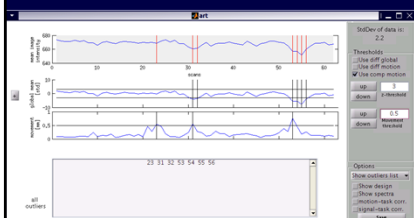


Art2Conn



Susan Whitfield-Gabrieli 12/11

The effect of motion

- The common practice is to include the 6 head motion parameters from realignment in the model, but is this enough ?



Contents lists available at ScienceDirect

NeuroImage

journal homepage: www.elsevier.com/locate/ynimg

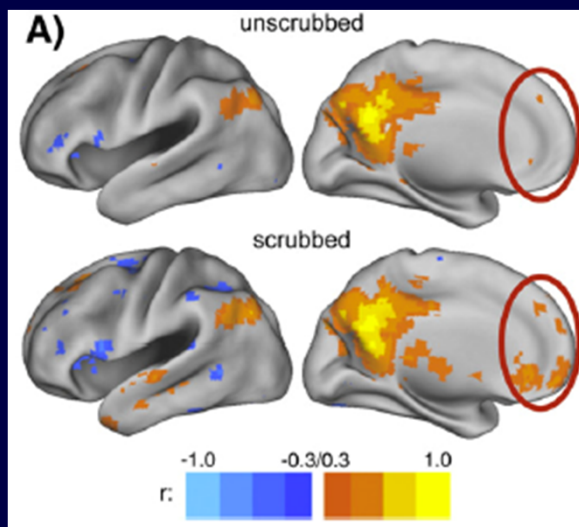
The influence of head motion on intrinsic functional connectivity MRI

Koene R.A. Van Dijk^{a,b}, Mert R. Sabuncu^{b,c}, Randy L. Buckner^{a,b,d,e,*}

Importance of artifact rejection above in beyond motion regression



Removing outliers "scrubbing"



(Power et al., 2011)

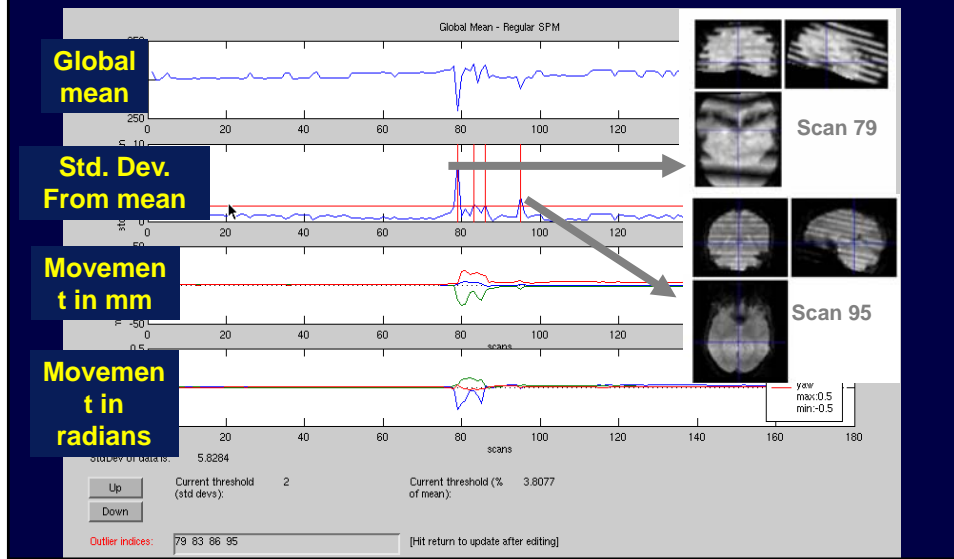
Movement Confound

- Children move more than adults,
- Older adults more than younger adults,
- Patients move more than controls.
- Head motion varies considerably among individuals within the same population.

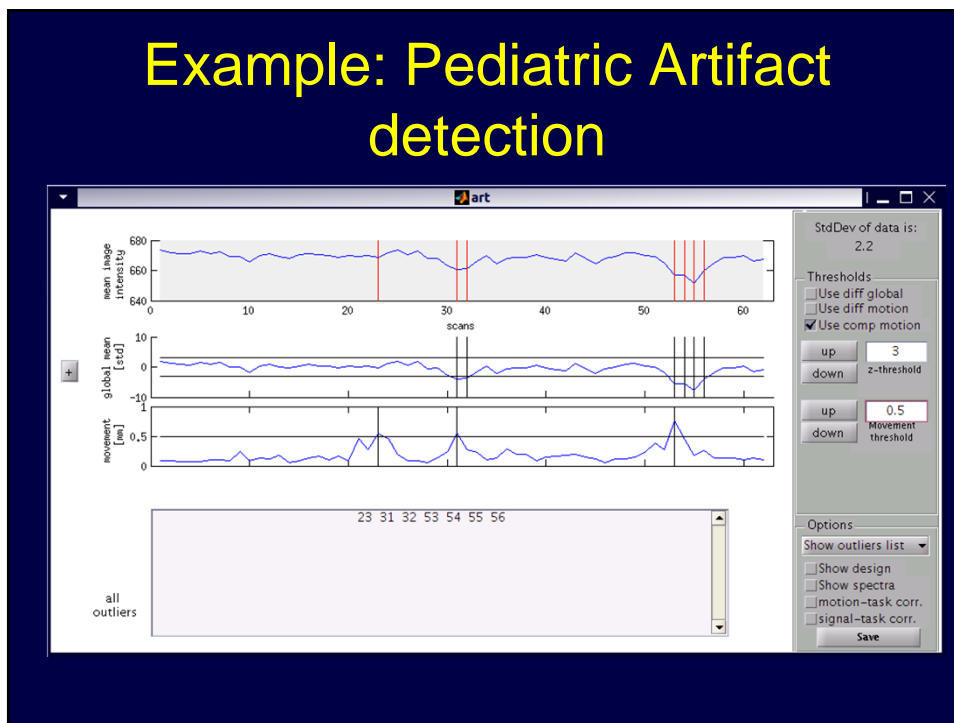
Solution:

Use Art 2 Conn for removal of outliers

Artifact Detection



Example: Pediatric Artifact detection



fMRI connectivity tool (beta)

SETUP

Covariates – first level: Defines within-subject covariates (e.g. artifacts and realignment from the art toolbox)

(one .txt or .mat file per subject/session; files should contain as many rows as scans)

Save outliers in ART

What would you like to

- Outliers
- Motion Statistics
- Graphs
- SPM regressors**
- Analysis mask

OK Cancel

SETUP PREPROCESSING ANALYSES RESULTS

Load Save Save as Import Done

Basic

Functional

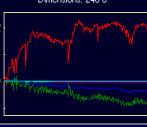
Structural

ROIs

Conditions

Covariates

FIRST-LEVEL COVARIATES SETUP

Covariates	Subjects	Sessions	
realignment	Subject 1	Session 1	<div style="border: 1px solid gray; padding: 2px;"> <p>covariate name: realignment</p> <p>Files: 1 file</p> <p>A:\drive\MIT\SLU..._23BOLD\modit16</p> <p>Dimensions: 240 6</p>  </div>
	Subject 2		
	Subject 3		
	Subject 4		
	Subject 5		
	Subject 6		
	Subject 7		
	Subject 8		
	Subject 9		
	Subject 10		
	Subject 11		
	Subject 12		
	Subject 13		
	Subject 14		

Art_regression_outliers_movement.mat

Select covariate files Find

Folder: C:\drive\mit\slu\an\connectivity


Filter: *.mat;*.txt

- bak
- conn
- data
- rais
- scripts
- sls
- fillog.mat

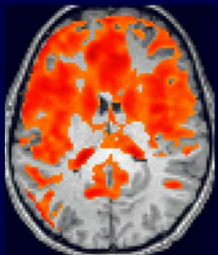
Effect of motion artifact

% of BOLD variance explained

Motion parameters only

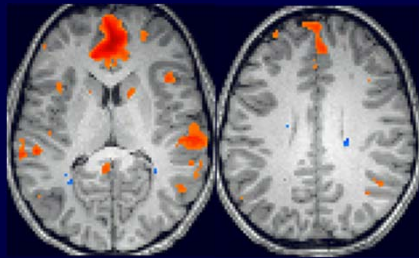


Motion parameters + outliers

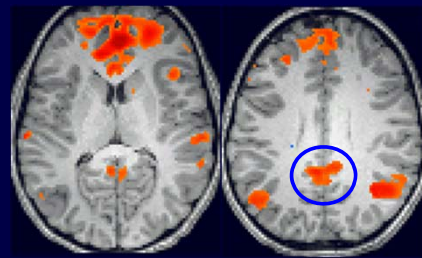


Effect of motion artifact first-level connectivity map

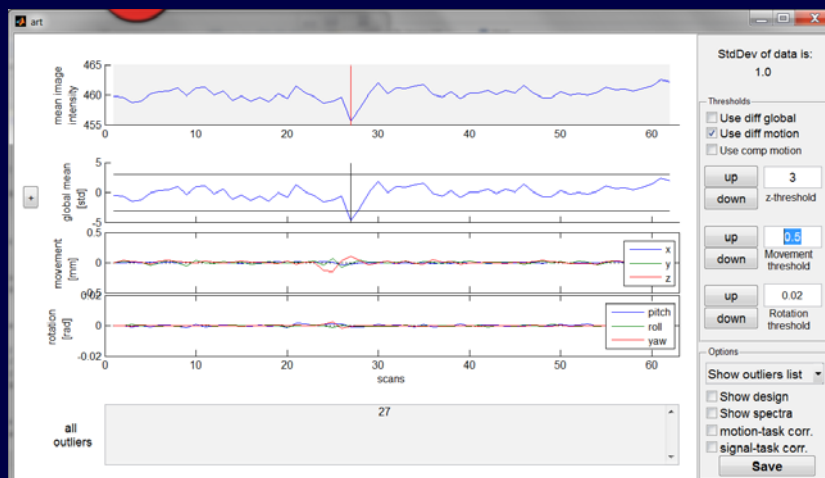
Regressing out motion
parameters only



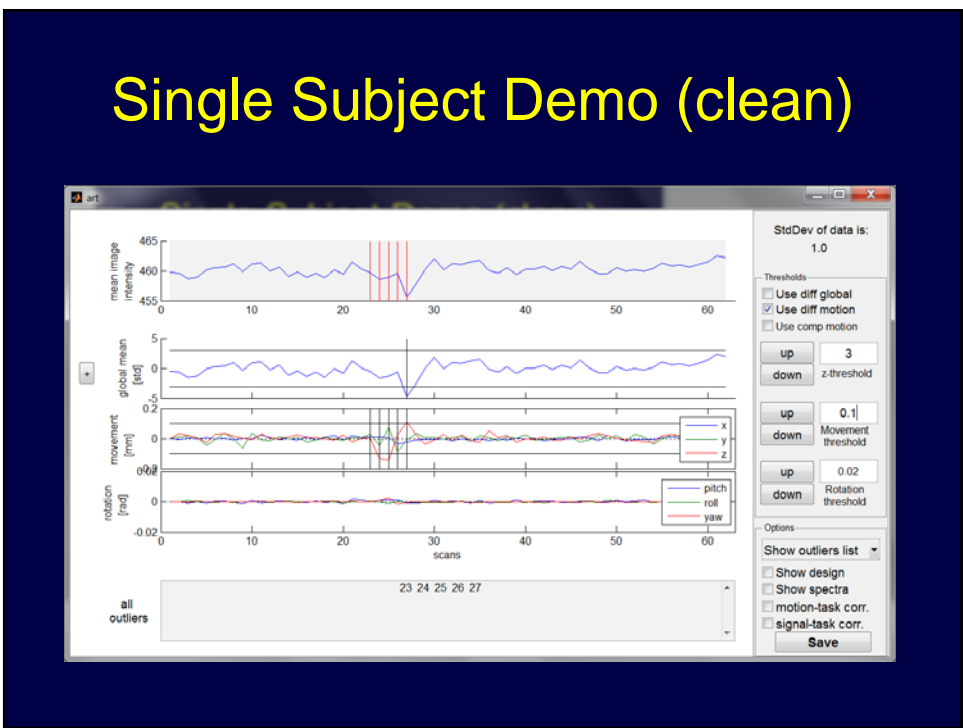
Regressing out motion parameters
+ outliers



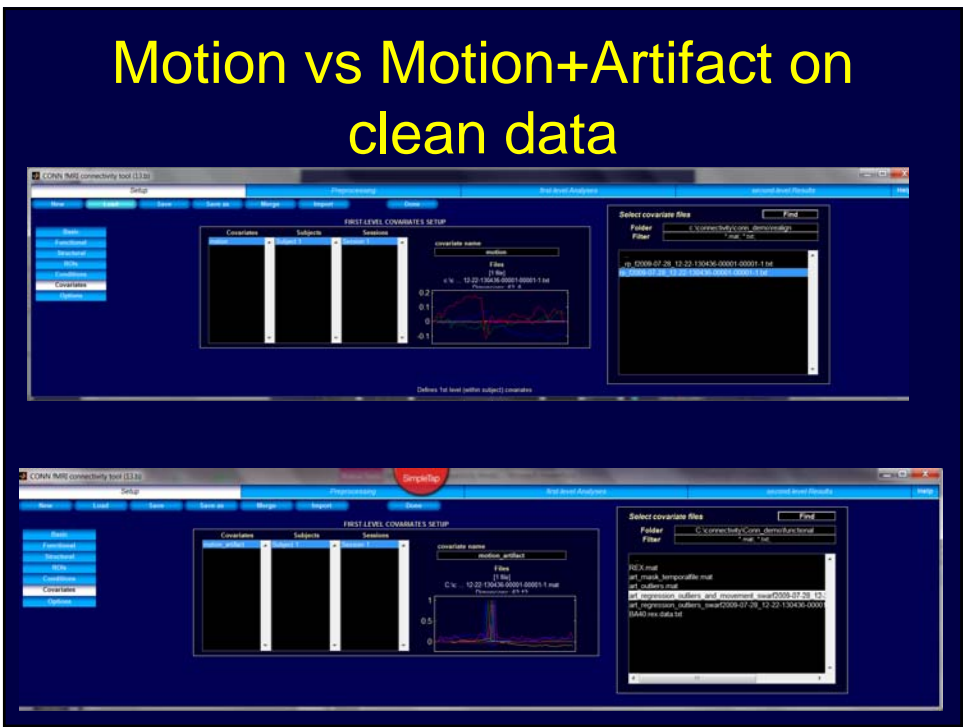
Single Subject Demo (clean)



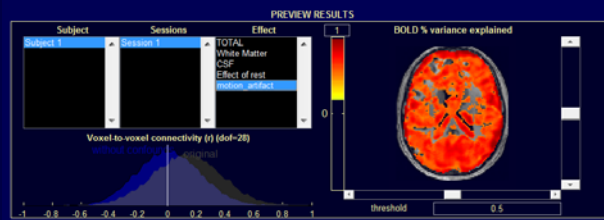
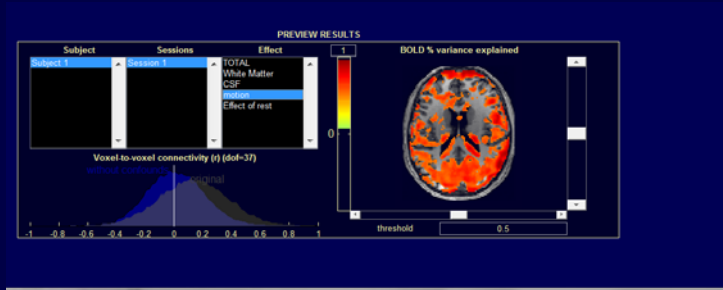
Single Subject Demo (clean)



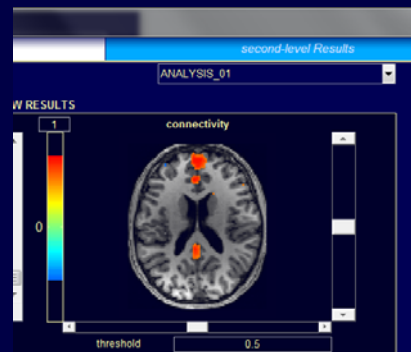
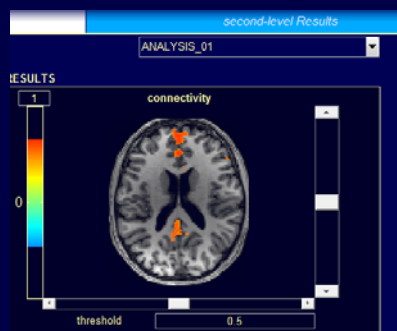
Motion vs Motion+Artifact on clean data



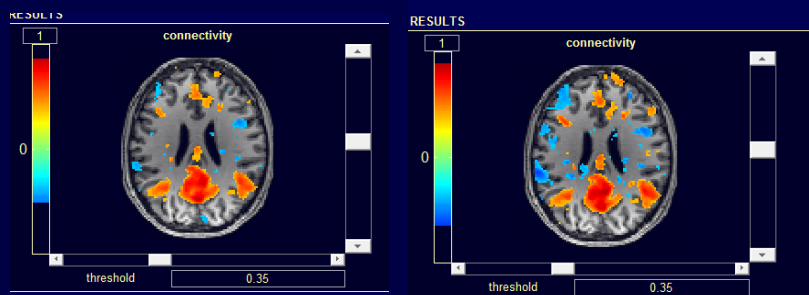
% BOLD Variance of Confounds



MPFC



PCC



Task Effects on rs-fcMRI

Another current debate over interpretations of rs-fcMRI analyses concerns methods of collecting “rest” data (i.e., continuous pure rest scans, interleaved resting blocks from blocked or mixed blocked designs, or the residual time courses from event-related designs).

1. No differences in rest blocks and pure rest ([Fair et al. 2007](#)).
2. NBACK.: differential DMN resting-state functional connectivity based on which level of an N-back task preceded the rest period; the time course of the DMN revealed increased activity at rest after 1-back and 2-back blocks compared to after a 0-back block ([Pyka et al. 2009](#)).
3. Other studies have shown learning-related modulation in resting BOLD functional connectivity after subjects experience both passive ([Hasson et al. 2009](#)) and active tasks ([Lewis et al. 2009](#), [Stevens et al. 2010](#)) as well as a real-time feedback task ([Hampson et al. 2011](#)).

