Rightward Hemispheric Asymmetries in Planum Temporale in Children with Autistic Disorder: An Anatomical MRI Investigation

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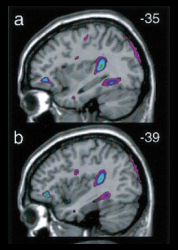
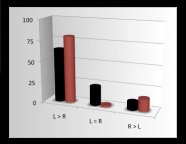
Hemispheric Asymmetries in Auditory Language Cortex



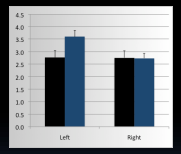
For most right handed individuals, the planum temporale is larger in the left hemisphere. Classic postmortem findings (Geschwind & Levitsky, 1968) have recently been supported in a large-scale (N=142) aMRI study by Watkins et al. (2001)



Black-filled columns show PT data from Geschwind & Levitsky (1968), red-filled columns from Watkins et al. (2001).

Hemispheric Asymmetries in Autism

Just 3 studies have used aMRI to investigate PT asymmetries in children with autism, with mixed results (deFosse et al, 2004, Herbert et al., 2002; Rojas et al., 2005).



Black columns show PT data for AD boys (N=12, Mean IQ 96), blue columns show data for controls (adapted from Rojas et al., 2005)

The Study Sample

N= 53 children (9 girls)

4-10 years (M=7.0, SD=3)

Research diagnosis of autism (ADOS, ADI-R)

Low functioning: M FSIQ = 63 (22.5)

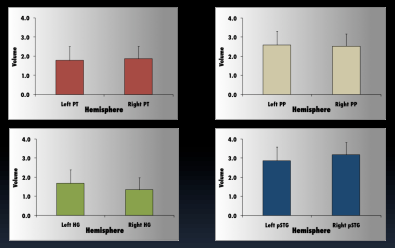
Three sets of MZ twins concordant for autism

Cortical Segmentation and Parcellation: Four Auditory Language Regions of Interest

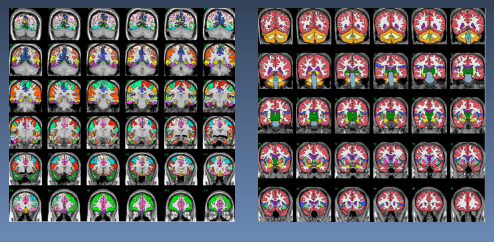
The neocortical ribbon was parcellated into 48 primarily gyral-based parcellation units per hemisphere, color coded, and voxels were summed to indicate gray matter volume (cm^3) of each parcellation unit.

Regions of interest: Heschl's gyrus (HG), planum temporale (PT), planum polare (PP), and posterior Superior Temporal gyrus (pSTG)

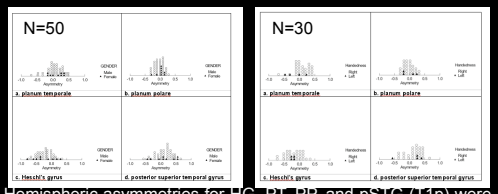
Results (N=50): Hemispheric Asymmetries in Autism



Mean gray matter volume (cm^3) of each region of interest: PT and PP showed no significant asymmetry. HG showed significant leftward asymmetry, pSTG showed significant rightward asymmetry.

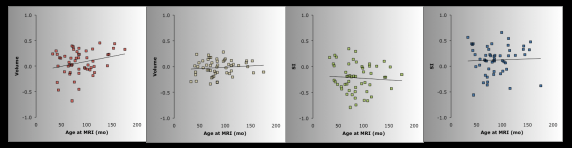


Results (N=30): Rightward Planum Temporale Asymmetry in Right-handed Boys with Autism



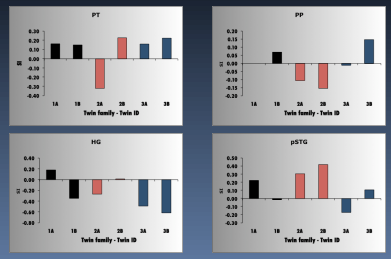
Hemispheric asymmetries for HG, PT, PP, and pSTG (T1p) were determined by calculating a Symmetry Coefficient (Index) :
SI: (R-L)/[0.5 * (R+L)] thus negative values reflect leftward asymmetry and positive values reflect rightward asymmetry

Age Dependence of Planum Temporale



Age was significant only for PT; no effects of gender, IQ, or handedness.

Evidence from MZ Twins Concordant for Autism: Epigenetic Factors in PT Asymmetry



Acknowledgements
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