## COVIPER pre-processing (see Fig. 1)

- Step 1: Use [EC and motion correction toolbox](#) to correct EC and motion artefacts for blip-up and blip-down data. The EC and motion corrected images will have a prefix "r".
- Step 2: Use fieldmap or DiSCo toolbox to unwrap the registered blip-up and blip-down data (the voxel-displacement map has to be applied to each DTI image. The unwarped images will have a prefix "u".
- Step 3 (only for fieldmap-based susceptibility correction): To refine the overlap between blip-up and blip-down DTI data, perform another 12-parameter affine registration (e.g. using spm_realign) between unwarped blip-up and blip-down image (use e.g. the first in each DTI data series). The registered images will have another prefix "r".
- Step 4: Define two variables in matlab, which cover the diffusion directions (3xN matrix) and b-values (1xN vector), before running the Fit Diffusion tensor toolbox. The "i-th" column (component) must correspond to the vector of the diffusion gradient (and the b-value) of the "i-th" image in the DTI dataset. If the b-value for the low-b-value images is unknown, type b=1, and if its diffusion gradient direction is unknown, type a random direction, which is normalised to

Fig. 1: The pre-processing steps for the COVIPER toolbox. For details see text.
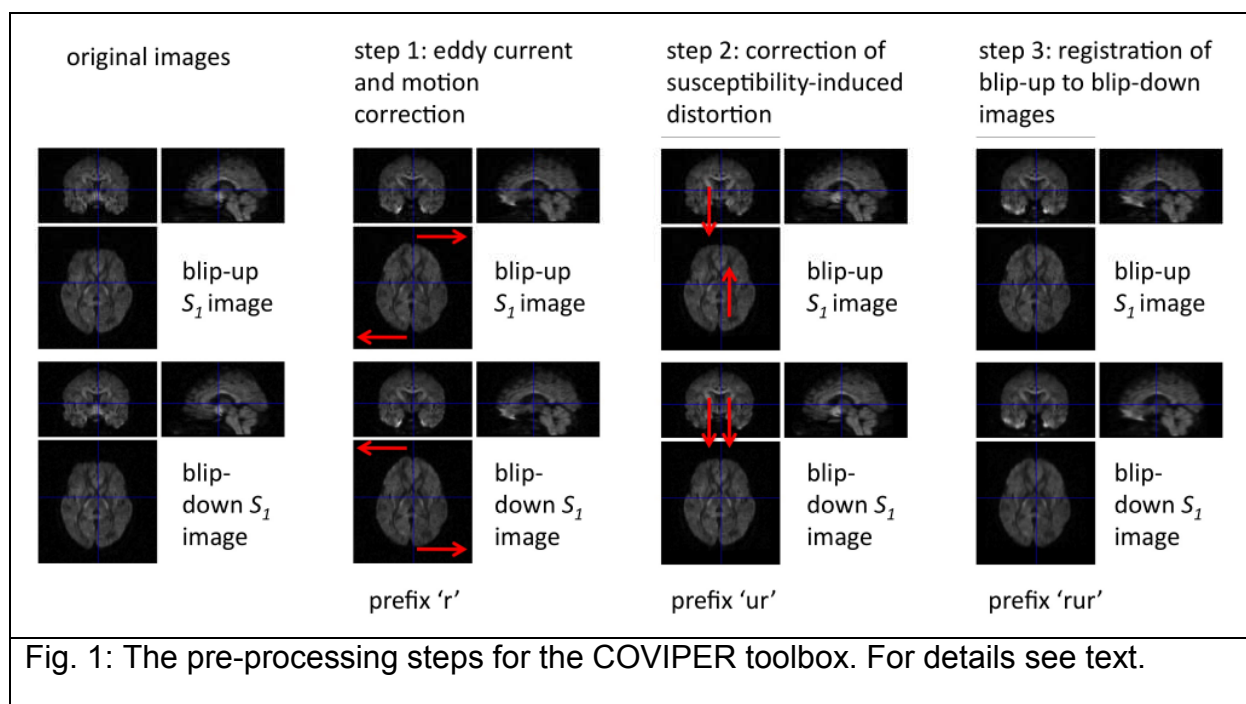
Use COVIPER:
1. Load pre-processed blip-up DTI images.
2. Load pre-processed blip-down DTI images.
3. Load the diffusion directions (3xN vector).
4. Load the b-values (1xN vector).

Referencing

Please cite the following paper when using this toolbox:

Mohammadi S, Nagy Z, Hutton C, Josephs O, Weiskopf N. Correction of vibration artifacts in DTI using phase–encoding reversal (COVIPER). Magn Res Med 2012; 68: 882–889; doi: 10.1002/mrm.24467.