

Analysis of resting-state fMRI data in SPM (using DPARSF)

Resting-state fMRI is...

- useful for investigating “intrinsic” and/or fundamental neural networks
- easy to incorporate into experimental design

Resting-state fMRI data can be used for...

- characterizing “default mode” and other networks
- distinguishing between patient and healthy populations

Resting-state fMRI data can be analyzed in a number of different ways

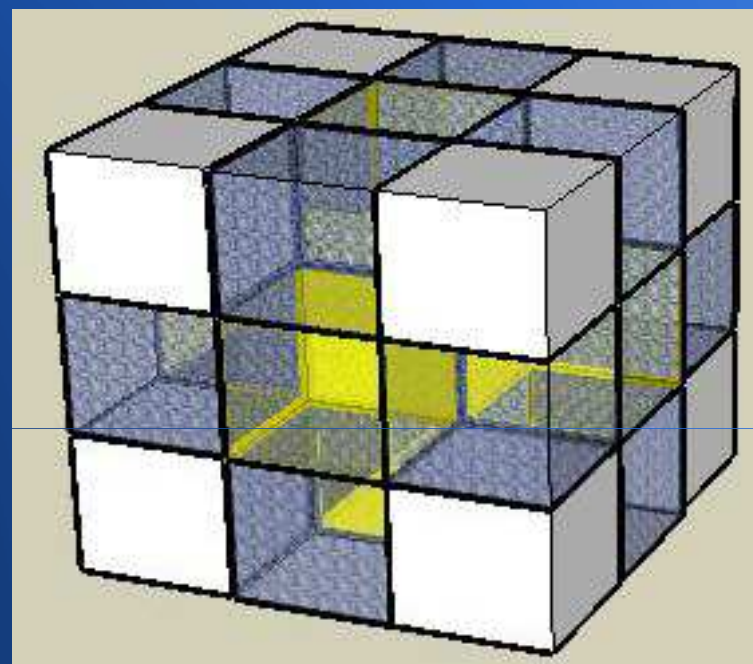
- Independent Components Analysis (ICA; e.g., GIFT toolbox in SPM, MELODIC in FSL)
- Seed-based functional connectivity (e.g., seed ROI, extract time-series, make correlation maps)
- **Frequency-information maps (ReHo, ALFF, fALFF; DPARSF, REST toolbox in SPM)**

Frequency-information measures from resting-state BOLD data

- Regional Homogeneity (ReHo)
- Amplitude of Low Frequency Fluctuation (ALFF)
- fractional ALFF (fALFF)

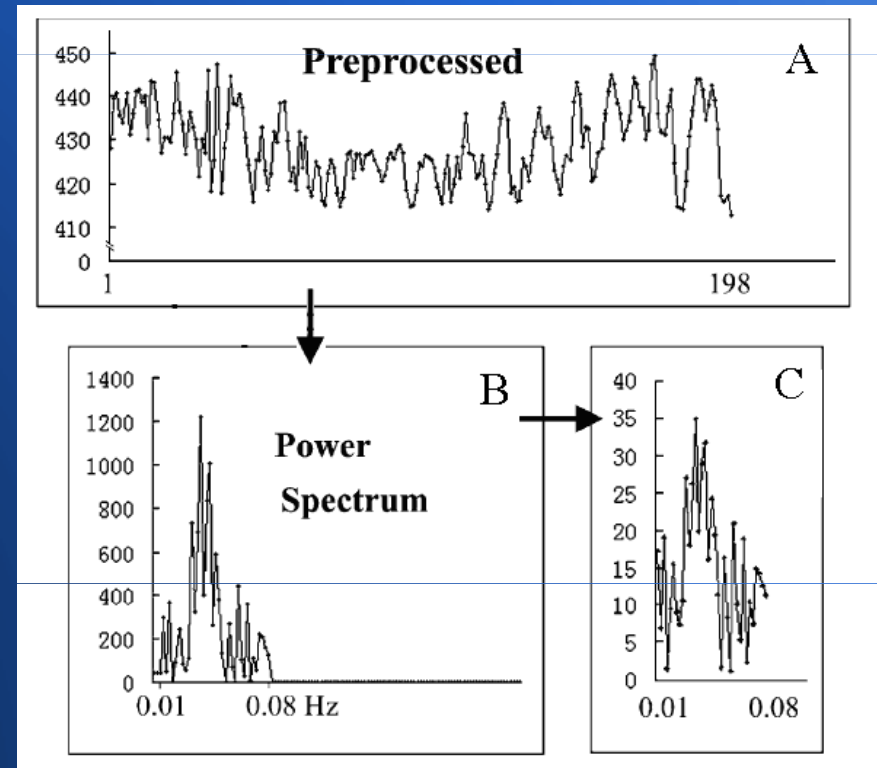
Regional homogeneity...

- A measure of the similarity of the time series of voxels within a cluster (based on Kendall's W)
- Reflects local temporal synchrony (Zang et al., 2004)
- Not sure what's the biological/physiological significance
- Different ReHo maps in schizophrenia patients (Liu et al., 2006)



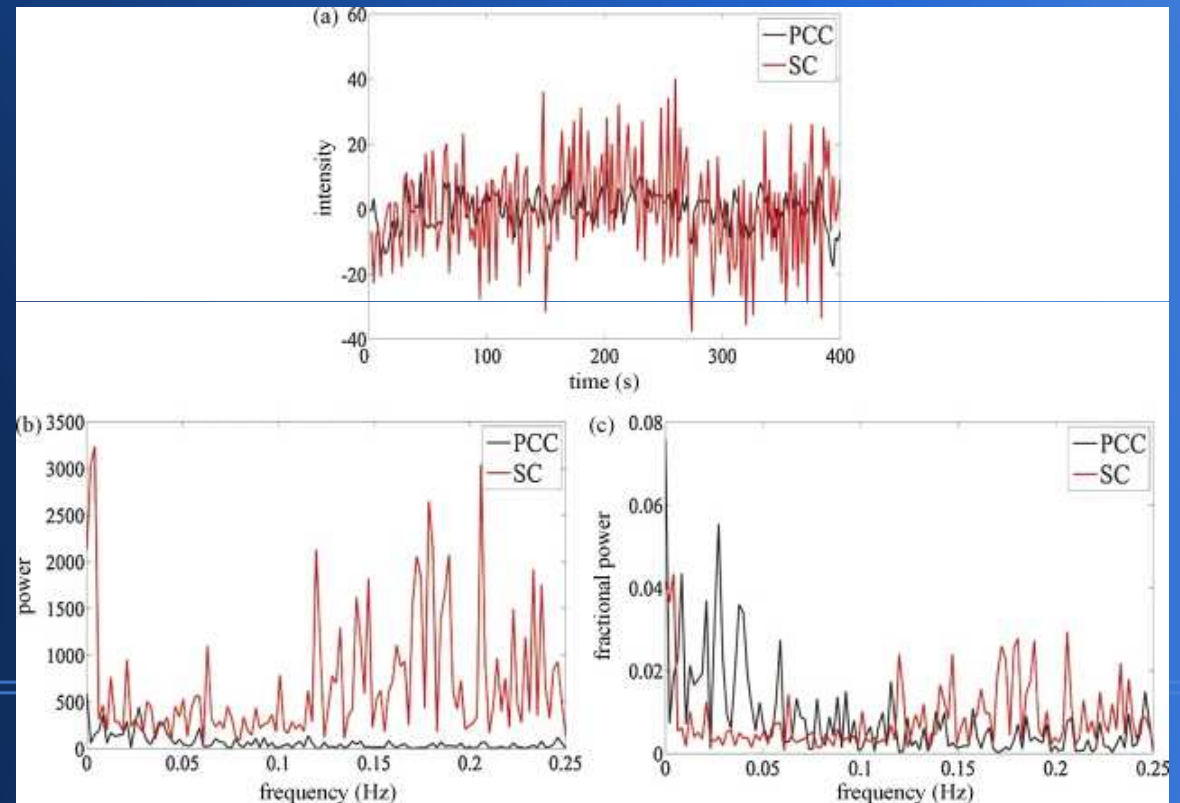
Amplitude of low frequency fluctuation...

- Measured within a frequency band (typically 0.01-0.08 Hz for resting-state fMRI)
- Calculated amplitude of this frequency component
- The square root of the FFT of time series, averaged across frequency band
- May reflect intensity of regional activity (Yang et al., 2007)
- Abnormal ALFF maps in ADHD children (Zang et al., 2007)



Fractional ALFF

- A measure of the proportion of low-frequency power (0.01-0.08 Hz) to that of the entire frequency range (0-0.25 Hz) (Zou et al., 2008)
- More sensitive indicator of the relative strength of low-frequency fluctuations than ALFF



DPARSF toolbox for SPM

- **Data Processing Assistant for Resting-State fMRI**
- Requires MATLAB, SPM5, REST toolbox
- Can do DICOM import, preprocessing, detrend/filtering, and output ReHo, ALFF, fALFF, seed-based correlation maps

Relevant links

- DPARSF: <http://restfmri.net/forum/DPARSF>
- REST: <http://restfmri.net/forum/REST>
manual:
[http://pub.restfmri.net/Anonymous/\[Long20080510\]R
EST_Manual_en.pdf](http://pub.restfmri.net/Anonymous/[Long20080510]REST_Manual_en.pdf)

References

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