



### Socioeconomic Status and Reading Disability: Neuroanatomy and Plasticity in Response to Intervention



Seeing Stars for Phonemic Awareness, Reading, and Spelling (SI)

#### PROFILE:

Number of Subjects:

- 40 Seeing Stars
- 25 Control

Age: 6-9

Lindamood-Bell Programs Implemented: Seeing Stars®

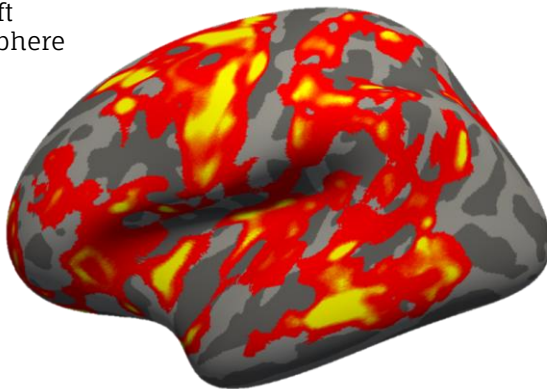
Outcome Measures: Brain Activity (fMRI)

#### BACKGROUND:

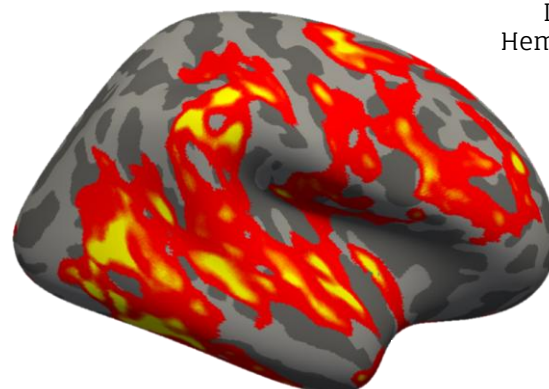
The Massachusetts Institute of Technology (MIT) McGovern Institute for Brain Research and Department of Brain and Cognitive Sciences in collaboration with Lindamood-Bell Learning Processes conducted a randomized controlled trial involving young children with reading disabilities (RD) and difficulties. This experiment investigated the efficacy of the Seeing Stars program, which develops symbol imagery for reading. Children were randomly assigned to intervention (Seeing Stars) or non-intervention (control) groups. Before and after, all children received functional magnetic resonance imaging (fMRI) to measure cortical thickness. Over a six-week period of time, children in the Seeing Stars group received between 100 and 120 hours of instruction that was delivered by specially trained Lindamood-Bell staff.

#### Brain (Cortical) Growth

Left Hemisphere



Right Hemisphere



Note. Figure used with author's permission.

#### RESULTS:

Brain regions (red and yellow areas) grew significantly thicker in children whose reading scores improved ( $n = 20$ ) after Seeing Stars instruction. In addition, children from lower-socioeconomic status (SES) families were more likely to benefit from instruction than children from higher-SES families, and children with more severe reading disability exhibited the most improvement in reading scores. "These findings indicate that effective summer reading intervention is coupled with cortical growth, and is especially beneficial for children with RD who come from lower-SES home environments" (p. 1).

Romeo, R. R., J. A. Christodoulou, K. K. Halverson, J. Murtagh, A. B. Cyr, C. Schimmel, P. Chang, P. E. Hook, and J. D. E. Gabrieli. 2017. "Socioeconomic Status and Reading Disability: Neuroanatomy and Plasticity in Response to Intervention." *Cerebral Cortex*: 1-16. doi: 10.1093/cercor/bhx131.