

QIBA 3-Month Interim Progress Report

fMRI Project: *Quantitative measures of fMRI reproducibility for pre-surgical planning*
Voyvodic Sub-project: *Development of reproducibility metrics*

This project started 7/15 and is currently in its 3rd month. We have made progress on all 3 data collections proposed for our analyses. The 2 large collections (Clinical scans and FBIRN Phase 1 data) have been organized into standardized forms suitable for standardized reproducibility processing. This involved aligning multiple data sets for each subject to a common anatomical reference data set, and identifying similar functional scans for direct reproducibility comparisons. This was our 1-2 month milestone.

The 3rd data collection of 31 scan sessions for 12 healthy control subjects who underwent multiple clinical fMRI protocols has been analyzed in greater detail. These data have been organized and aligned as above, and we have developed automated processing scripts to perform quantitative comparisons of fMRI reproducibility across scans. This analysis has developed and tested our processing methods and generated a variety of quantitative reproducibility measures. The results have been written up and submitted as a manuscript to the Journal of Magnetic Resonance Imaging. They show relatively poor quantitative test-retest reproducibility based on standard fMRI statistical thresholding methods, but good quantitative reproducibility when brain maps were normalized using our AMPLE algorithm. The methods and results produced in this study will be applied to the other data collections in the next phase of this project.

We have also made joint progress with Dr. Deyoe's sub-project by exchanging software tools, which has also involved some interoperability modifications. His group now has our fScan program installed and has successfully used its automated clustering and AMPLE normalization tools on their retinotopic fMRI data. We have installed AFNI and received sample visual activation data from the Deyoe lab. We will continue to work together to develop and evaluate processing algorithms for assessing quantitative reproducibility of brain activity maps across our various different functional paradigms.