Comparison of landmark-based and automatic methods for cortical surface registration

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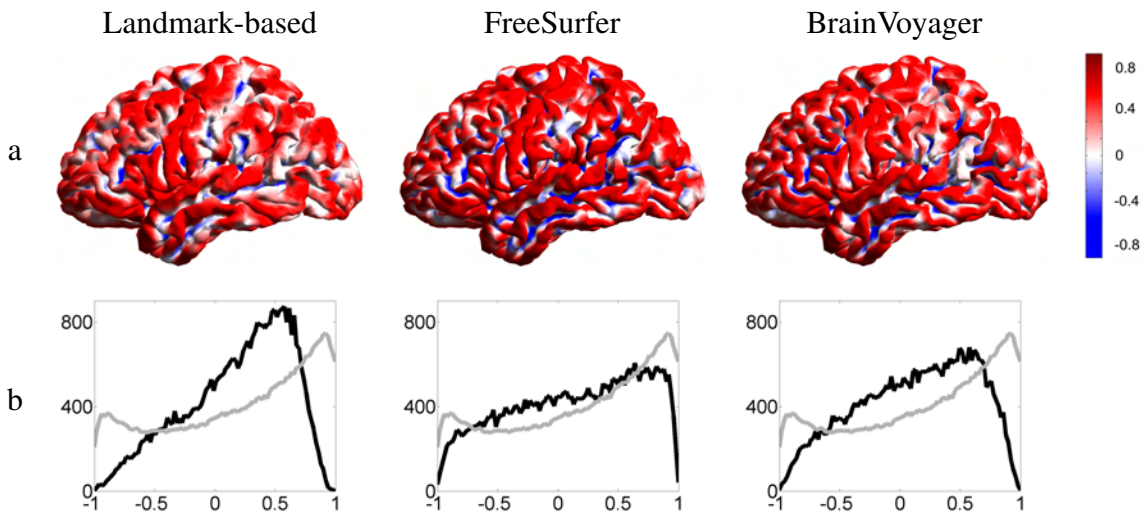

Fig. 1. a: Average curvature of Group 2 surfaces on the target brain; b: Histogram of the average curvature after registration (black), and average of the curvature histograms before registration (gray). In other words, black denotes the histogram of the curvature map displayed in row (a), and gray the typical curvature histogram a cortical surface has before registration.

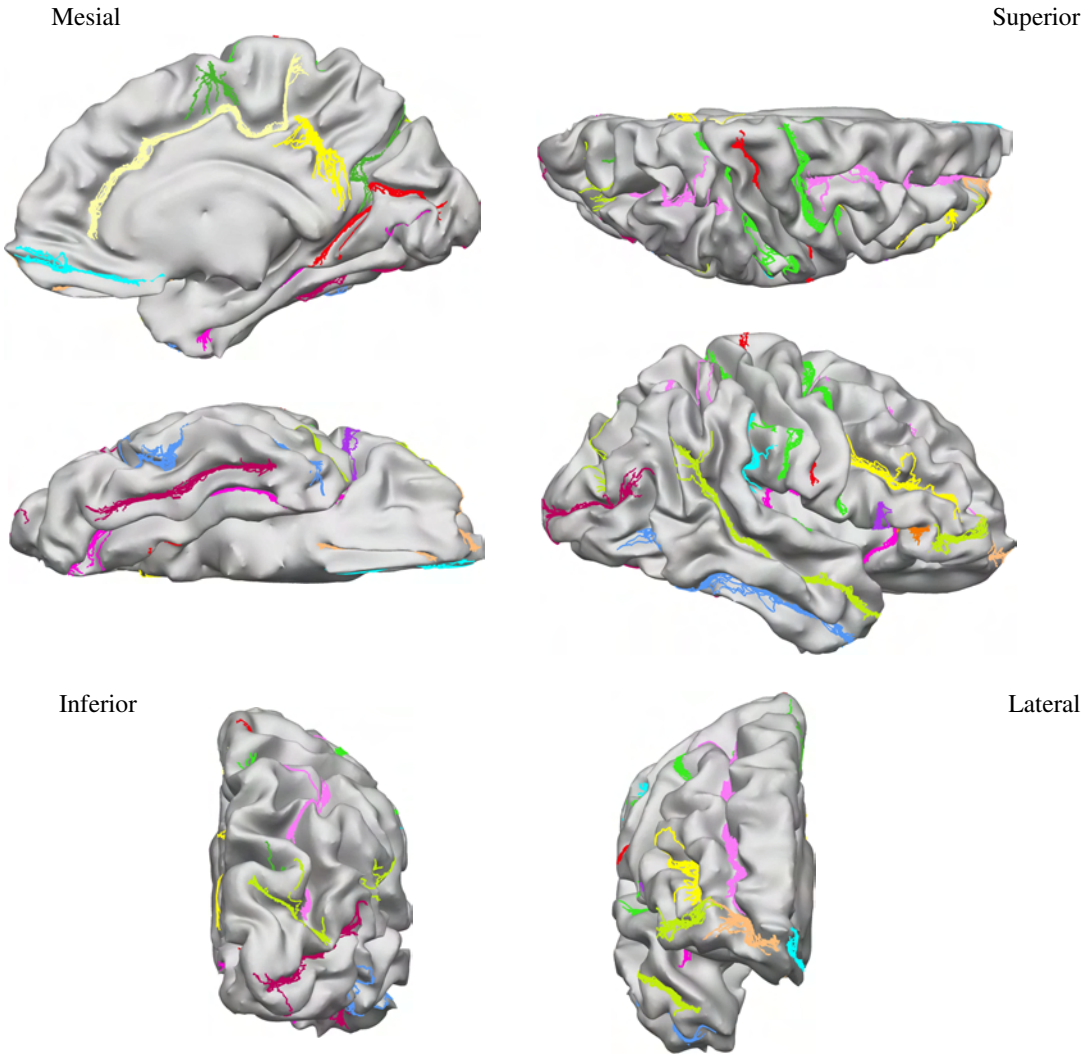

Fig. 2. Protocol curves for Group 2 surfaces mapped onto the target subject using landmark-based registration

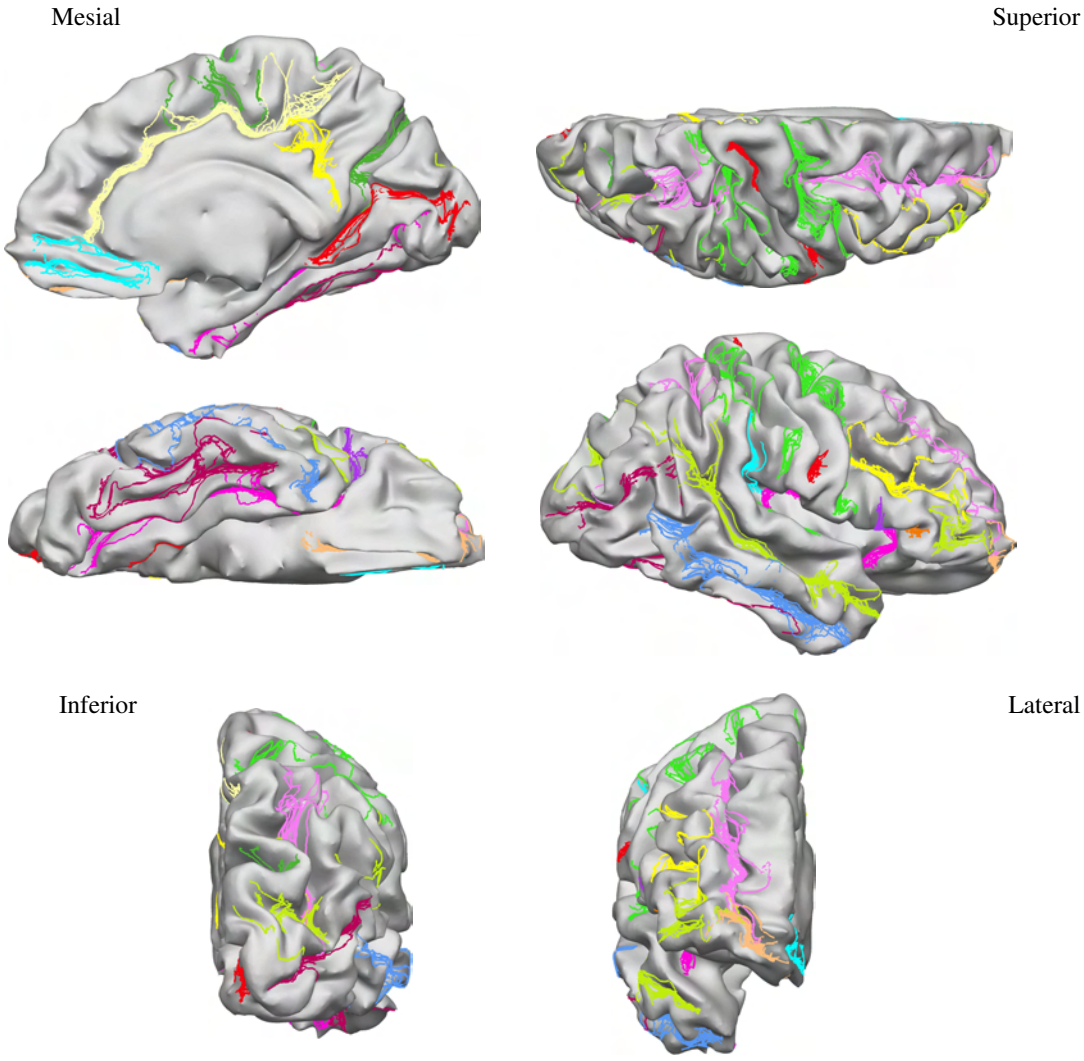

Fig. 3. Protocol curves for Group 2 surfaces mapped onto the target subject using FreeSurfer registration

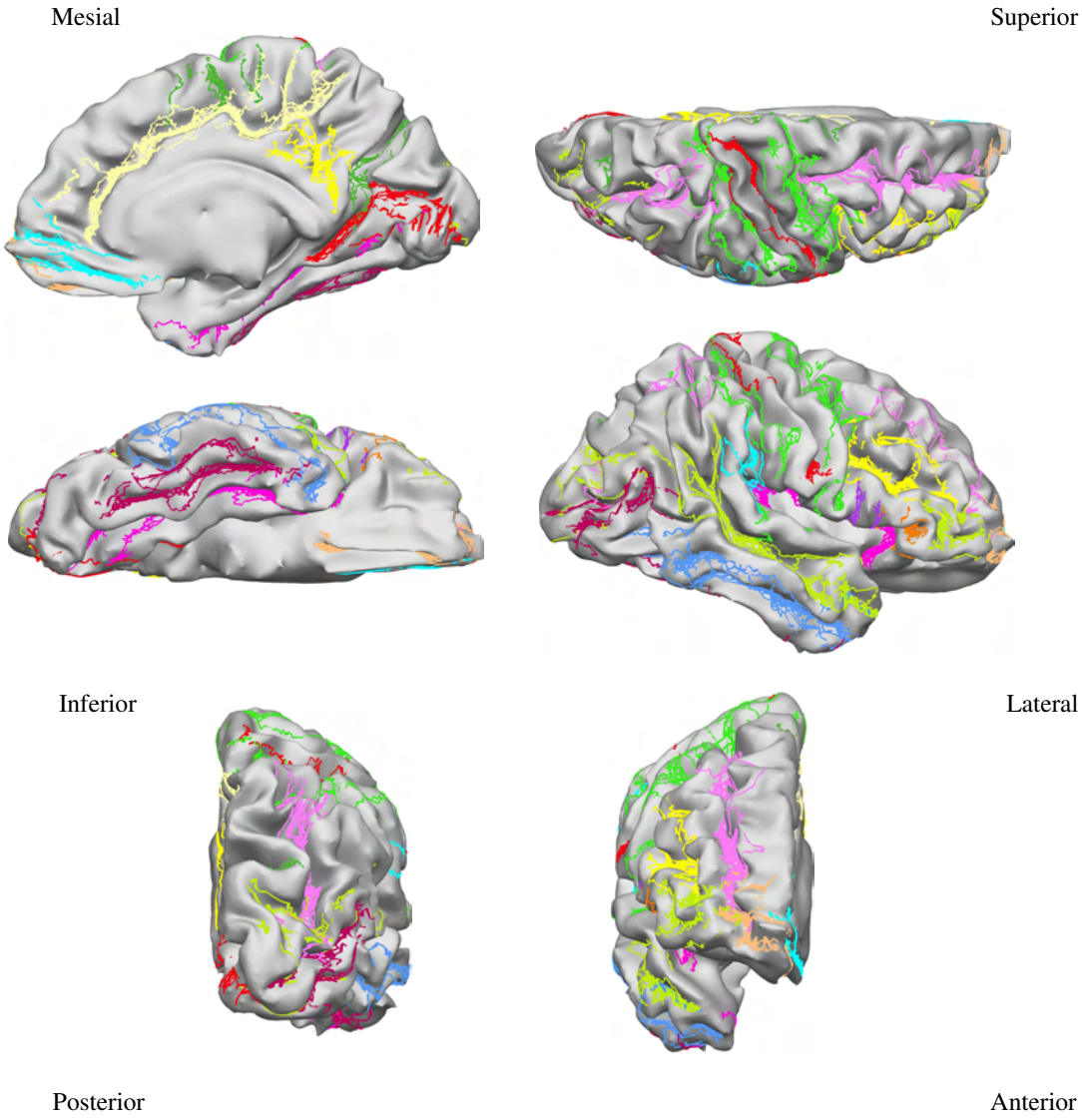

Fig. 4. Protocol curves for Group 2 surfaces mapped onto the target subject using BrainVoyager registration

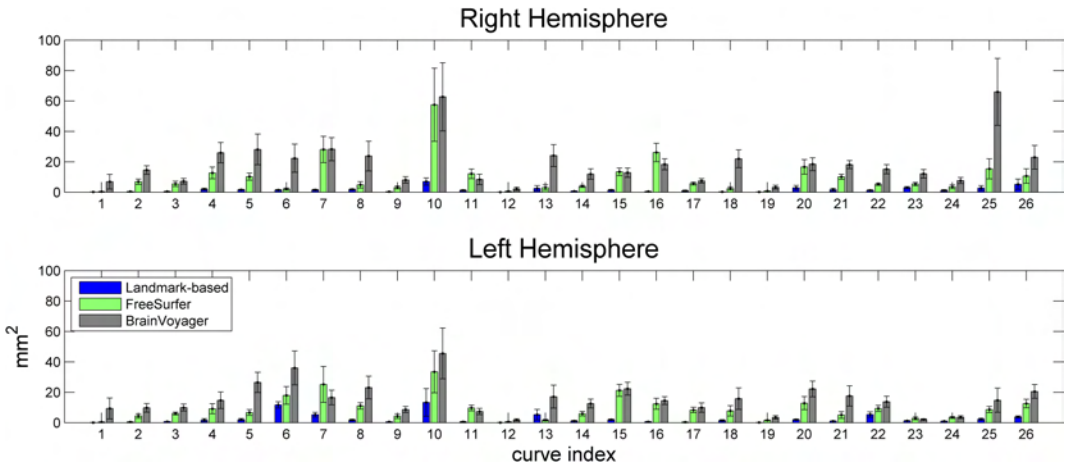

Fig. 5. Variance of protocol curves of Group 2 after being mapped onto the target surface using the 3 registration methods. The bars indicate 1 standard error from the mean.

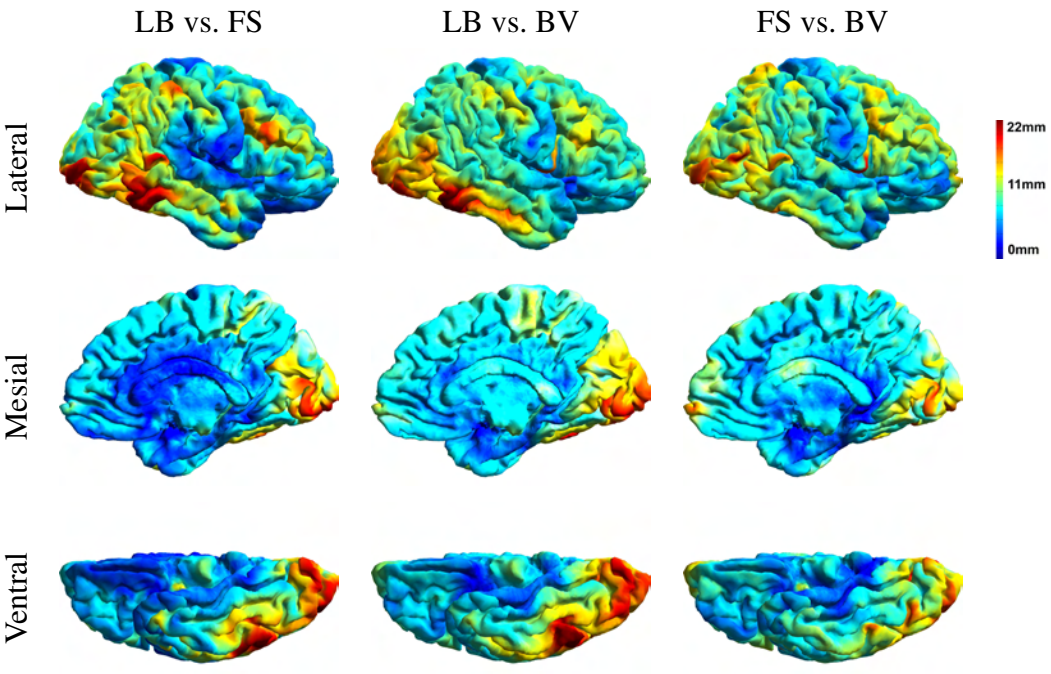

Fig. 6. Color-coded cortical maps indicating averaged pairwise root mean square Euclidean distance in mm between registration methods averaged over the 11 subjects in Group 2. Distances are computed with respect to the Talairach coordinates. LB: landmark-based, FS: FreeSurfer, BV: BrainVoyager. The results were obtained for the subjects of Group 2.

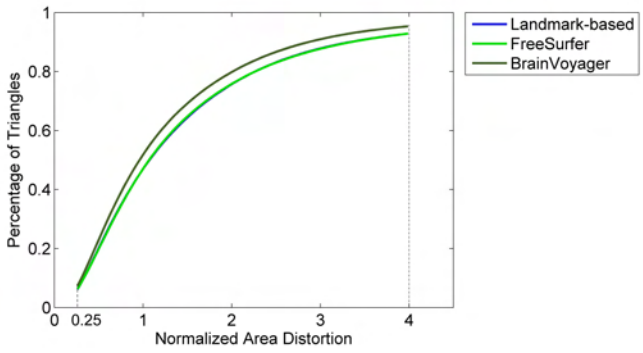

Fig. 7. Cumulative distribution function (CDF) of the normalized area distortion of triangles forming the tesselated cortical surface after registration with the 3 methods. Results are averaged over all brains comprising Group 2. Normalized area distortion at a cortical location is defined as the area of the corresponding triangle on the target surface, divided by the area of the subject surface mapped into the same triangle. The value of the CDF at 0.25 represents the percentage of triangles that become at least 4 times smaller after registration. Similarly, 1 - CDF at 4 represents the percentage of triangles that become at least 4 times larger after registration.