Investigating the Impact of Motion and Associated B0 Changes on Oxygenation Sensitive MRI through Realistic Simulations

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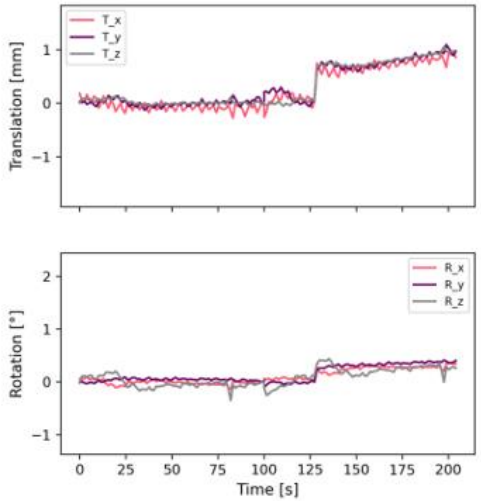
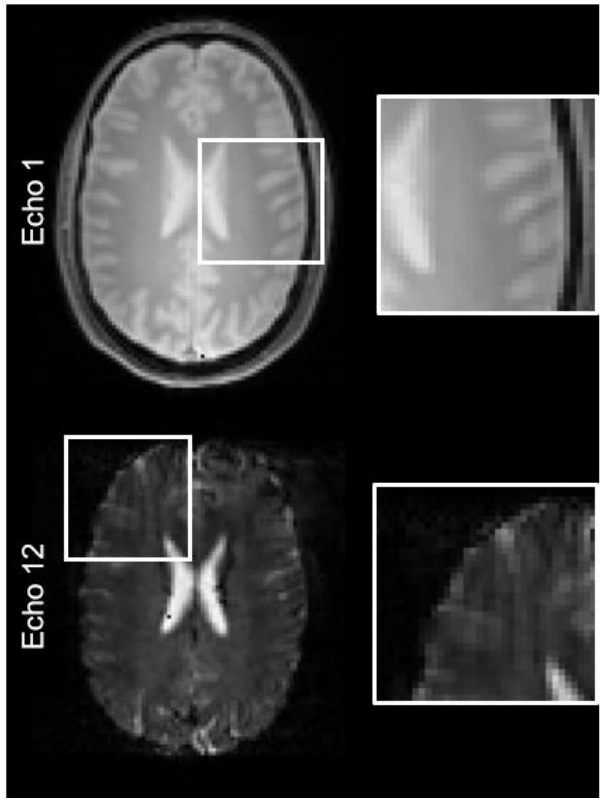




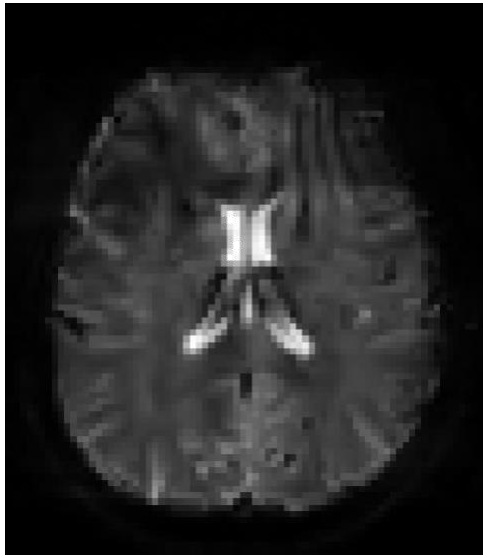
Declaration of Financial Interests or Relationships

Speaker Name: Hannah Eichhorn

I have no financial interests or relationships to disclose with regard to the subject matter of this presentation.

INTRODUCTION

Motion sensitivity of mqBOLD MRI



- T2*-weighted MRI sensitive towards B_0 inhomogeneities
  → particularly affected by motion[1]

- Motion artefacts might propagate towards derived mqBOLD parameters[2]

- **How does motion affect T2* GRE data?**
- **How does it influence T2* and R2' parameter maps?**

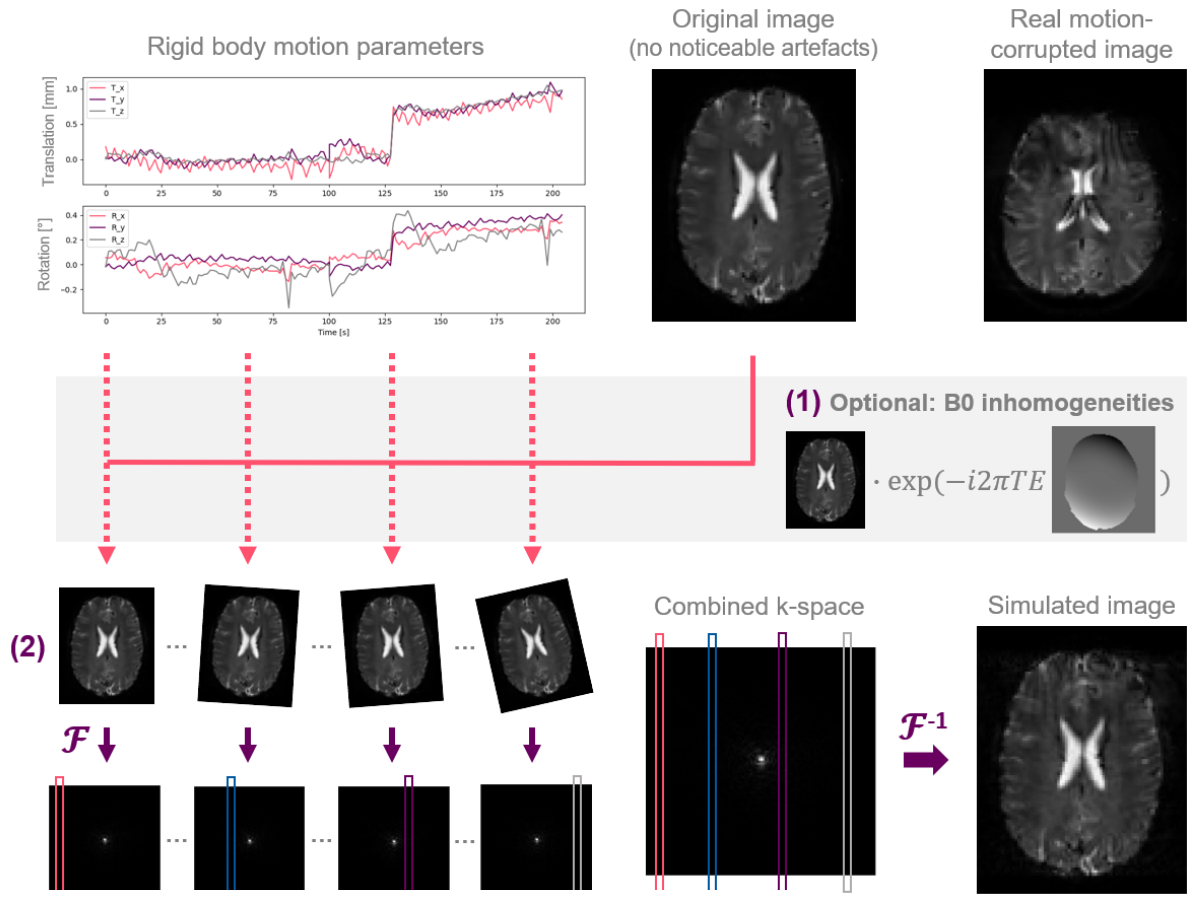
→ Realistic simulations: rigid body transformations & B_0 inhomogeneities

[1]Magerkurth et al. 2011, [2]Hirsch et al. 2014

METHODS

Motion simulation

Motion parameters extracted from fMRI time series, augmented by shifting and scaling



20 volunteers (unpublished mqBOLD data from ongoing studies)

Random B_0 inhomogeneities of max. 5Hz[1]

Code:

[3]Liu et al. 2018

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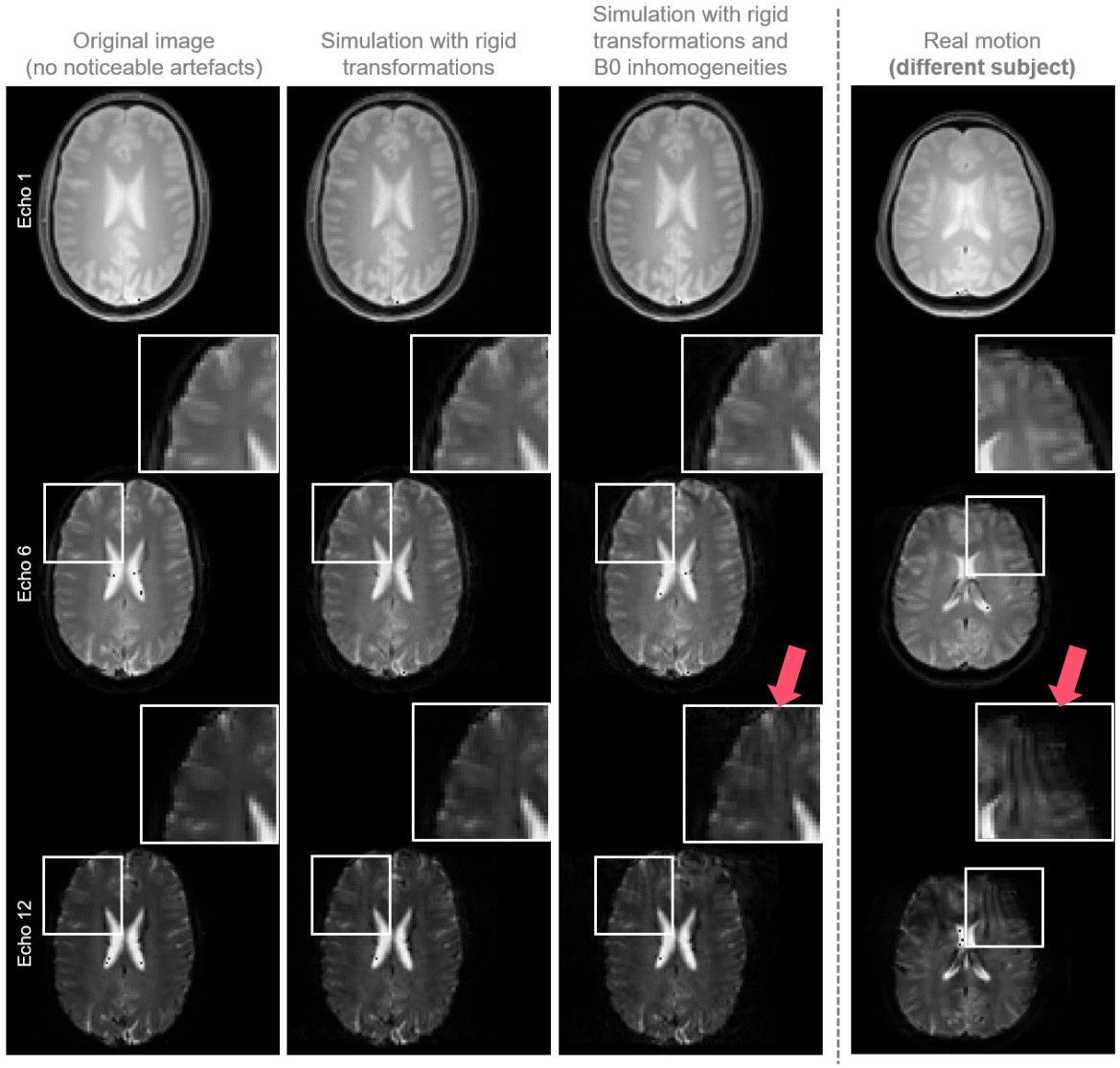
RESULTS

More realistic simulations by including B_0 inhomogeneities



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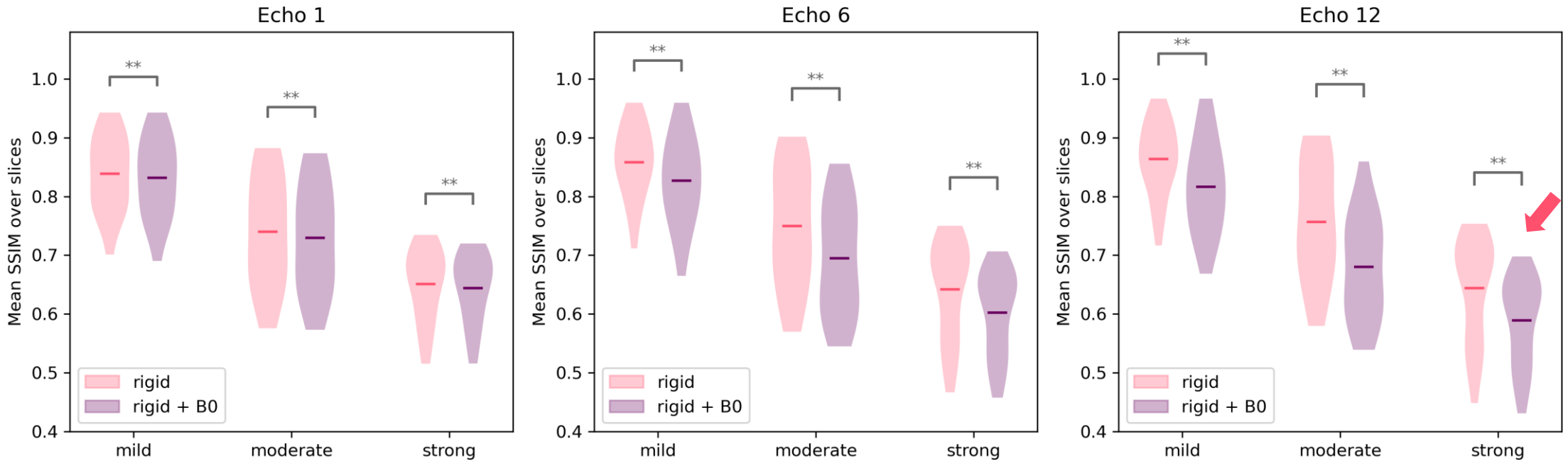
RESULTS

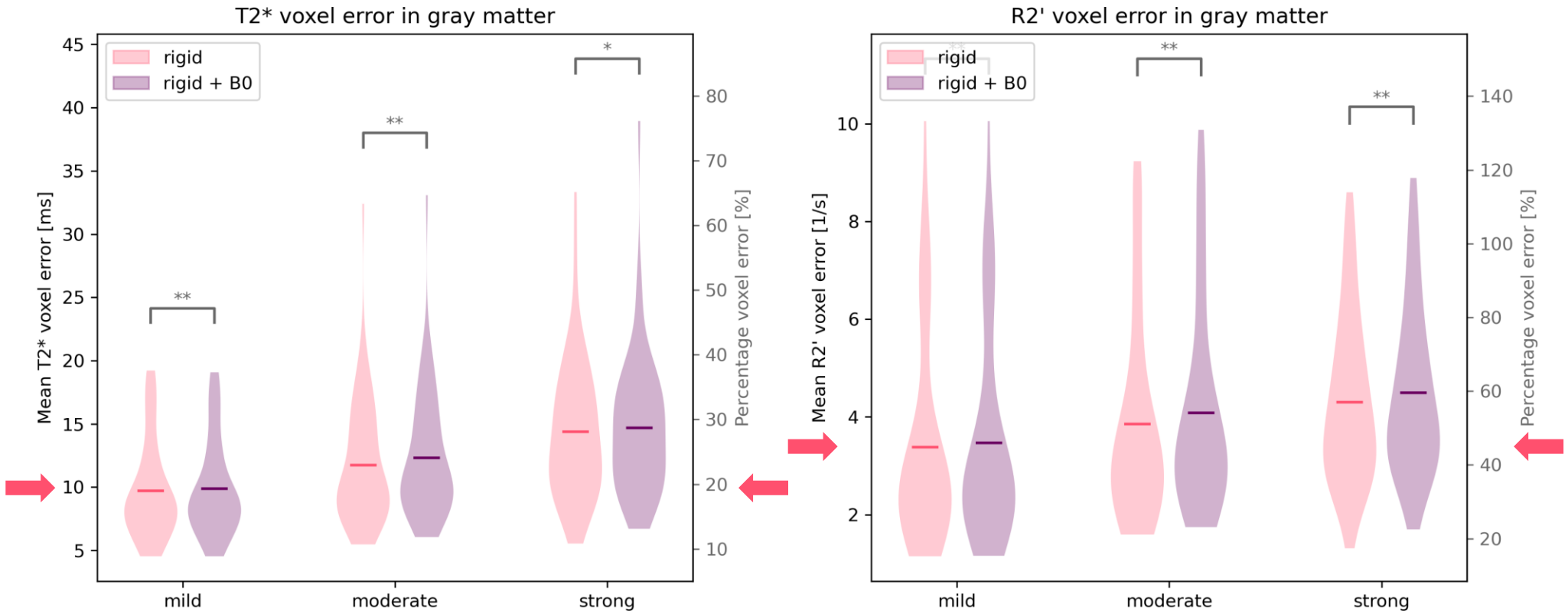
SSIM reflects qualitative observations



Average displacement: 0-0.66mm (mild), 0.66-1.33mm (moderate), 1.33-2.0mm (strong)

RESULTS

Motion causes substantial errors in derived parameters



[4]Hirsch et al. 2014, [5]Kacumarz et al. 2020, [6]Baudrexel et al. 2009

CONCLUSION

Importance of motion correction for T2*-weighted MRI

- Including motion-induced inhomogeneity changes for realistic motion simulation

- Motion artefacts propagated into erroneous T2* and R2' estimates

➡ **Importance of motion correction for robust quantification of blood oxygenation**

Acknowledgments

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