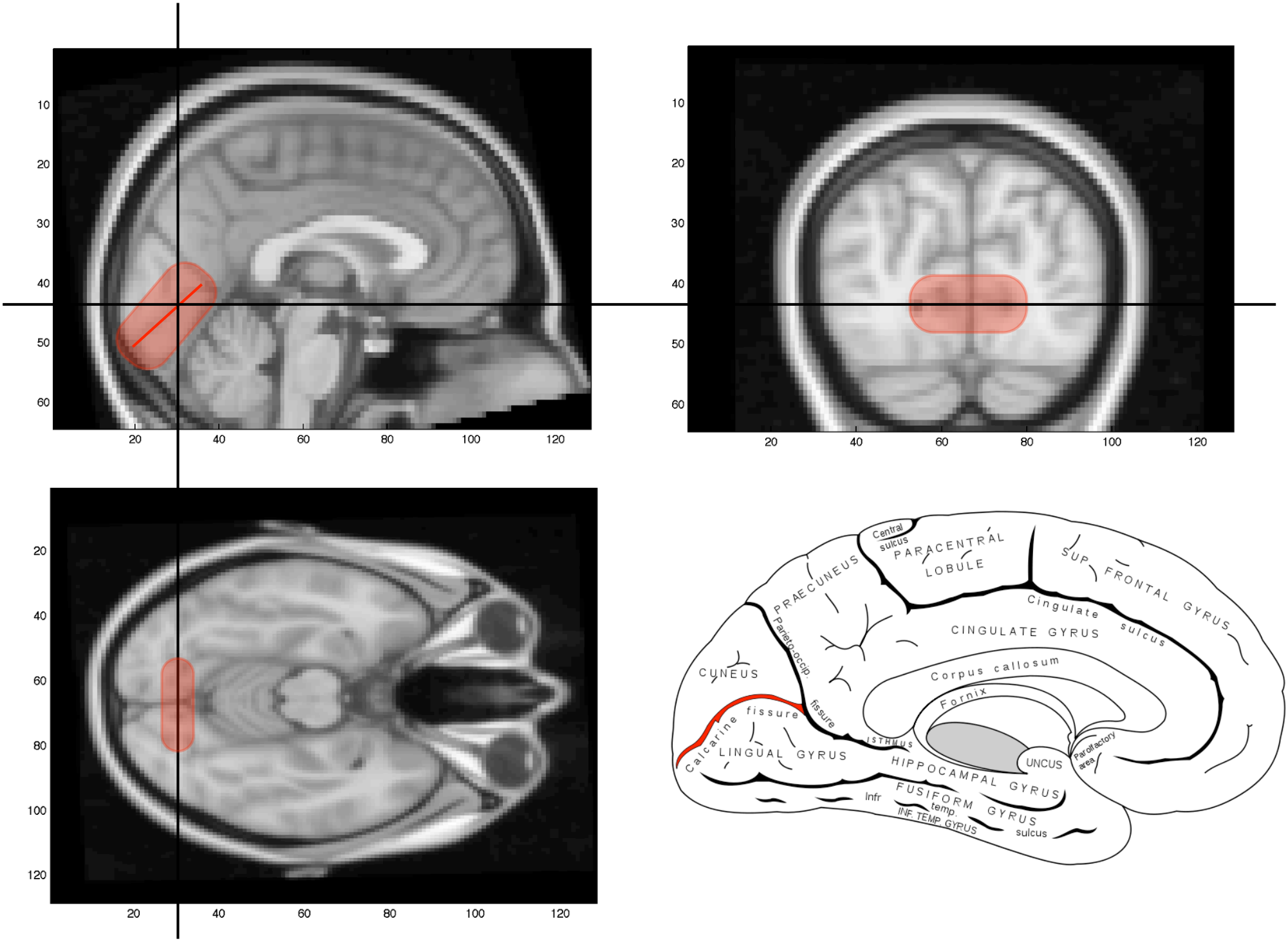
FA concentration analysis in optic fibers in autism

Based on Kim's data and
Nagesh's DTI processing

Analysis done by PhD student Soo Hyun Park, SNU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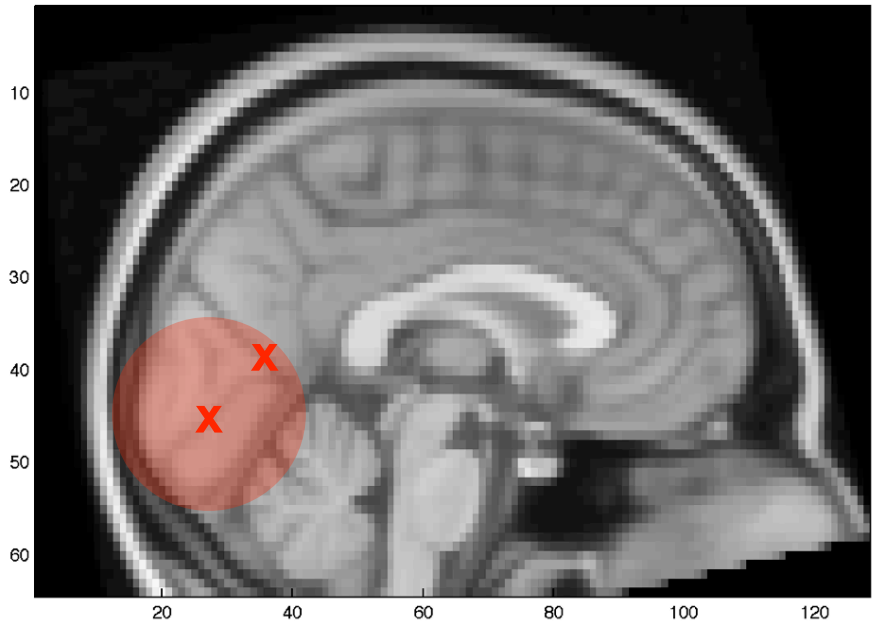
Central sulcus
PARACENTRAL LOBULE
SUP. FRONTAL GYRUS
PRAECUNEUS
Cingulate sulcus
CINGULATE GYRUS
Parieto-occip. fissure
Corpus callosum
CUNEUS
Fornix
Calcarine fissure
ISTHMUS
LINGUAL GYRUS
HIPPOCAMPAL GYRUS
UNCUS
Parolfactory area
Inf temp.
FUSIFORM GYRUS
INF. TEMP. GYRUS
sulcus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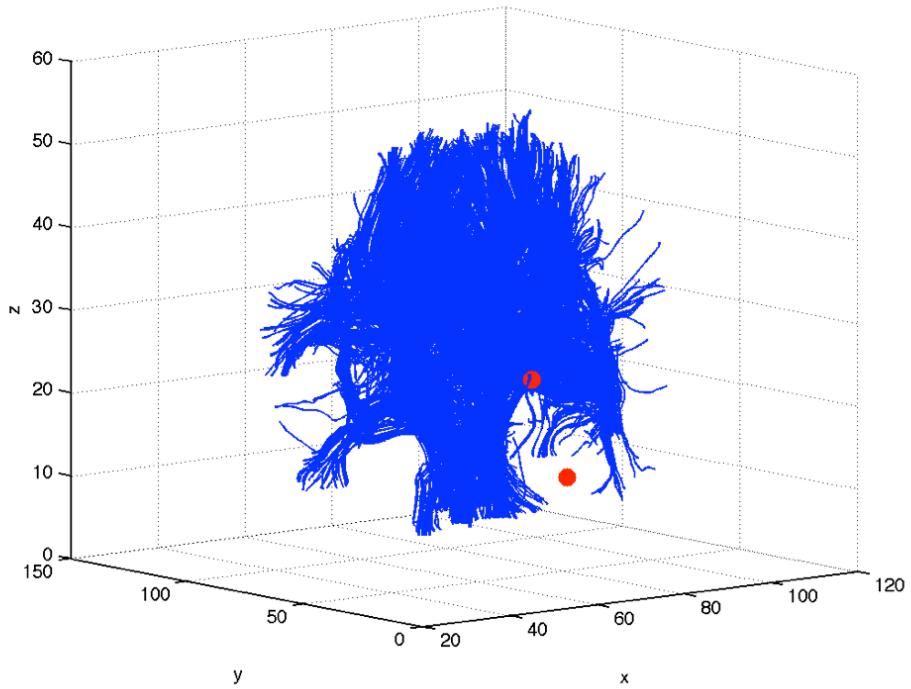
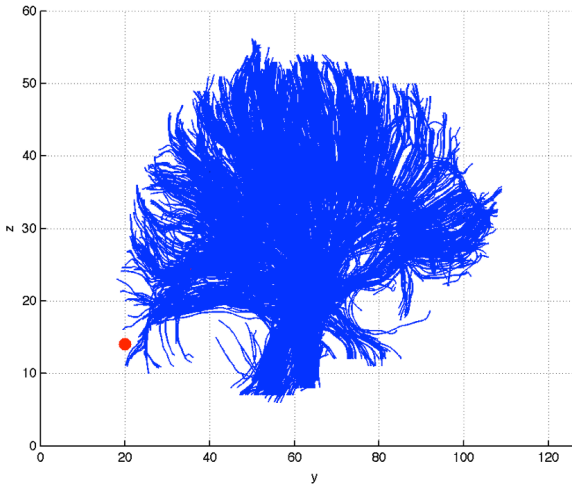

z
y
x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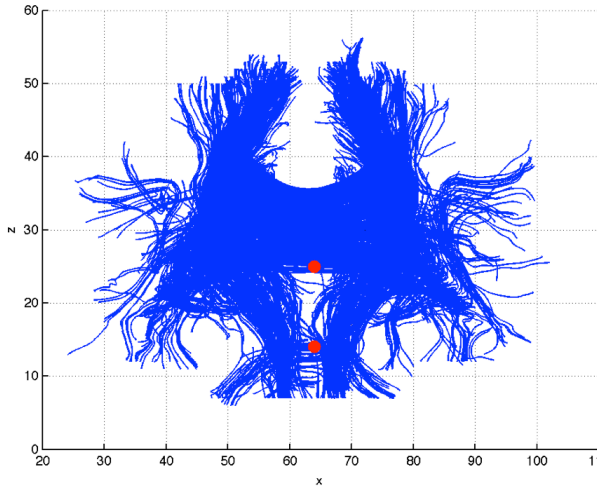
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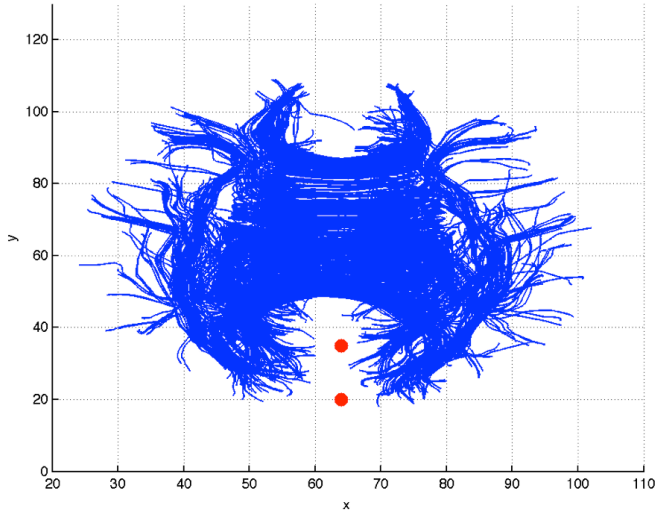
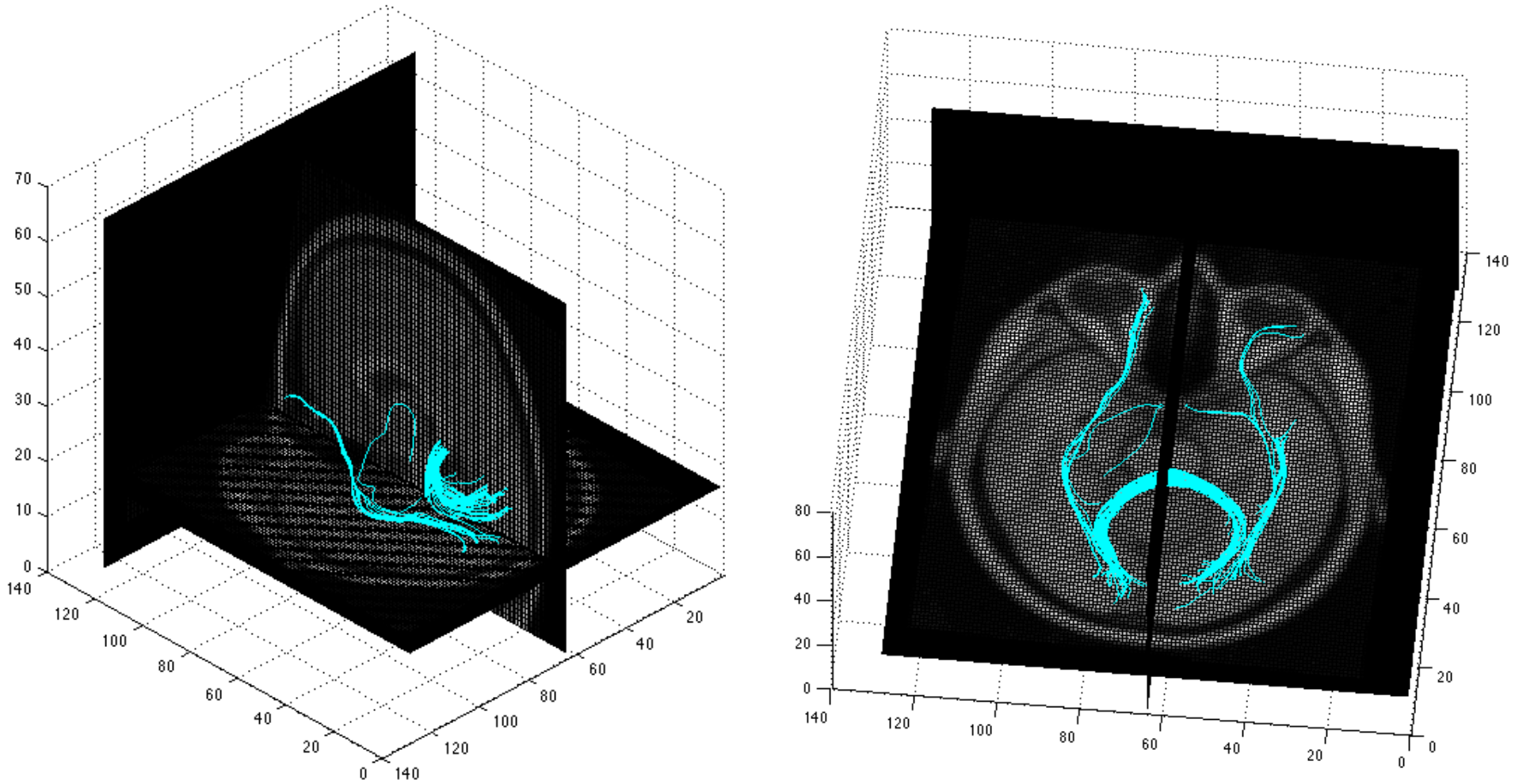
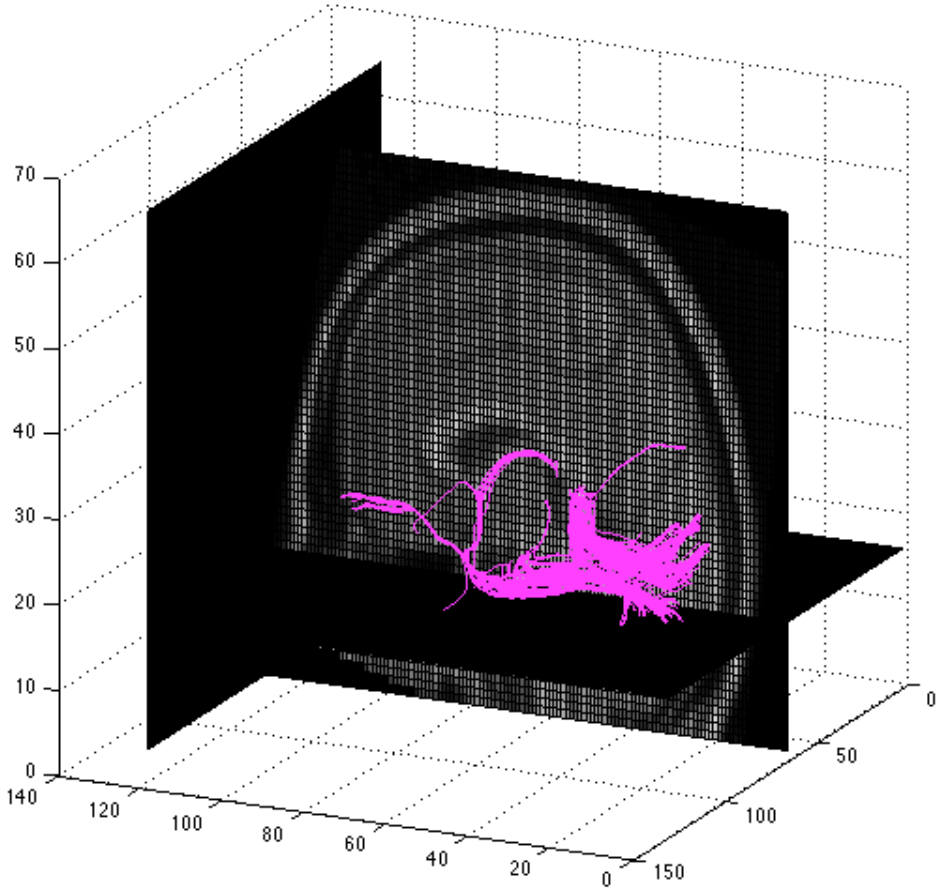

y
x

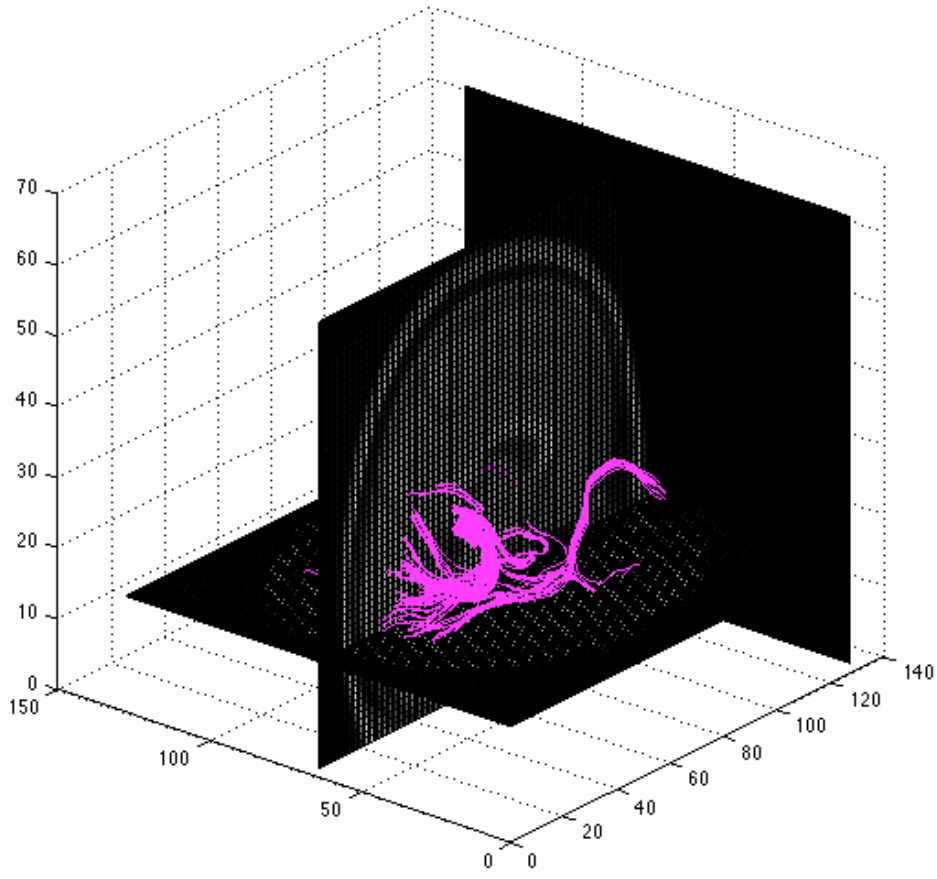
Tractography Results



Control subject #001

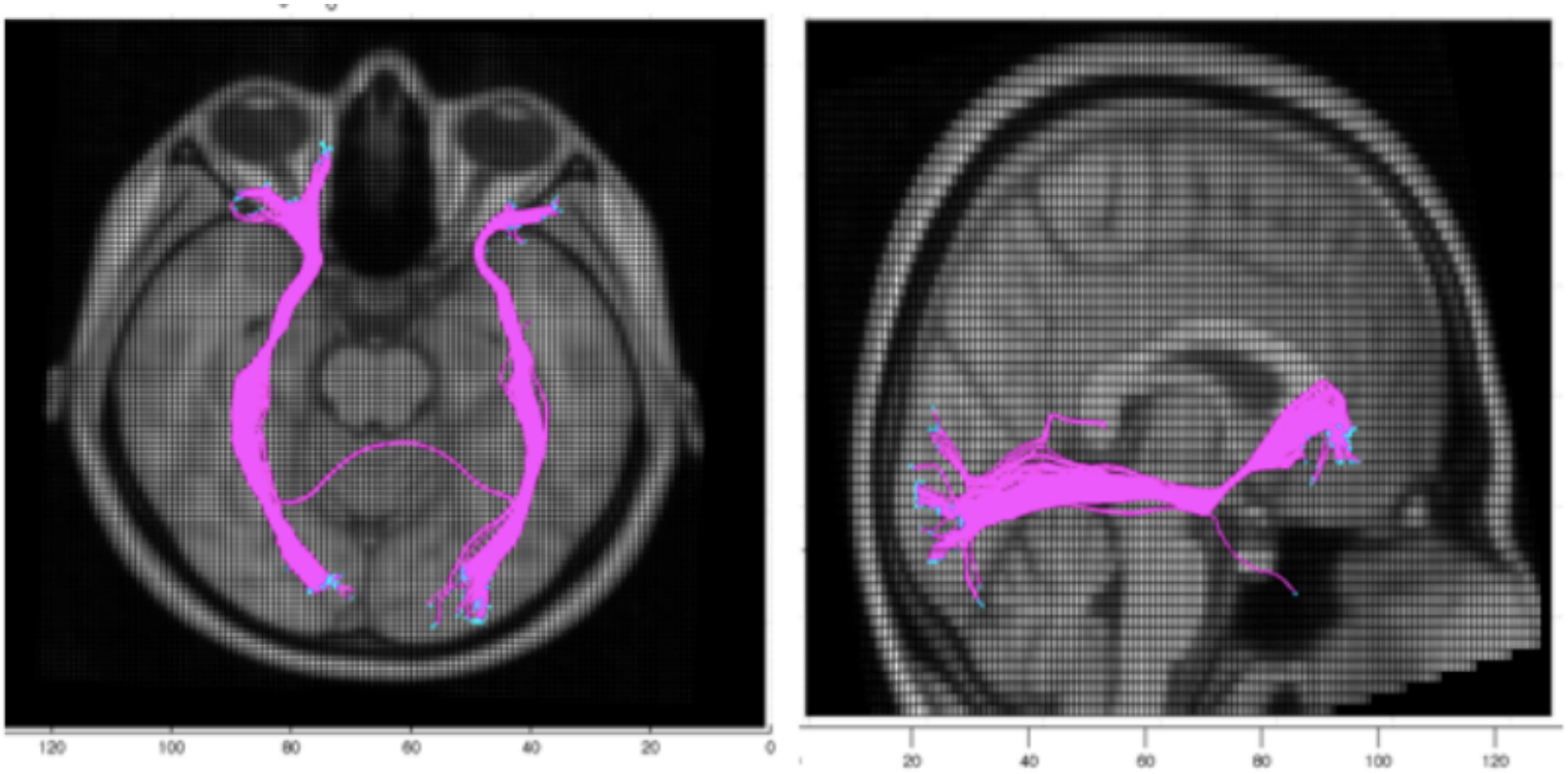
Tractography Results



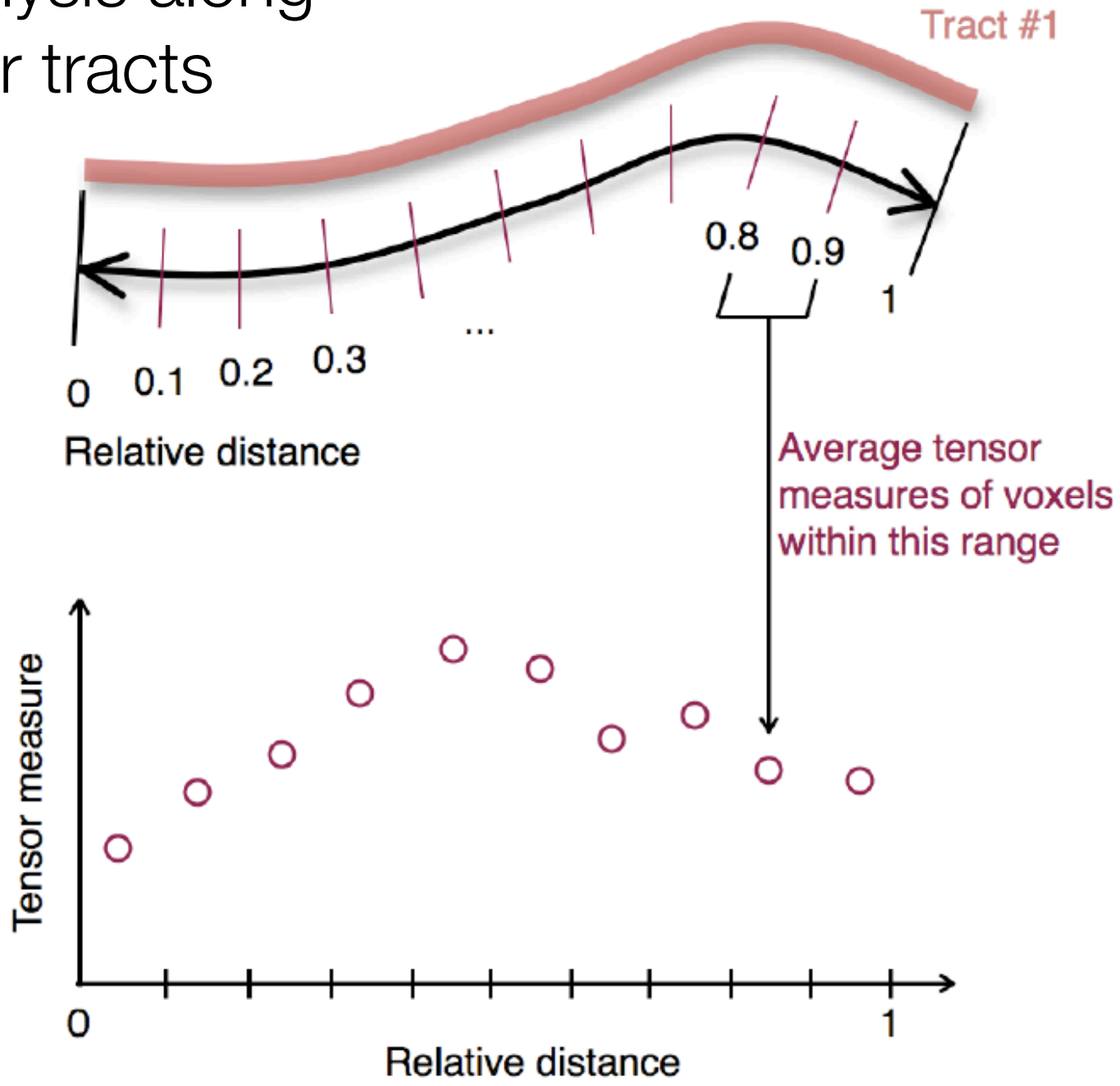


Autism subject #122

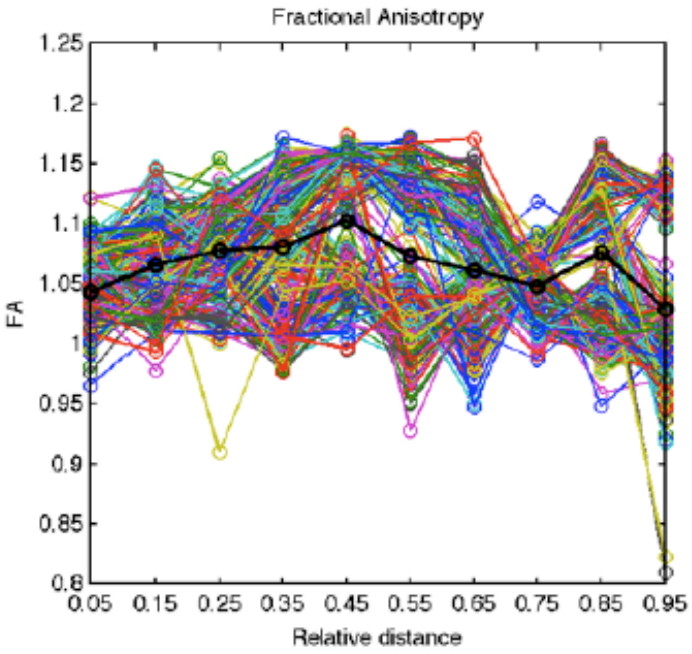
End Point Identification

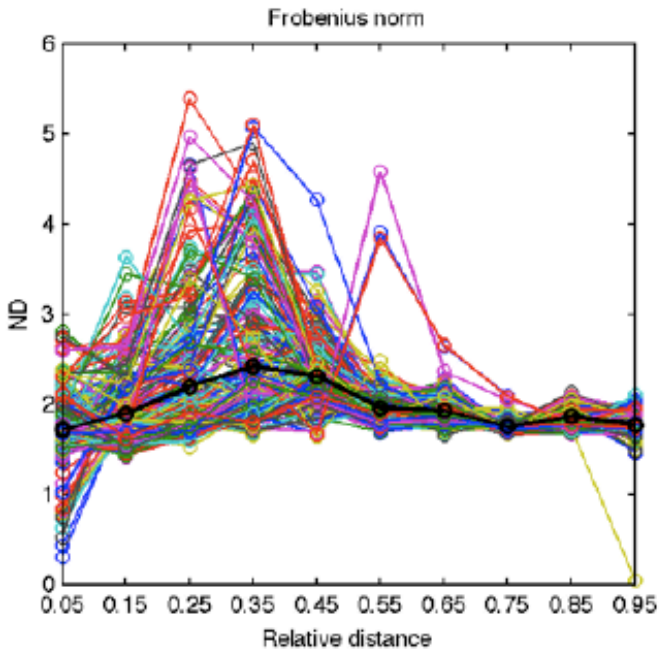


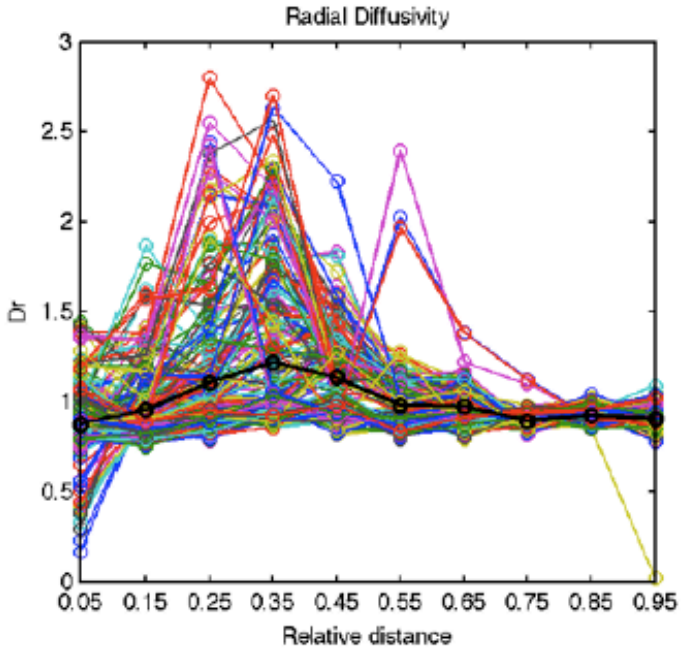
FA analysis along fiber tracts

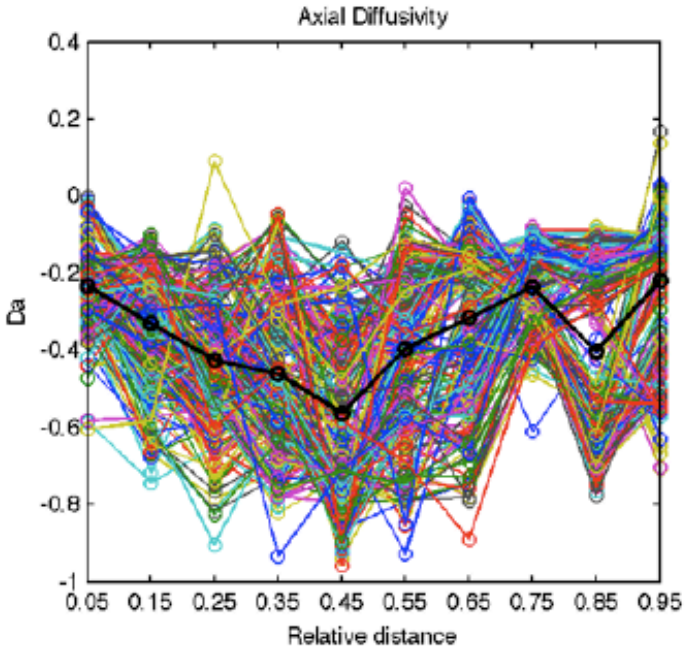


subject 001

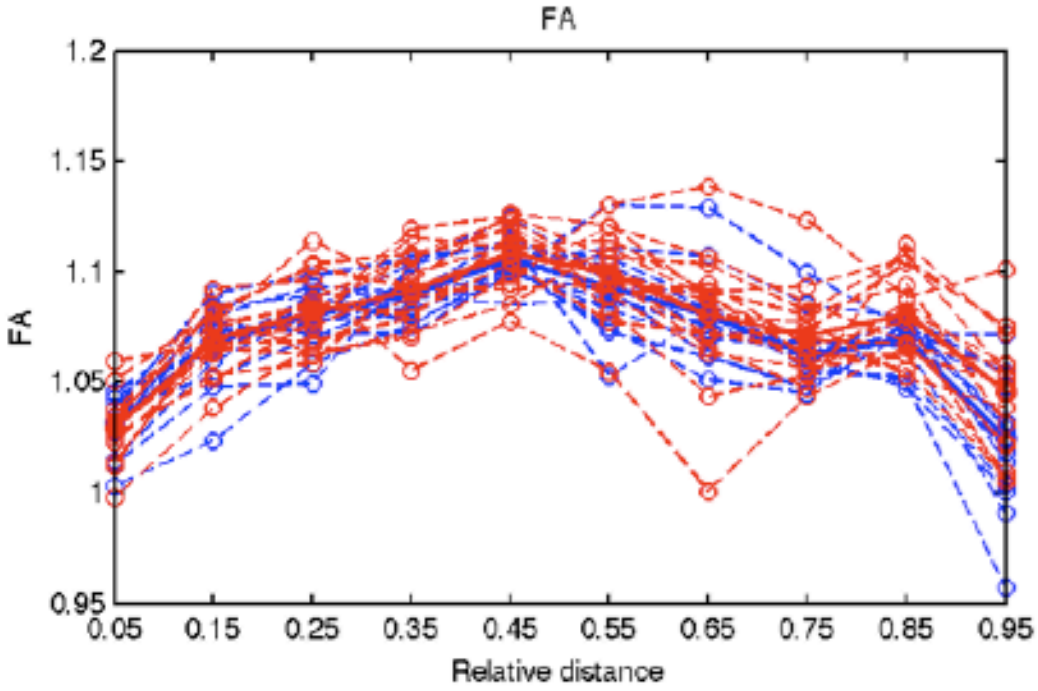

Fractional Anisotropy
FA
Relative distance

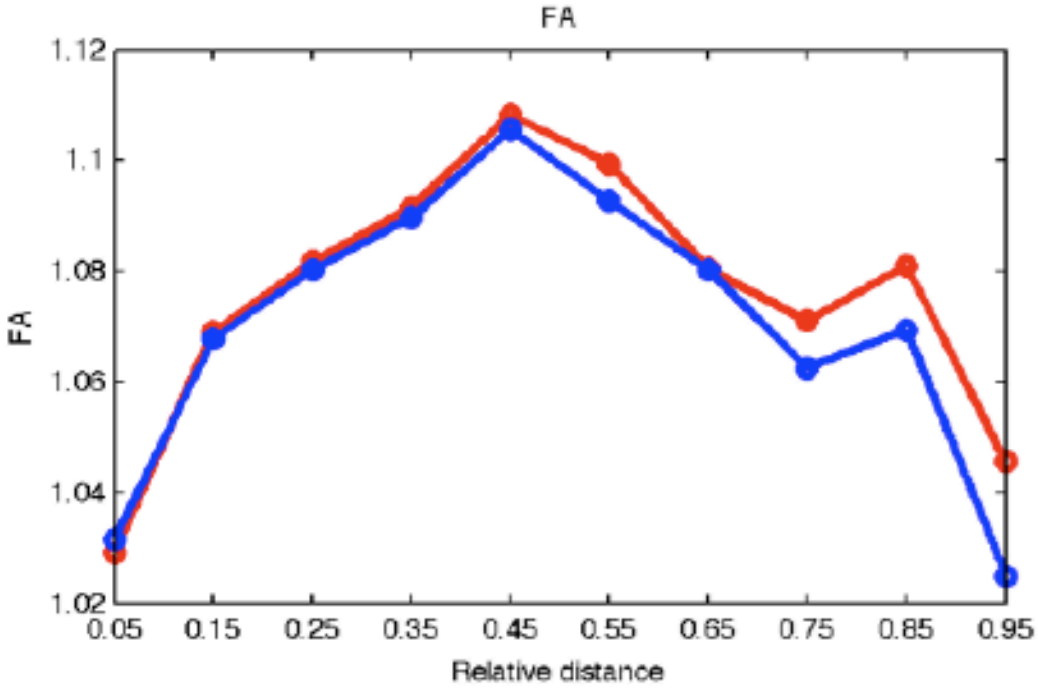

Frobenius norm
ND
Relative distance


Radial Diffusivity
Dr
Relative distance


Axial Diffusivity
Da
Relative distance

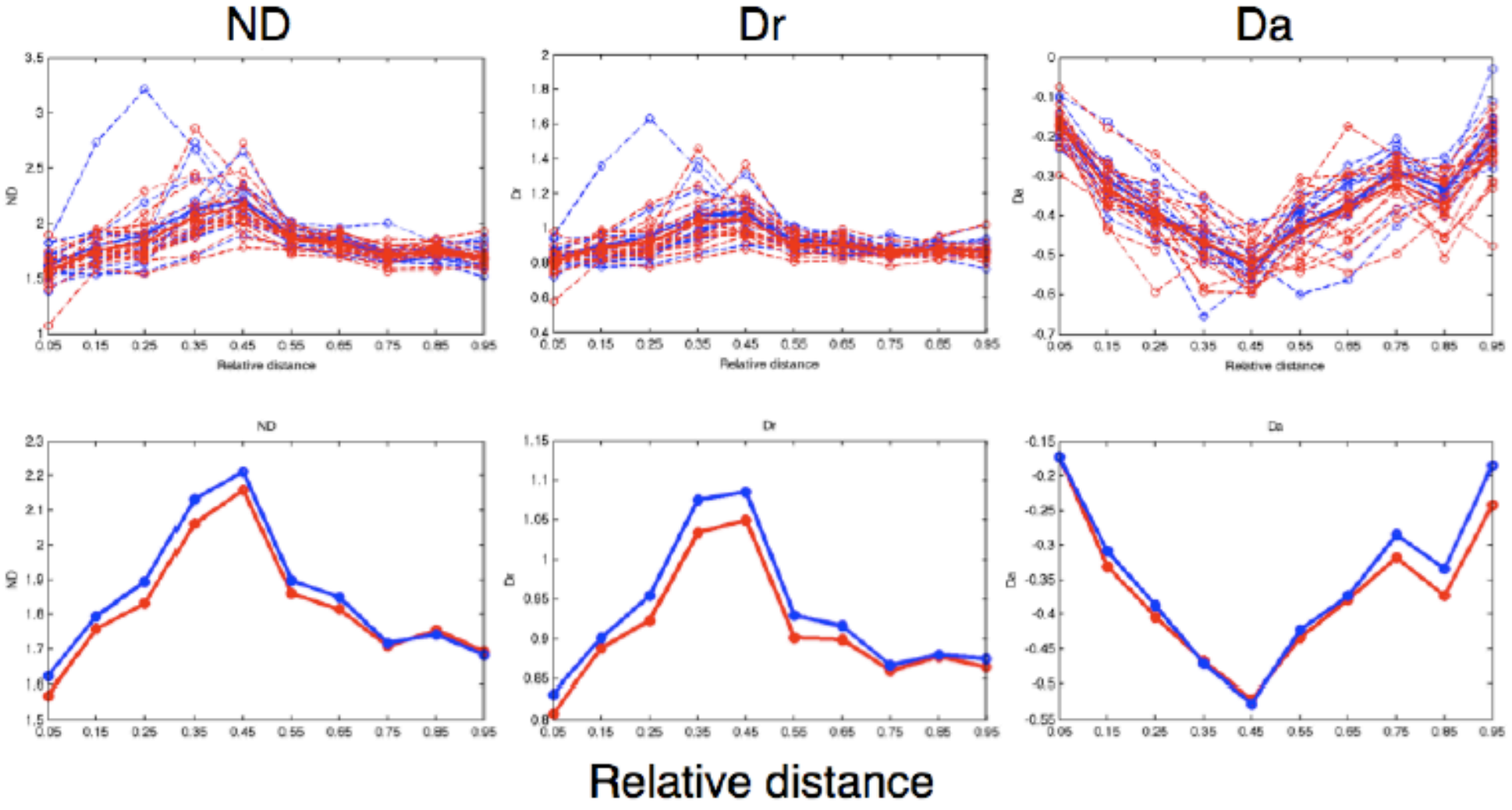
Group comparision





Group comparision

Tensor measures	p-value
Fractional anisotropy (FA)	.5908
Frobenius norm (ND)	.6578
Radial diffusivity (Dr)	.5709
Axial diffusivity (Da)	.7235



What's wrong with the analysis? Many things

- No treatment of noise in both geometry and measurements --- Use heat kernel smoothing on manifolds. Need to smooth tracts as well as FA values (IEEE TMI 2007).

- No tract-to-tract registration --- Use cosine series representation (Statistics and its interface 2010)

- Statistical analysis can be done without ROI and smoothly. Just parameterize smoothly using cosine series representation.