

Abstract View

A COMPARISON BETWEEN SURFACE AND VOLUME-BASED AVERAGING TECHNIQUES FOR CROSS-SUBJECT FMRI ANALYSIS

B.D. Argall¹; Z.S. Saad²; A. Martin^{1*}; M.S. Beauchamp¹

1. LBC, NIMH/NIH, Bethesda, MD, USA 2. SSCC, NIMH/NIH, Bethesda, MD, USA

Average fMRI activation maps are usually constructed by converting each subject's data to standard Talairach space, and then averaging across subjects at each voxel in the standard volume. This approach can result in poor alignment of cortical structures, whose locations in Talairach space vary from subject to subject due to anatomical variance. An alternative (Fischl et al., Hum Brain Mapp 8, 272-284) is to align the sulcal and gyral pattern of each subject's cortical surface to a template. To the extent that functional brain areas correspond to sulcal and gyral patterns, active areas will be better aligned, resulting in more accurate average maps. To test this idea, we compared volume and surface averages for 8 subjects performing an fMRI study of auditory and visual object recognition (see Beauchamp et al., this volume). Volume averages were created in AFNI and surface averages were created in FreeSurfer. Surfaces were resampled using an icosahedral tessellation and visualized using the AFNI-SUMA viewer (see Saad et al., this volume). Only a small fraction of active voxels were mapped to the cortical surface (20.4% +/- 2.7% SD). However, in most subjects, the most active voxels (measured by peak significance) were mapped to the cortical surface so that peak values in the volume and the surface did not differ (average peak t score, $t = 17.6$). When volume average maps were created, the peak t score in the average map decreased due to blurring caused by anatomical variation (peak $t = 9.5$). However, the peak t in the average surface map was higher ($t = 12.6$) suggesting that spherical morphing aligns anatomical/functional regions with more precision than Talairach normalization. Unexpectedly, in some subjects spherical morphing produced unexpected "swirl" patterns related to alignment with the spherical template (as opposed to the simple blurring caused by Talairach normalization).

Support Contributed By: NIMH-IRP

33rd Meeting for the Society for Neuroscience, Abs. No. 863.12

Top of Form

Bottom of Form