



MRC Cognition
and Brain
Sciences Unit

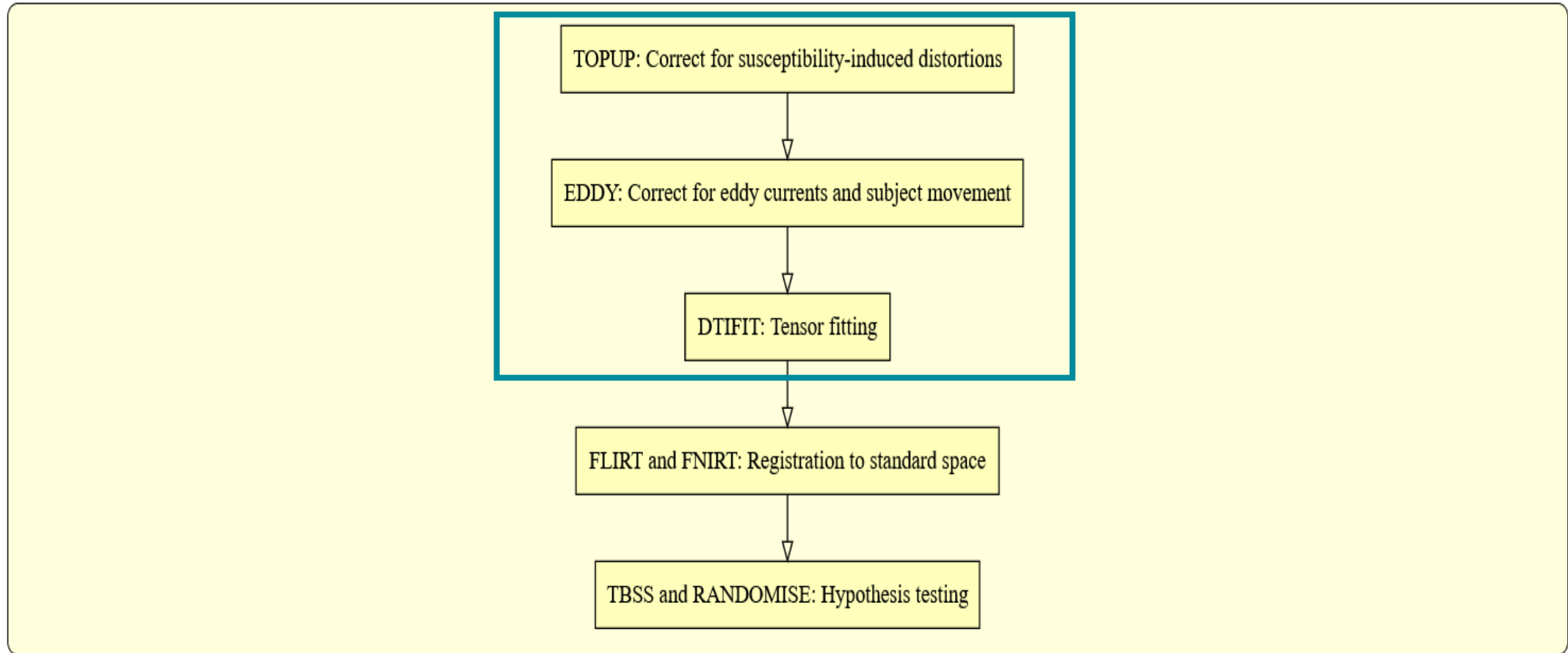


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DTI Model Fitting in FSL

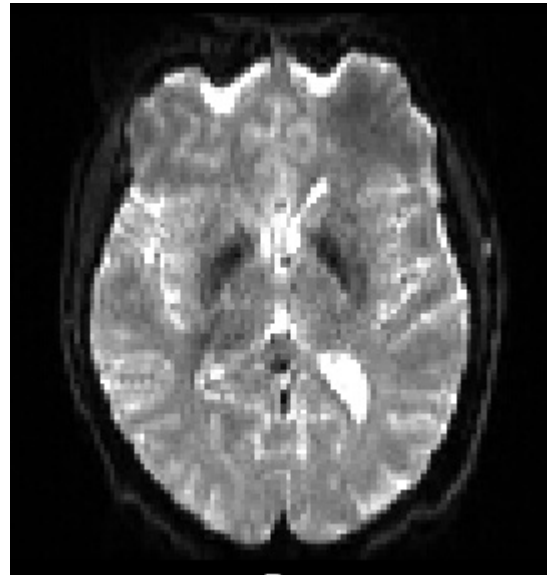
Marta M. Correia
MRC Cognition and Brain Sciences Unit

Overview of the FSL Diffusion Toolbox pipeline

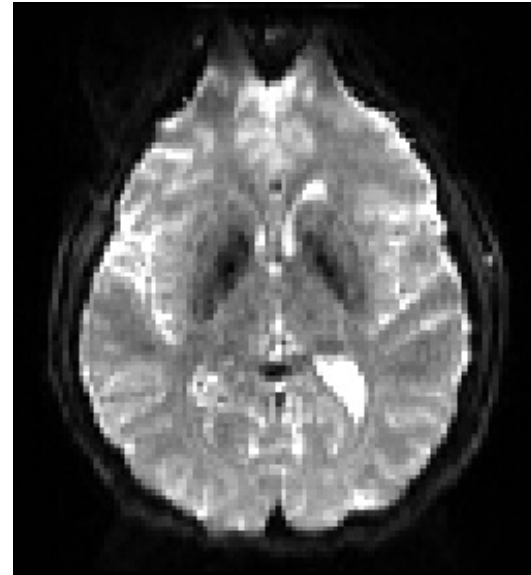


TOPUP: correction for EPI distortions

- EPI distortion due to B0 inhomogeneity depends on phase-encode direction



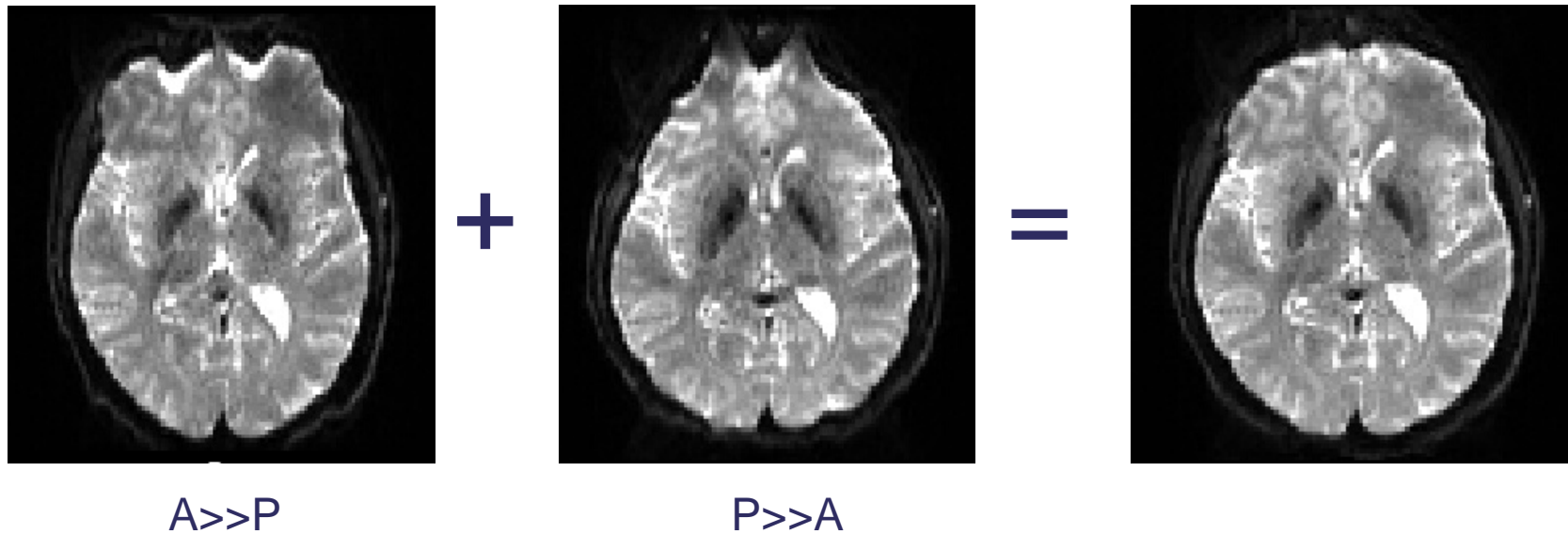
A>>P



P>>A

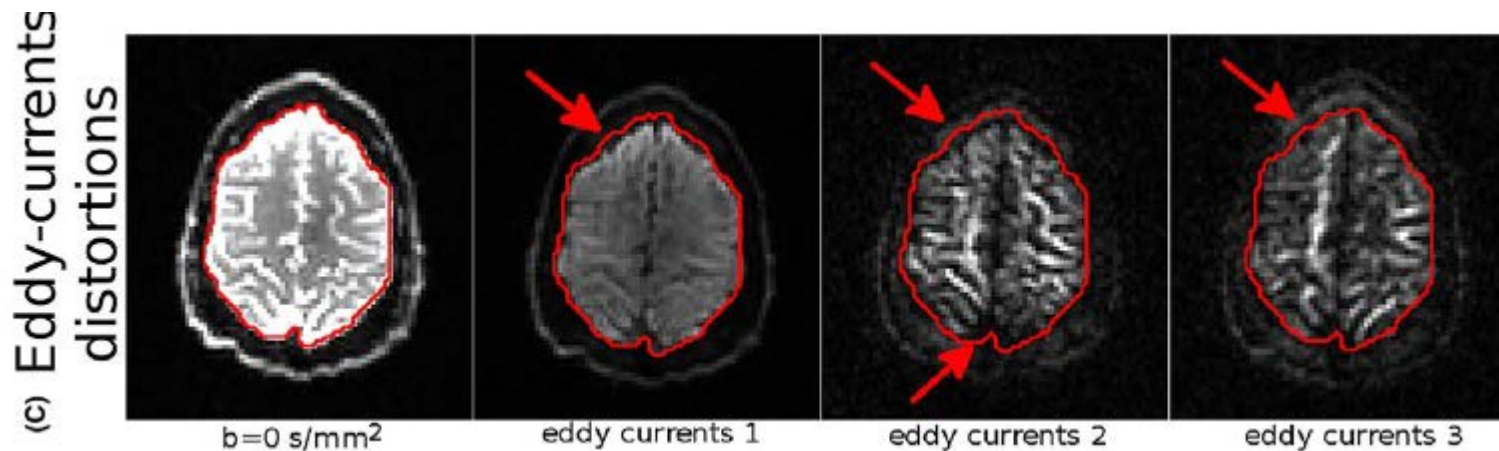
TOPUP: correction for EPI distortions

- EPI distortion due to B0 inhomogeneity depends on phase-encode direction
- Can it be corrected?



EDDY: correction for eddy currents and motion

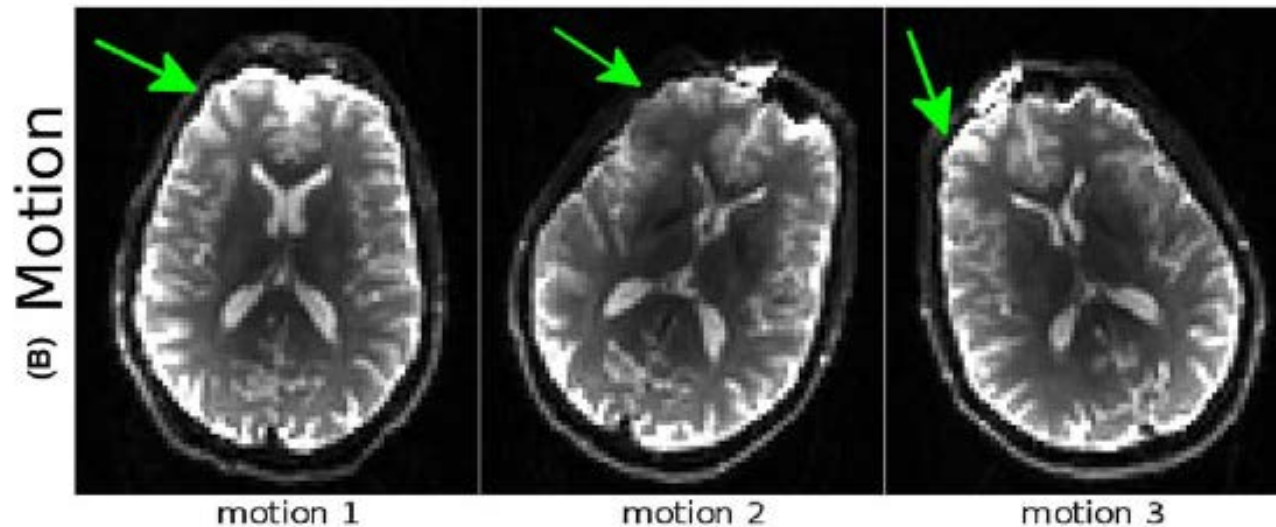
- Eddy-current distortions occur due to the rapid switching of diffusion gradients.
- Depend on gradient magnitude and direction.
- They affect the diffusion weighted images (DWI) but not the $b=0$ image.
- Results in mismatching between $b=0$ and DWI volumes.



Irfanoglu et al, MRM 2018

EDDY: correction for eddy currents and motion

- Motion artefacts occur due to involuntary head movements.
- Results in mismatching between DWI volumes.
- Can also result in signal changes due to coil sensitivity.



Irfanoglu et al, MRM 2018

EDDY QC: quality control

- For individual subjects: eddy_quad

Volume-to-volume motion

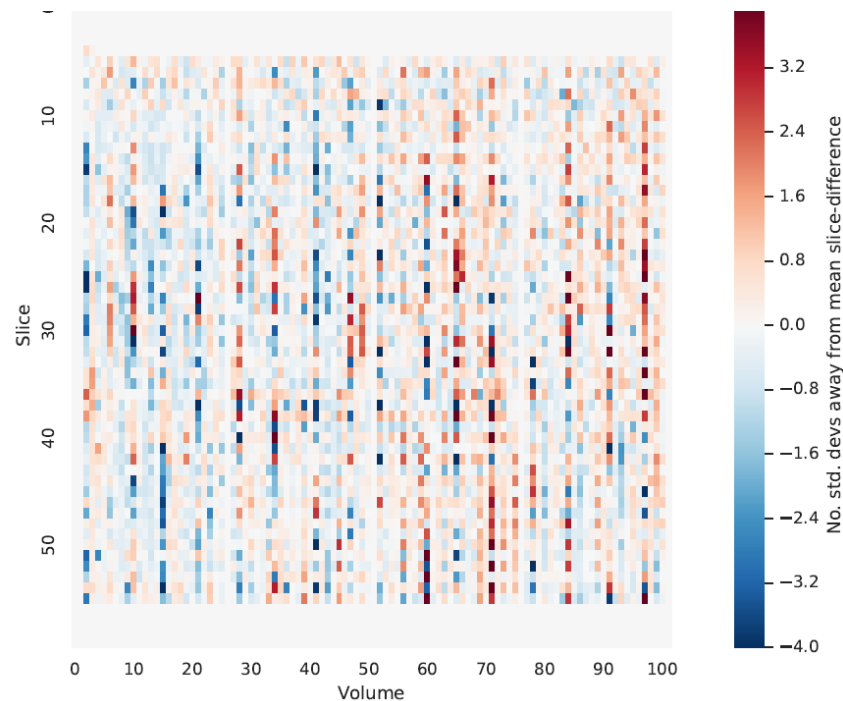
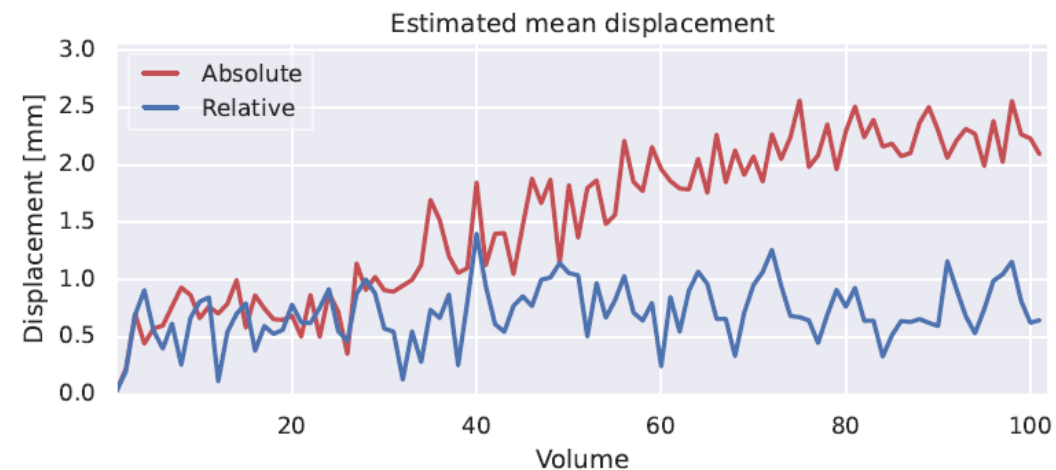
Average abs. motion (mm)	1.52
Average rel. motion (mm)	0.70
Average x translation (mm)	0.10
Average y translation (mm)	-0.90
Average z translation (mm)	0.98
Average x rotation (deg)	-0.02
Average y rotation (deg)	0.19
Average z rotation (deg)	-0.15

Outliers

Total outliers (%)	0.45
Outliers (b=700 s/mm ²)	2.71
Outliers (b=1200 s/mm ²)	0.00
Outliers (b=2800 s/mm ²)	0.00
Outliers (PE dir=[0. 1. 0.])	0.42

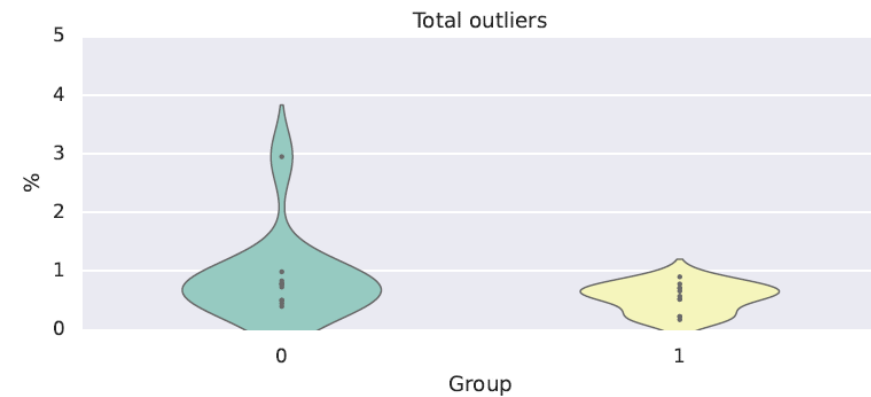
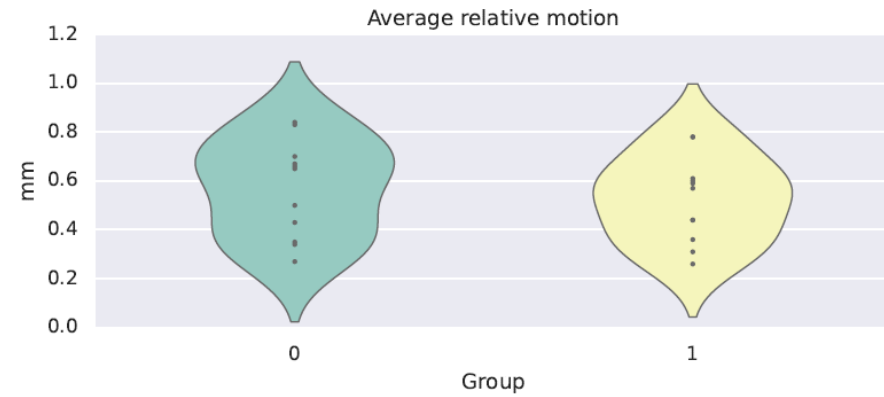
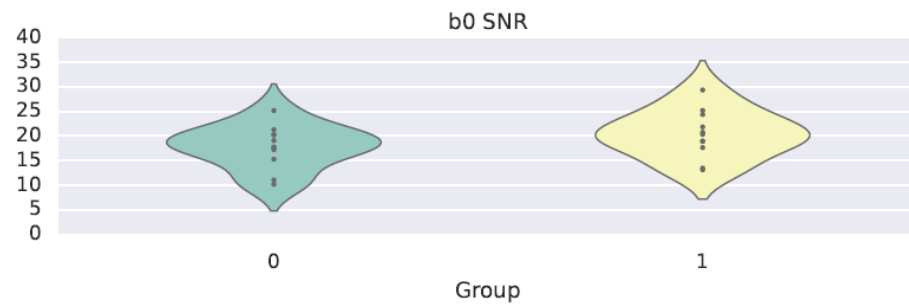
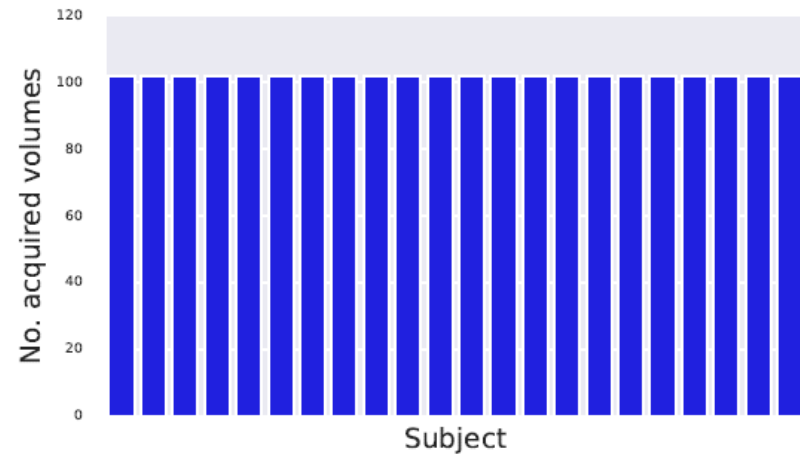
SNR/CNR

Average SNR (b=0 s/mm ²)	17.57
Average CNR (b=700 s/mm ²)	0.96
Average CNR (b=1200 s/mm ²)	1.33
Average CNR (b=2800 s/mm ²)	1.54

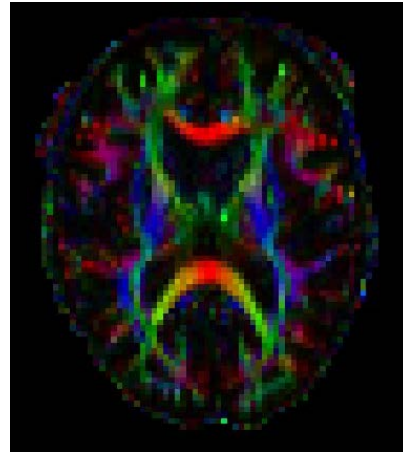
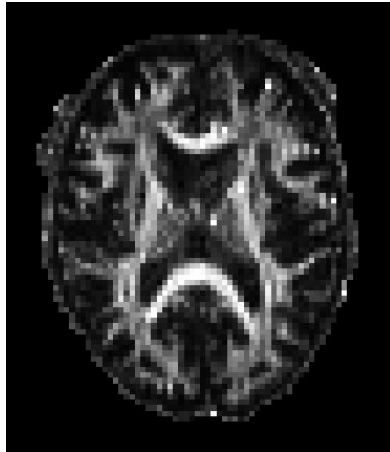
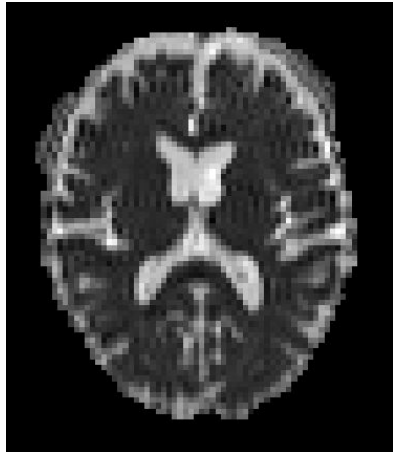
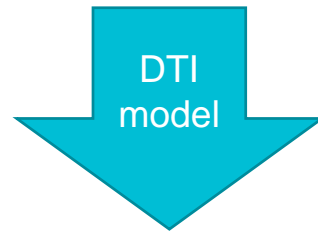
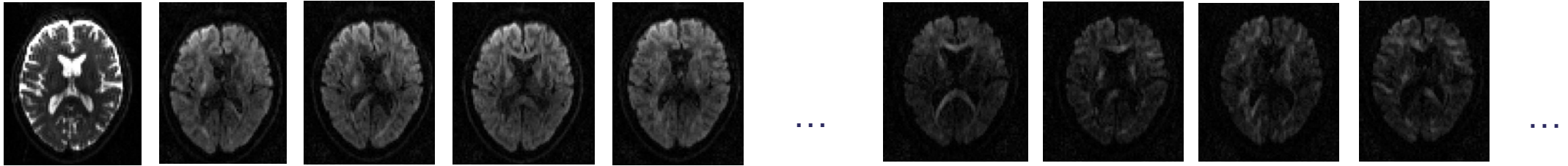


EDDY QC: quality control

- Study-wide quality control: eddy_squad



DTIFIT: diffusion tensor model fitting





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Thank you