



Supplementary Materials for

Response to Comment on “The Geometric Structure of the Brain Fiber Pathways”

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Supporting Materials

The studies of Catani et al. (1) were performed with diffusion sensitivity $b \approx 2/3 q^2 \Delta = 5000 \text{ s mm}^{-2}$ which, in a clinical scanner with gradient peak amplitudes $G \approx 40 \text{ mT m}^{-1}$, would correspond to a diffusion encoding $r = 2\pi q^{-1} \geq 8 \text{ }\mu\text{m}$. By contrast, the *ex vivo* imaging in our study (2) used a sensitivity $b = 40,000 \text{ s mm}^{-2}$ with gradients $G = 400 \text{ mT m}^{-1}$ for $r \approx 2 \text{ }\mu\text{m}$.

Shown in Fig S1, co-registered DSIs of the centrum semiovale of a normal human subject, improved diffusion resolution leads to improved detection of crossing fibers (Fig. S1B). Human data were acquired in compliance with MGH IRB, including written informed consent, per (11). DSI was acquired in the MGH-UCLA 3T Connectom Scanner (11). The acquisition is a diffusion-weighted SE 2000/100, and 2 mm isotropic spatial resolution. Case (A): $G_{\text{max}} = 40 \text{ mT m}^{-1}$, $b_{\text{max}} = 5000 \text{ s mm}^2$ vs. case (B): $G_{\text{max}} = 300 \text{ mT m}^{-1}$, DSI $b_{\text{max}} = 15000 \text{ s mm}^2$. By Eq. 1, $R_{\text{eff}} \approx 22 \text{ }\mu\text{m}$ (A) vs. $R_{\text{eff}} \approx 8 \text{ }\mu\text{m}$ (B).

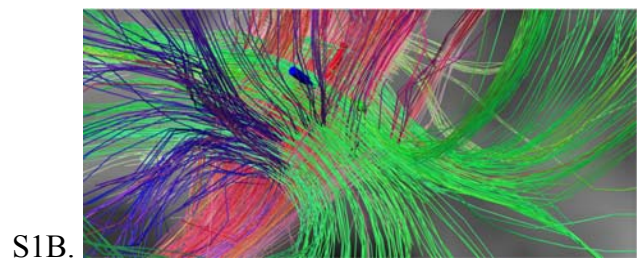
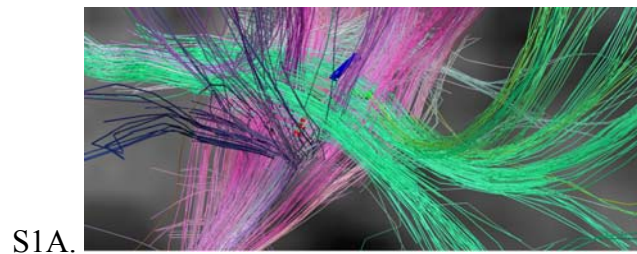


Fig. S1. Improved detection of a known crossing of pathways due to improved diffusion resolution (smaller R_{eff}) (12). In vivo DSIs in a normal human subject with MRI acquisitions with different diffusion encoding gradient strength and diffusion resolution and scan parameters otherwise identical (TR, TE, image matrix). In this lateral

view of the frontal lobe centrum semiovale, crossing pathways of the corona radiata (red), superior longitudinal fasciculus (green) and callosum (blue) are more extensively visualized with higher diffusion resolution (B).

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