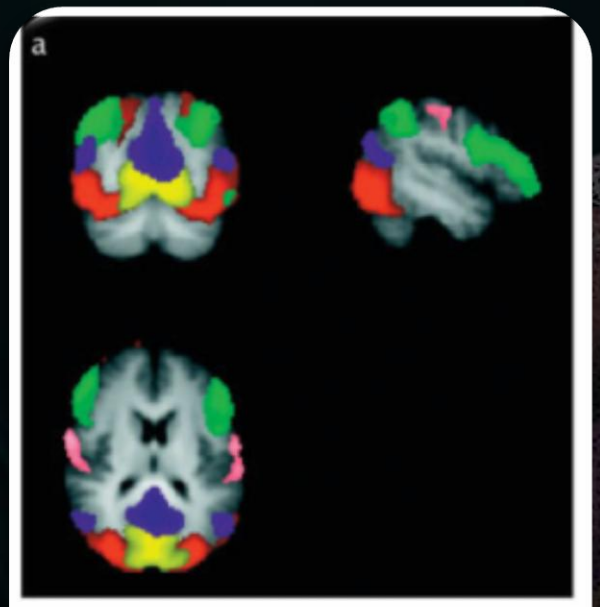
Different Sentence

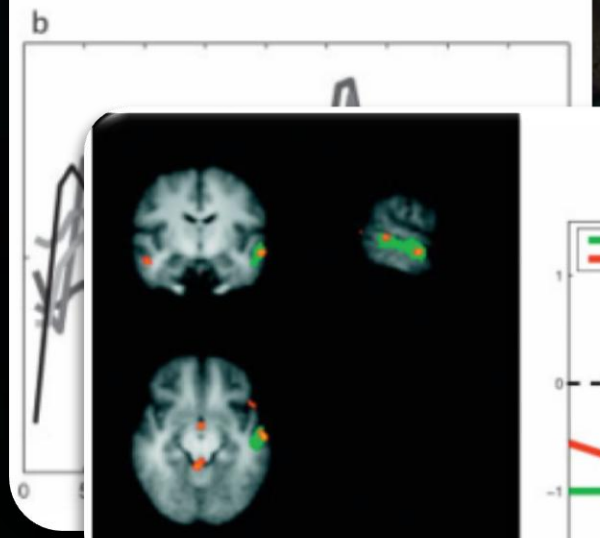


Different Speaker

FIAC: FSL

ICA, P-ICA analyses





FIAC: Summary

TABLE III. Summary of results for the block data group analysis for each contribution

	Main effect of all vs. rest	Main effect of sentence	Main effect of speaker	Interaction effect	Notes: general	Notes: specific to methods
Aston et al., Phiwave	Large activity in temporal lobes bilat. Signif. not computed	Left temporal gyrus Significance not computed	Weak signals in bilat. temporal gyri, significance not computed	ventral visual stream, SMA, ventral and medial prefrontal	Excluded subjects 8 for spikes, 0 5 and 11 for lack of fieldmaps.	Applied wavelet transform for greater MSE estimates.Results are not quantified in terms of type I error.
Beckmann et al., FSL	HG bilat., planum temporale, planum polare, Lat. Sup. temp. STS, MTG	Left Ant STS (simple main FX for DSp)	NS Contrast 13: Right Broca and left post. STS/MTG Mixture model: DStSSp < DStDSp: HG Bilat	Right Broca and left post. STS/MTG	Results suggest that both effects are processed in a single system without asymmetries for content vs. voice processing	3 ways mixed effects model. Estimation of the session effects. Gaussian assumption for cluster test. Show improvements with H1 modeling and HRF estimation.
Dehaene-Lambertz et al., SPM2	Bilateral temporal	Left temporal	NS	NS	Analysis of hemispheric asymmetries	First sentence modeled separately.
Goebel et al., Brain-Voyager	Bilateral temporal	Left Ant STG	NS	Left n Right temporal-occipital	Excluded subj 5, 7, 8, 12; ica + clustering : left STG and IFG for suppress of SStSSp; Performed a within block analyses.	Control of false positive based on simulations that require assumptions (Forman et al., 95)

FSL

SPM2

BV

Best For....	Software
Beginners	BV (FSL)
Unix People	FSL
Matlab People	SPM
Group Analyses	SPM/FSL
Single-Subject /ROI Analyses	BV
Surface-based Analyses	BV
Model-Free Analyses	FSL
Connectivity/R-S	FSL? (SPM)
MVPA	BV/SPM
Pretty pictures	BV