

## BRAINSTEM

### An Update on Language, Literacy and Early Brain Development With information on STEM and the BRAIN



## BRAIN FACTS

### Neurocognitive Linguistics: Sydney H. Lamb

Books: *Pathways of the Brain: The Neurocognitive Basis of Language* and  
*Language and Reality: Selected Writings of Sydney Lamb*

<http://www.ruf.rice.edu/~lngbrain/>

Website at Rice University on Language and the Brain: Neurocognitive Linguistics

## The Connectome Project

<http://www.humanconnectomeproject.org/>

Primary site for the connectome project with links to articles and links to collaborators.

<http://www.whitehouse.gov/the-press-office/2013/04/02/fact-sheet-brain-initiative>

The White House Office of the Press Secretary-m the announcement of the Connectome Project. Includes a Fact Sheet: on the BRAIN Initiative, and has links to many of project collaborators

[http://developingchild.harvard.edu/resources/multimedia/lectures\\_and\\_presentations/mapping\\_brain\\_connectivity/](http://developingchild.harvard.edu/resources/multimedia/lectures_and_presentations/mapping_brain_connectivity/)

Harvard University Center on the Developing Child provides a narrated, 15-minute multimedia presentation sharing results and insights from the work at the Lichtman Lab, using images and videos that show three-dimensional recreations of actual neural connections in the brain and connectivity.

<http://www.youtube.com/watch?v=82tQ4ID-xNg>

Connectomics: Mapping the Brain | Harvard Department of Physics

A lecture by Professor Jeff Lichtman from Harvard Department of Physics. Move through the introductory comments to about 30 minutes and you will see brilliant pictures of neurons in the brainstem, cerebellum, and spinal cord plus great connectome photos.

<http://www.youtube.com/watch?v=0oNHukxz5rl>

How Brains See, a Nature video. Fascinating seeing exactly how brain cells are wired together, giving us new insights into brain function. The researchers who made the 3D maps in this video discovered a new type of cell and worked out how insects see movement.

[http://www.ted.com/talks/sebastian\\_seung.html](http://www.ted.com/talks/sebastian_seung.html)

Professor of Computational Neuroscience at MIT, Sebastian Seung discusses how the study of "connectomes", a comprehensive map of neural connections in the brain, can help turn science fiction into reality.

<http://connectomethebook.com/>

Sebastian Seung's website for his book: *Connectome: How the Brain's Wiring Makes us Who We Are*.

<http://www.liebertpub.com/overview/brain-connectivity/389/>

*Brain Connectivity*: Journal disseminates information on rapidly advancing field of connectivity research, brain mapping, modeling, novel research techniques, new imaging modalities, and the translation of research discoveries from the laboratory to the clinic.

## **NeuroGlia: R. Douglas Fields, National Institutes of Health, and Neuroscience and Cognitive Science Program, University of Maryland, College Park**

Book: *The Other Brain: From Dementia to Schizophrenia, How New Discoveries about the Brain Are Revolutionizing Medicine and Science*

In addition to describing the major types of glia—astrocytes, Schwann cells, oligodendrocytes, and microglia—Fields explores in detail the ways in which they are changing our understanding of the mind. Everything from immune system responses to infection, to insulating axons, to wiring up and rewiring the brain, to recovery from brain disease and injury, may be influenced by impulse activity acting through glia.

<http://www.theotherbrainbook.com/home.php>

Link to website about the book: *The Other Brain*

<http://www.youtube.com/watch?v=hWYa-SzOwes>

TEDxHendrixCollege - Doug Fields - *The Other Brain*

In this talk, Dr. Doug Fields discusses glia, or "glue," which make up 85% of the cells in the human brain. New discoveries about these glial cells are revolutionizing the way that scientists view the brain.

<http://www.youtube.com/watch?v=SR2OtDYuloU>

Neuroglia and the Brain. A brain awareness video contest winner that gives a good overview of the neuroglia in an easy to understand format.

Book: *The Root of Thought: Unlocking Glia--the Brain Cell That Will Help Us Sharpen Our Wits, Heal Injury, and Treat Brain Disease* by Dr. Andrew Koob

In *The Root of Thought*, leading neuroscientist Dr. Andrew Koob reveals what we've learned about these remarkable glia cells, from their unexpected role in information storage to their function as adult stem cells that can keep your brain growing and adapting.

### **General**

<http://www.tedxcaltech.com/>

On January 18, 2013, Caltech hosted TEDxCaltech: The Brain, a forward-looking celebration of humankind's quest to understand the brain, by exploring the past, present and future of neuroscience.

It's worth it just to watch the minute video teaser about the conference.

Click on 'speakers' to find links to the researchers and their topics.

### **Harvard University: National Scientific Council on the Developing Child**

<http://developingchild.harvard.edu/>

In Brief: *The Science of Neglect*

This report explains why when adult responses are unreliable, inappropriate, or simply absent, developing brain circuits can be disrupted, and subsequent learning, behavior, and health can be impaired.

Working Paper #12: *The Science of Neglect: The Persistent Absence of Responsive Care Disrupts the Developing Brain*

This Working Paper explains why significant deprivation is so harmful in the earliest years of life and why effective interventions are likely to pay significant dividends in better long-term outcomes in learning, health, and parenting of the next generation. Discusses the four types of unresponsive care, provides information about neglect, shows statistics about neglect, and presents intervention models.

**Dr. Helen Neville, University of Oregon, Brain Development Lab**

<http://bdl.uoregon.edu/>

Dr Neville continues her program of research to study the effects of a variety of child-focused interventions on brain development and cognition. Her latest research findings were on a parent training program, Parents and Children Making Connections - Highlighting Attention (PCMC-A). Neville and her team worked with the Head Start program in Lane County to help children learn to focus. They also trained parents how to help their children with these skills. The children showed significant improvements in their ability to focus, and they found that when the parents were involved in their children's education the children focused more, performed better, and parents were less stressed.

- ❑ Neville, H., Stevens, C., Pakulak, E., Bell, T.A., Fanning, J., Klein, S. and Isbell, E. (2013). *Family-based training program improves brain function, cognition and behavior in lower socioeconomic status preschoolers*. *PNAS, Early Edition*.
- ❑ Stevens, C., Harn, B., Chard, D.J., Currin, J., Parisi, D., and Neville, H. (2013). *Examining the role of attention and instruction in at-risk kindergarteners: Electrophysiological measures of selective auditory attention before and after an early literacy intervention*. *Journal of Learning Disabilities* 46(1):73-86. PMID:PMC3129372.
- ❑ Hampton Wray, A., Bell, T., Pakulak, E. and Neville, H. (2012). *Preliminary evidence for longitudinal efficacy of a successful parent-child training program in preschool children at risk for school failure*, *Society for Neuroscience* 19, New Orleans.

**Sandra R. Waxman, PhD, Northwestern University**

<http://www.ipr.northwestern.edu/faculty-experts/fellows/waxman.html>

Dr. Waxman's recent work in biological thought explores how notions of the natural world unfold—across development, across cultures, and across languages, exploring fundamental questions, including: What is the place of humans within the natural world? What does it mean to be “alive”? How do children across cultures develop these concepts?

- ❑ Waxman, S.R. 2012. *Social categories are shaped by social experience*. *Trends in Cognitive Sciences* 16(11): 531–32.
- ❑ Waxman, S.R. and A.D. Grace. 2012. *Developing gender- and race-based categories in infants: Evidence from 7- and 11-month-olds*. In *Psychology of Culture: Psychology of Emotions, Motivations, and Actions*, ed. G. Hayes and M. Bryant. Hauppauge, NY: Nova Science Publishers.
- ❑ Taverna, A., S. Waxman, D. Medin, and O. Peralta. 2012. *Core-folk biological concepts: New evidence from Wichí children and adults*. *Journal of Cognition and Culture* 12(3-4): 339–58.
- ❑ Unsworth, S. J., W. Levin, M. Bang, K. Washinawatok, S.R. Waxman, and D.L. Medin. 2012. *Cultural differences in children's ecological reasoning and psychological closeness to nature: Evidence from Menominee and European-American children*. *Journal of Cognition and Culture* 12(1-2): 17–29

<http://ilabs.washington.edu/>

- ❑ Can, D. C., Richards, T. L., & Kuhl, P. K. (2013). *Early gray-matter and white-matter concentration in infancy predict later language skills: A whole-brain voxel-based morphometry study*. *Brain & Language*, 124, 34-44.

The purpose of our study was to examine the whole brain and explore areas associated with infants' language development. The findings support the view that individual differences in gray-matter and white-matter, as early as at 7 months, are associated with language skills (i.e. expressive and receptive) at 12 months.

- ❑ Kuhl, P. K., Coffey-Corina, S., Padden, D., Munson, J., Estes, A., & Dawson, G. (2013). *Brain responses to words in 2-year-olds with autism predict developmental outcomes at age 6*. *PLOS ONE*, 8, e64967.

The study revealed an important link between brain measures of word processing and social function in very young children with ASD. The study revealed that the identified signature for known words in the children with ASD at age 2 years is a powerful predictor of linguistic, cognitive, and adaptive outcomes in all children with ASD many years later, when the children were 4 years of age, and when these same children were 6 years of age.

- ❑ Moon, C., Lagercrantz, H., & Kuhl, P. K. (2012). *Language experienced in utero affects vowel perception after birth: a two-country study*, *Acta Paediatrica*, 102, 156-160.

This two-country study aimed to see whether neonates demonstrated prenatal learning by how they responded to vowels in a category from their native language and another non-native language, regardless of how much postnatal experience the infants had.

## **STEAM: Science Technology Engineering and Mathematics with an A for Art**

### **STEM and Early Childhood Education: Dr Lilian Katz**

<http://education.illinois.edu/people/lqkatz>

Lilian Katz at University of Illinois with links to her publications.

<http://www.youtube.com/watch?v=w0-cOiqkMcw>

University of Illinois video with Lilian Katz

<http://ecrp.uiuc.edu/beyond/seed/katz.html>

Early Childhood Research & Practice article "STEM in the Early Years" by Lilian Katz.

### **BRAIN STEM Resources**

- ❑ Books about brains for adults
- ❑ Books about brains for young children
- ❑ Brain Fun and Exploration for Kids

***Have Fun exploring and using this information. Thank You!***