ISC-toolbox: Group comparison

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What?

- To compare ISCs of two groups of subjects
- A new feature in the version 3.0 of the toolbox
- Stimulus/task must be same for both groups; Especially, fMRI time series must be of the same length
- Pre-processing as in basic ISC analysis
- Statistics via a permutation test -> see
 https://www.biorxiv.org/content/10.1101/370023v1

for details

How?

▲ ISC toolbox 3.0: Start-up GUI File and folder setup Parameter setup Main parameters Project name ☑ Basic ISC analysis Settings... ICBM FRB noeffect uegOM Compute ISC difference maps Settings... Destination directory \\research.uefad.uef.fi\groups\tohkagroup\jussi_win_re Compute Functional Segmentation Settings.. Subject 4D fMRI data files Apply global signal regassi... Give full path names with .nii(.gz) or .mat Frequency specific analysis Session / Group: Session2 Number of bands: √ TR (s): 3.4002 Frequency-specific ISC Compute difference maps across frequency bands \\research.uefa...uef.fi\groups\tohkagroup\ICBM F ^ RB\ICBM sets 5mm\OM\5mm\ORIG ICBM su Number of permutations (Sum ZPF): 25000 bject 3 s40 ORIG OM hires 5mm.nii Inter-subject phase synchronization research.uefad.uef.fi\groups\tohkagroup\ICBM F RB\ICBM 5sets 5mm\OM\5mm\ORIG ICBM su Time-window analysis bject7 s40 ORIG OM hires 5mm.nii Step size Window length Time-window ISC (samples): 30 \\research.uefad.uef.fi\groups\tohkagroup\ICBM F (samples): RB\ICBM 5sets 5mm\OM\5mm\ORIG ICBM su -Templates bject17 s40 ORIG OM hires 5mm.nii ☐ Use Template \\research.uefad.uef.fi\groups\tohkagroup\ICBM F MNI-152 stereotactic template (1 or 2 mm) RB\ICBM_5sets_5mm\OM\5mm\ORIG_ICBM_su bject2 s40 ORIG OM hires 5mm.nii Binary mask file name (extension .nii or .mat) \\research.uefad.uef.fi\groups\tohkagroup\ICBM F C:\Users\justoh\Data\fsl standard\avg152T1 gray roi025.nii RB\ICBM_5sets_5mm\OM\5mm\ORIG_ICBM_su bject4 s40 ORIG OM hires 5mm.nii Grid computation Main process on Grid ✓ Force local computing Data removal after analysis Grid Type: Grid parameters: No parallelization Remove memory mapped subject data --partition=normal --mem=10096 --time=2-0 Remove memory mapped filtered data Run analysis Validate parameters Export to workspace Launch visu-GUI

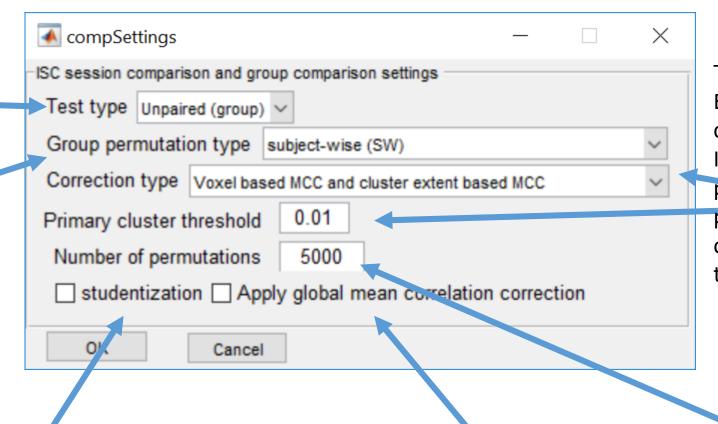
Check compute ISC difference maps checkbox

You need 2 groups of subjects

Group comparison settings

Set test-type as unpaired (group)

Group permutation type should be SW; Other choices lead to incorrect results and they will be removed from later versions



These relate to cluster
Extent based multiple
comparisons correction;
If you have read the stats
paper linked on the first
page, these choices apply
only for global models at
the moment

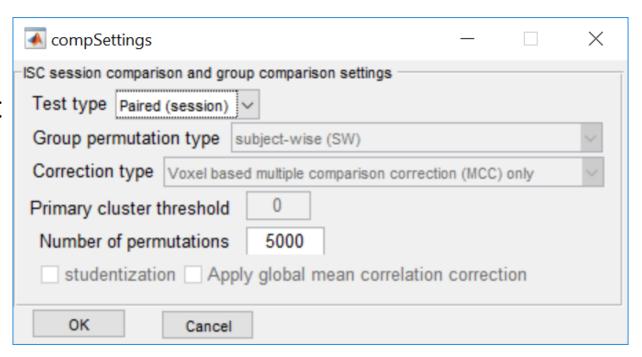
Recommended to set this on

Experimental feature; not recommended if you are uncertain about its function

5000 should be enough. We do fine tune restricted set of voxels automatically.

Session comparison

- If you want to compare two different stimuli on the same subjects
- Time-series length must still be equal
- See: Aleksandra Herbec, Jukka-Pekka Kauppi, Corinne Jola, Jussi Tohka, Frank E. Pollick. Differences in fMRI intersubject correlation while viewing unedited and edited videos of dance performance. <u>Cortex</u>, 71:341 - 348, 2015.



Files

- In the PFsession directory for most up-to-date info see PfsessionFiles.wiki in the wiki sub-directory
- The most important ones:
- z_nonparametric1Band0.nii : Z-values with voxel-wise models.
 Obtained from voxel-wise permutation test yielding different model for each voxel
- pvalmaps3D1Band0.nii : Uncorrected p-value map, referring to ZsumStat1.mat, all voxels with the same model

Files

• In the results directory, up-to-date info resultsFiles.wiki

SessionComparison1Band0ThresholdsWin0_Group_SW_MCConly_0
 _25000.csv : Group comparison thresholds, use these to threshold
 group comparison maps. There are several thresholds which apply to
 different files as explained in resultsFiles.wiki

 Note that this file may be named differently based on the options used.

Finally

Read the stats paper:

https://www.biorxiv.org/content/10.1101/370023v1

Please cite the paper if you use the methods implemented in the ISC toolbox

As a general reference for the toolbox, we recommend

J.-P. Kauppi, J. Pajula and J. Tohka. A Versatile Software Package for Inter-subject Correlation Based Analyses of fMRI. Frontiers in Neuroinformatics, 8:2, 2014.