

SPIRAL IN/OUT POSTPROCESSING FOR FMRI

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<http://www-radiology.stanford.edu/research/RR.html/>

Supported by the NIH National Center for Research Resources P41-RR009784

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Introduction

It is assumed the reconstructed images are available as Pfile.7.mag and an accompanying Efile. If denoising is desired, the Pfile.physio file is also required.

There are three scripts that can automatically create Analyze volumes, NIFTI .nii files or AFNI BRIKs, makevols, makenifti and makebricks, respectively. Each program will provide a help menu if the name is typed without arguments, viz.:

```
>makenifti
usage:  /Users/gary/fmriutil/makenifti  [-d  physio_denoising]  [-s
sprlio_mode] EeeeeeeSsssPxxxxx.7 outfilename
      [physio_file]
where:
physio_denoising = 1: retroicor 2: rvhrcor 3: both
if sprlio data, then optional sprlio_mode can be set to
  0: wtd average [default]; 1: simple ave
  2: extract spiral-in;      3: extract spiral-out;
physio_file is required input for
  RETROICOR or RVHRCOR correction if -d switch is set
The input onefile is expected in same directory as Efile
The NIFTI outfile will be outfilename.nii
Rev 5   5/09/09
```

Basic use

```
>makevols E12345S005P01024.7 outfoo
```

will create a set of files outfoo.Vnnn.img and outfoo.Vnnn.hdr, where nnn = 001 to nframes.

```
>makebrick E12345S005P01024.7 outfoo
```

will create the two AFNI brik files.

```
>makenifti E12345S005P01024.7 outfoo
```

will create outfoo.nii (single file format).

Physiological denoising

To diminish effects of cardiac and respiration on BOLD signals:

```
>makenifti -d 3 E12345S005P01024.7 outfoo
```

will run `retroicor` and then `rvhrcor` before creating the NIFTI file. The `Pfile.physio` file must be in the same directory as the other files. Other combinations of denoising are possible; see the help menu (e.g. above).

The use of denoising is highly recommended for resting state analyses.

See, e.g.

1. Birn, R.M., J.B. Diamond, et al., Separating respiratory-variation-related fluctuations from neuronal-activity-related fluctuations in fMRI. *Neuroimage*, 2006. 31(4): p. 1536-48.
2. Chang, C., J.P. Cunningham, and G.H. Glover, Influence of heart rate on the BOLD signal: the cardiac response function. *Neuroimage*, 2009. 44(3): p. 857-69.
3. Chang, C. and G.H. Glover, Relationship between respiration, end-tidal CO(2), and BOLD signals in resting-state fMRI. *Neuroimage*, 2009.
4. Chang, C. and G.H. Glover, Effects of model-based physiological noise correction on default mode network anti-correlations and correlations. *Neuroimage*, 2009. 47(4): p. 1448-59.
5. Glover, G.H., T.Q. Li, and D. Ress, Image-based method for retrospective correction of physiological motion effects in fMRI: RETROICOR. *Magn Reson Med*, 2000. 44(1): p. 162-7.

Installation instructions

Load the appropriate tarfile directory on your workstation in some suitable place and make accessible to user. Make sure all files are executable. Files are scripts `makevols`, `makenifti`, `makebrick`, and c programs `spriioadd`, `onefile2nii`, `expandonefile`, `makeaheader`, as well as `retroicor*` and `rvhrcor*`.