Cortical thickness abnormalities associated with dyslexia, independent of remediation status

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Background on Dyslexia

- Prevalence rate: 5-17.5% (Shaywitz, 1998)
- May have profound effects throughout the lifespan (Francis et al., 1996)
- Marked difficulty in reading with no clear cause
- Impairment in phonological awareness
- What is dyslexia? (0:00-2:10)
Theoretical Framework

- Differences in the brain regions associated with the reading network (Pugh et al., 2000)
- Conflicting findings in the literature
  - Experience independent (Raschle, 2011)
  - Experience mediated changes (Krafnick et al., 2014)
Current Study Aims

- Measures of cortical thickness (CT), surface area (SA), and grey matter volume (GMV)
- Examine subgroups of individuals with dyslexia
  - Remediated vs. unremediated groups
- **Hypothesis 1**: If structural abnormalities are present in all subgroups, then possible cortical marker of dyslexia in children
- **Hypothesis 2**: If abnormalities in CT, SA, or GMV measurements in non-remediated group (not remediated), then environmental influences
Methods

- **Dyslexia participants (n=32)**
  - Group 1: children with current deficits in both reading and spelling
  - Group 2: children with a previous diagnosis of dyslexia, but currently exhibiting no reading deficit
  - Group 3: children with a previous dyslexia diagnosis, but currently exhibiting no reading or spelling deficits

- **TD controls (n=32)**
  - Group matched on age, gender, & IQ
MRI Procedure

- CT, SA, and GMV measurements for each participant
- 11 Regions of interest:
  - IFGOp
  - IFGOr
  - IFGTr
  - HG
  - STG
  - PP
  - PT
  - SMAR
  - AG
  - FFG
  - IOG
Results

\[ AI = \frac{\text{left} - \text{right}}{\text{left} + \text{right}} \]
Results
Results

- Left fusiform gyrus CT increase in individuals with dyslexia
- Rightward CT lateralization of the superior temporal gyrus in dyslexia group
- Normal SA & GMV measurements in dyslexia group
Discussion

- CT abnormalities in children with dyslexia, regardless of remediation status
- No effect of remediation on cortical structures in individuals with dyslexia
Thank you!

Questions?