

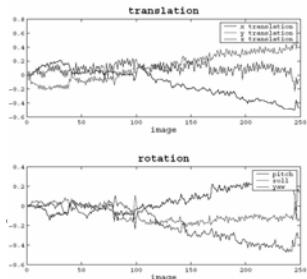
Summary

- Physiological artifacts
 - Filtering
 - Iterative subtraction movie ($i_1 - i_2; i_2 - i_3 \dots$)



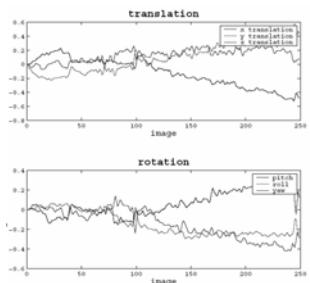
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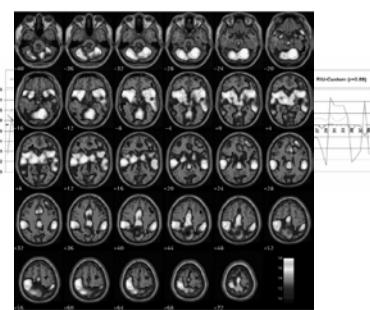
Can BOLD activity be ‘estimated’ as motion?

A



Can BOLD activity be ‘estimated’ as motion?

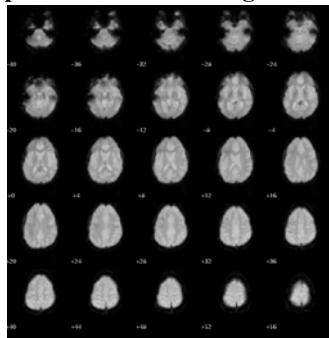
YES. In some circumstances



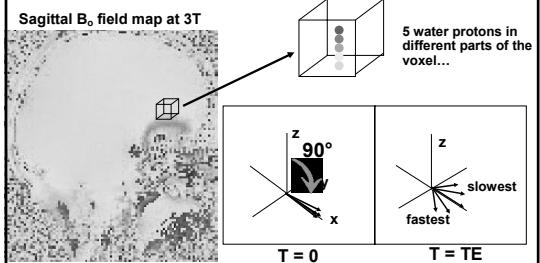
References

- L. Freire, A. Roche and J.-Fr. Mangin. *What is the best similarity measure for motion correction in fMRI?* IEEE Transactions in Medical Imaging 21, p. 470-484, 2002.
- L. Freire and J.-F. Mangin. *Motion correction algorithms may create spurious brain activations in the absence of subject motion.* Neuroimage 14(3), p. 709-722, september 2001.
- P.J. Rousseeuw and A.M. Leroy. **Robust Regression and Outlier Detection.** Wiley Series in Probability and Mathematical Statistics. 1987.

Typical Functional Image Volume



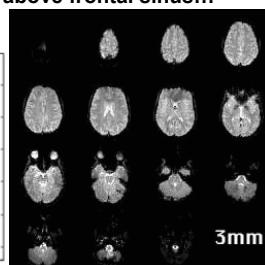
1) Non-uniform Local Field Causes Local Dephasing



Local susceptibility gradients: thru-plane dephasing

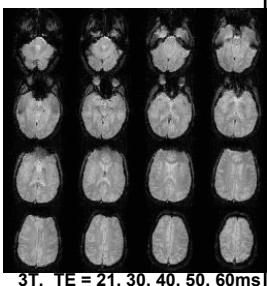
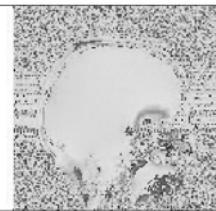
Bad for thick slice above frontal sinus...

Orbitofrontal susceptibility region



Thru-plane dephasing: worse at long TE

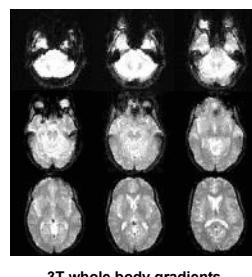
Orbitofrontal susceptibility region



Susceptibility in EPI can give either a compression or expansion

Altering the direction kspace is transversed causes either local compression or expansion.

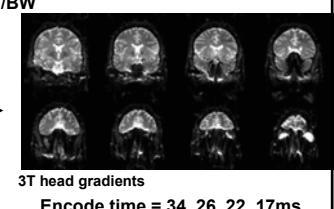
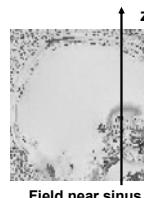
choose your poison...



Susceptibility Causes Image Distortion

Use shortest possible encoding

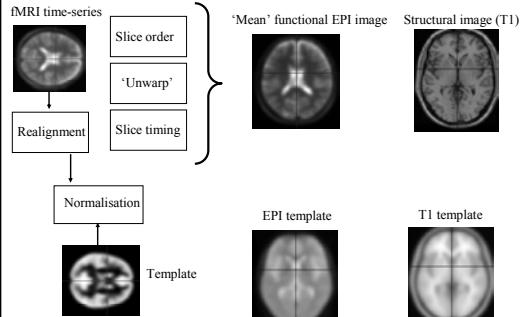
Echoplanar Image,
 $\Delta\theta \propto$ encode time $\propto 1/BW$



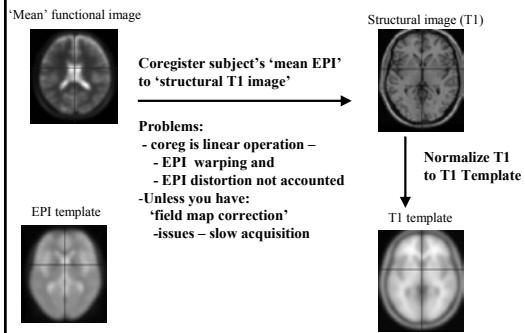
Talairach space

- Revised in spm96 using MNI brain
 - Montreal Neurological Institute
 - Based on 304 normal subjects
 - More representative of population
 - 10-15% larger than Talairach space
- Much confusion in the literature
 - Must convert to 'Talairach' to 'MNI' space
 - Meta-analyses
 - Planning studies, regions of interest
 - Different groups/software use different methods
 - Manuscripts must specify the 'actual space' used

Spatial Normalization



Spatial Normalization



Spatial Normalization

