

Stanford



Mareike Grotheer

Postdoctoral Research Fellow, Psychology

Bio

PROFESSIONAL EDUCATION

- Doctor of Philosophy, Friedrich Schiller University Jena , Psychology (2015)
- Master of Science, University of Regensburg , Neuroscience (2012)
- Bachelor of Science, Georg-August-Universität Göttingen , Biology (2010)

STANFORD ADVISORS

- Kalanit Grill-Spector, Postdoctoral Faculty Sponsor

LINKS

- Go to Mareike's Personal Site: <http://www.mareikegrotheer.com>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Multimodal investigations of the neural substrates of math and reading

A child's math and reading abilities have dramatic implications for their future career prospects and socioeconomic outlook. As a result, children suffering from math and reading learning disabilities are at a distinct disadvantage; despite normal intelligence, these disorders make it extremely difficult for afflicted children to acquire math, reading and subsequent academic skills. A better understanding of the neural substrates of math and reading plays a vital role in battling such learning disabilities. At the same time, math and reading also offer a unique opportunity to better understand human brain plasticity. To date, brain plasticity is commonly investigated using animal models which differ substantially in their developmental trajectories compared to human children. In contrast, math and reading are uniquely human abilities that are acquired through extensive learning. My research investigates what are the neural substrates of math and reading, how these substrates emerge as we acquire these essential skills, as well as, how this process goes awry in children with learning disabilities. Addressing these questions requires understanding multiple aspects of the brain, which is why my research is characterized by a multimodal approach that combines functional (fMRI), quantitative (qMRI) and diffusion-weighted magnetic resonance imaging (dMRI) with behavioral observations. What makes my work unique, is that I simultaneously investigate both math and reading in meticulous, multimodal single-subject analyses. This work will have implications that reach well beyond math and reading itself. Math and reading are model systems of how learning and cultural inventions shape human cognition and the human brain, thereby, allowing me to address fundamental questions in cognitive neuroscience including why the brain is organized the way it is, which components of the brain are static and which change due to learning, and how brain function and structure concert human cognition.

LAB AFFILIATIONS

- Jason Yeatman, Brain Development and Education Lab (9/1/2019)
- Kalanit Grill-Spector, Vision and Perception Neuroscience Lab (5/1/2016)

Publications

PUBLICATIONS

- **Significant repetition probability effects in schizophrenia** *PSYCHIATRY RESEARCH-NEUROIMAGING*
Kovacs, G., Grotheer, M., Muenke, L., Keri, S., Nenadic, I.
2019; 290: 22–29
- **Separate lanes for adding and reading in the white matter highways of the human brain.** *Nature communications*
Grotheer, M., Zhen, Z., Lerma-Usabiaga, G., Grill-Spector, K.
2019; 10 (1): 3675
- **A preference for mathematical processing outweighs the selectivity for Arabic numbers in the inferior temporal gyrus.** *NeuroImage*
Grotheer, M., Jeska, B., Grill-Spector, K.
2018; 175: 188–200
- **The contribution of surprise to the prediction based modulation of fMRI responses.** *Neuropsychologia*
Amado, C., Hermann, P., Kovács, P., Grotheer, M., Vidnyánszky, Z., Kovács, G.
2016; 84: 105-112
- **Neuroimaging Evidence of a Bilateral Representation for Visually Presented Numbers** *JOURNAL OF NEUROSCIENCE*
Grotheer, M., Herrmann, K., Kovacs, G.
2016; 36 (1): 88-97
- **The relationship between repetition suppression and face perception.** *Brain imaging and behavior*
Hermann, P., Grotheer, M., Kovács, G., Vidnyánszky, Z.
2016
- **Can predictive coding explain repetition suppression?** *Cortex; a journal devoted to the study of the nervous system and behavior*
Grotheer, M., Kovács, G.
2016; 80: 113–24
- **Causal evidence of the involvement of the number form area in the visual detection of numbers and letters.** *NeuroImage*
Grotheer, M., Ambrus, G. G., Kovács, G.
2016; 132: 314–19
- **The relationship between stimulus repetitions and fulfilled expectations** *NEUROPSYCHOLOGIA*
Grotheer, M., Gyula Kovacs, K.
2015; 67: 175-182
- **Repetition probability effects for inverted faces** *NEUROIMAGE*
Grotheer, M., Hermann, P., Vidnyanszky, Z., Kovacs, G.
2014; 102: 416-423
- **Repetition Probability Effects Depend on Prior Experiences** *JOURNAL OF NEUROSCIENCE*
Grotheer, M., Kovacs, G.
2014; 34 (19): 6640-6646