

Storytelling and the Brain

Dr. Brian Cullen, Nagoya Institute of Technology

cullen.brian@gmail.com

Presented at FAB4, Nanzan University on July 6th, 2013

Please email me for slides, questions, comments, and stories to share!

Listening to stories is a natural part of every person's experience and many teachers have discussed how storytelling can be a powerful pedagogical tool (e.g. Abrahamson, 1998). In a highly readable book, *The Storytelling Animal*, Jonathan Gottschall (2012) explores how evolution has wired our brains for storytelling and how a story powerfully communicates connections between cause and effect, helping us to learn vicariously from other people's experiences and avoid the same mistakes. But what is happening in our brains when we listen to those stories and how can we better utilize the rich potential learnings of stories for our learners?

In *Metaphors We Live By*, George Lakoff (1979) proposed that our entire conceptual meaning system is based around meaning and story. For example, when someone says "I love you", we do not get meaning out of that utterance by using a dictionary definition such as "Love is a deep romantic or sexual attraction", but rather understand it by using metaphors such as "LOVE IS A PHYSICAL FORCE" which leads naturally to metaphorical extensions such as "I can feel the magnetism between us" or "I'm really attracted to you." Of course, we can use multiple metaphors to understand a concept. For example, "LOVE IS A FIRE" leads to "his latest flame" and "I don't want to be burned."

While Lakoff's work was based on linguistic evidence, in a recent book, *Louder than Words*, one of his students called Benjamin Bergen (2012) discusses the ability of modern neuro-imaging techniques such as fMRI and CT scans to show us how sensory words activate the corresponding cortex in the listener's brain (visual, auditory, motor, somato-sensor). When we listen to a PowerPoint bullet-point presentation with typical academic non-sensory language, the Broca's and Wernicke's areas activate in order to transform language into meaning. But listening to sensory language such as stories activates other areas of the brain necessary to actually 'experience' the story. For example, Gonzalez (2006) has showed that a word such as 'cinnamon' activates the same neural area as when a person actually smells cinnamon. Similarly, Boulenger (2012) showed that "the meaning of action words embedded in sentences is reflected by somatotopic activation of precentral motor systems." Oatley (2011) suggests that our brains create a running sensory movie based on the stories we read or hear. These come together in the theory of embodied simulation which suggests that words that we hear or read or even say to ourselves actually create experiences inside our brains.

When we look at mental practice, we can see the effects of this internal experience. Feltz & Landers (2007) describe sports where mental practice has been linked with substantial improved actual practice. Storytelling is one way to create similar mental practice in the classroom which can help students to create rich internal experiences.

How do we know that our stories are actually causing experiences in the students' brains? The neuro-coupling model suggests that a listener's brain actually comes into sync with the storyteller's brain (Stephens et al, 2010), and it demonstrates that the listener is very active in creating internal experiences from the words that echo the storyteller's own brain patterns. Interestingly, the listener can even move ahead of the storyteller at times as they predict what will happen.

As teachers, we can learn a lot from this research. Our words are not just words - as Bergen says, they are "louder than words," and they actually create experiences in our students' minds. We can use this to help our students to learn vicariously through stories or to prepare for future experiences in the world by inducing experiences mentally in the classroom. We can also instill desirable beliefs through story such as "mistakes are important in learning." Neuro-ELT is showing us that our words create experiences and we should choose our words carefully. We can tell them stories of how Taro travelled overseas, or how Tomoko learned English

successfully, or wrap up our lessons in stories about bears or fairies. Even if we simply wrap up our regular content in stories, we get about 30% increase in comprehension (Arya & Maul, 2012). We are storytelling animals!

Some of the Many More Questions

- How does the use of voice in stories show up in neuroimaging studies; e.g. the effect of tempo, pitch, rhythm, dynamics, timbre on the listener's brain.
- Limiting and guiding listener focus (e.g. through storytelling) and a movement from external to internal focus are also characteristics of hypnosis; there is lots of recent research in neuroscience that may be relevant.
- Students seem to forget that they are listening in L2 when they are truly engaged in a story - is there some corresponding neurological shift?
- What are the physical signs of being engaged in a story (e.g. leaning forward, eyes focused on speaker, defocused eyes) - are these signs of underlying neurological changes?
- What stories are useful for your students, i.e. what internal experiences do you want to help them to create in order to learn more effectively?

Key Books

1. Bergen, B. K. (2012). *Louder than words: The new science of how the mind makes meaning*. Basic Books
2. Gottschall, J. (2012). *The storytelling animal: How stories make us human*. Houghton Mifflin Harcourt.
3. Lakoff, G., & Johnson, M. (2008). *Metaphors We Live By*. University of Chicago press.

Some Other References

1. Abrahamson, G. E. (1998). Storytelling as a pedagogical tool in higher education. *Education*, 118.
2. Feltz, D., & Landers, A. (2007). The effects of mental practice on motor skill learning and performance: A meta-analysis. *Essential readings in sport and exercise*.
3. Gonzalez, J., et al. (2006). Reading cinnamon activates olfactory brain regions. *Neuroimage*, 32(2), 906-912. doi:10.1016/j.neuroimage.2006.03.037
4. Stephens, G. J., et al. (2010). Speaker-listener neural coupling underlies successful communication. *Proc Natl Acad Sci U S A*, 107(32), 14425-14430. doi:10.1073/pnas.100866217

For teachers who want to find or share stories as part of a project I have been working on, please visit the website below. There are currently 180 stories for teaching! I also run workshops.

www.standinginspirit.com/metaphors

And if you'd like to send questions, feedback, stories, etc., email me at:

cullen.brian@gmail.com