Science Article

Dr. Marlene Behrmann

Summary

The following project is an article that I wrote for a science writing course. For this project, we were asked to write an article that highlighted the works of Dr. Marlene Behrmann and provide a journalistic approach to the article.

The purpose of the article was to highlight the notable feats of Dr. Behrmann's work, but also tie in a narrative that would help the audience move through the entirety of the article. I pulled from a personal story to create an emotional impact.

I wrote two versions of this article with the final draft shown below. [1, 2,3,4,5]

Intended Audience

Client:	Mark Roth - Carnegie Mellon University Science Writing Course Instructor
Recipient:	Mark Roth - Carnegie Mellon University Science Writing Course Instructor

Completed Tasks

- Researched a Dr. Behrmann and her work
- Interviewed for the development of the article
- Categorized notes
- Wrote a lead
  - Quote/Emotion ending
- Drafted twice
- Workshopped
- Elaborated on specifics

Developed Skills

- Revising and Editing
- Research
- Interview Process
- Organization and Structure
- Effective Leads and Endings
- Writing for a Lay Audience
- Information Architecture
- Science Communication
- Journalism Tactics

(Re)Wired Brain

I sit on a stack of weights as my sister, barely three inches over five feet, hoists a barbell loaded with more weight than her body up over her head and sinks into a squat. Each excruciating second sends a bead of sweat to the ground, and I wait for something to snap. She eases back into a standing position like nothing and steps forward, letting the weight drop to the ground behind her. I wince with the clatter. "Your turn." She says as she rolls the barbell with her toes.

Looking at her no one would ever expect that at one point she had experienced seizures daily when she was 11 years old. She is in peak condition, minus the small portion of her brain that was cut into to remove a cavernous angioma in the temporal lobe.

Hearing Carnegie Mellon University's Dr. Marlene Behrmann talk about the eight kids with partial sections of their brains removed and the complete recovery she witnessed after analyzing them, I couldn't help but wonder if the neural plasticity she spoke about so adamantly played was a significant role in my sister's recovery of her own neural abilities.

My sister's journey, after the removal of the swelling and bleeding clump of veins (the angioma), started with classes that helped her brain relearn how to communicate between the hemispheres. She used the NeuroGeniSys Procedure program 4 months after her surgery in 2007 to teach her brain to regulate her emotions and relearn concepts, like number recall. The program is a process developed by Crossroads Institute, in Phoenix Arizona, which identifies dysfunctional areas of the brain and recommends plans to assists in correcting issues appropriately.

It allowed my sister's brain to create neural pathways and strengthen communication of the right and left hemispheres. The reframing of neural pathways aided her recovery in processing sensory information and allowed her to work equations, recall memorization tactics, and analyze all visual cues on a computer screen. The program aided the right hemisphere's neural reconstruction with the left, and Dr. Behrmann's discussion made me realize that plasticity played a key role.

Research understand that the retina, a section in the back of the eye, picks up the light of our visual environment and sends it to the brain. These neural signals are then interpreted, and we recognize the input that our eyes see. The world of science knows a lot about the visual complexities of the eye and even the molecular and cellular composition of the brain, the multiple layers of the architectural structure. But what Dr. Behrmann argues, is that rich visual behavior is an emergent property of the neural system. That to explore the question of "how this meaningful comprehension of the world occurs" she must select a particular domain for investigation and this domain was face recognition.

For Dr. Behrmann, her research on facial recognition, most notably prosopagnosia, or "face blindness," is purely scientific, a way to learn how the brain processes visual information. "It seemed like an appealing way to get some leverage on the thorny problem of understanding how the brain really works to give rise to knowledge of such rapid and efficient visual performance," Dr. Behrmann explains. "I will add it was hard to gain information [on the] brain. The students who participated [early on] in my studies, [were] not willing to have their heads cut open."

But research done solely for science led her to compelling stories from patients. People's perceptual failures, and how those shortcomings changed their lives kept her motivated.

She began with patients whose facial recognition was normal, but who then lost the ability to recognize others because of brain trauma or a stroke. That led her into the realm of those who never developed face recognition skills in the first place. Those patients gave rise to the question: how does the brain develop face recognition?

From these subjects, her research moved on to children who had the parts of their brains removed that play a preeminent role in facial recognition. They shouldn't any longer have had the brain tissue to be able to recognize faces. However, in most cases, the children's brains were able to rewire themselves to retain face recognition abilities.

"It turns out that these kids actually do really well, they recover," she said. "Adults with even smaller lesions do not recover the ability to recognize faces. But these kids with whopping sized lesions or dissections do. There's something really provocative about that; something sort of intellectually intriguing and unnerving– but it speaks to the plasticity of the developmental system and sort of the lack of plasticity in adulthood."

Conversing with Dr. Behrmann prompted me to dig further into my sister's surgery. The surgery eliminated the seizures, and besides the need for acupuncture and a regime of vitamins, her emotions are under control. She has expressed confusing colors, such as orange with green, but it isn't a continuous problem. Likely resurfacing on occasion due to the proximity of the surgery to the visual recognition area of the brain.

The part of the brain associated with face recognition is the fusiform gyrus, and while the location of my sister's cavernous angioma, a mass of swelling and hemorrhaging vessels, wasn't exactly in the face recognition area, it was extremely close. Yet my sister's ability to recognize faces was unaffected, and Dr. Behrmann's work helps explain why.

Her research showed that younger patients always recovered pretty fully, unless the brain showed extensive alterations, such as irreparable damage from issues with brain development or massive lesions, as she had seen in two other children. According to Dr. Behrmann, there is no exact cutoff point for the brain's ability to reorganize itself, but younger is always better.

As Dr. Behrmann moves forward in her research, she hopes that she can get a handle on some of the crucial questions about the limits of plasticity. “The idea is that if we test enough [children], we can begin to sort of examine whether or not there are patterns in the group that will allow us to answer some of these really difficult questions.”

She shifts her weight forward. “Actually I'm excited about this. We have a four-year-old kid who is coming from out of town to be scanned. He's the first kid we'll have scanned who's had an entire hemisphere removed.”

Her ability to study children with partial brain removal is fairly recent. A past neurologist at UPMC Children’s Hospital showed no interest in helping with her research, so she focused on adults who suffered from prosopagnosia. Eventually, a new pediatric neurosurgeon arrived who quickly opened the path that she had wanted to start for over ten years.

That allowed her to find patients that fit the criteria for further examination. “We'll take everybody into this study and [determine] the prognosis [of] function depending on how big their resection is.”

Perhaps my sister would be a good candidate for Dr. Behrmann’s research. What would Dr. Behrmann find behind the faint scar along the right side of my sister’s skull? The white tissue almost invisible in front of her ear.

“You’ve got the personal side to my research.” She says to me.

For Dr. Behrmann, the challenge is in the very complexity of the problem of how the brain constructs visual information. “For me, I think Einstein said something like, if you're a scientist and you are trying to find the answer to a question you might as well try and find the answer to a hard problem rather than a simple one. You know you're in for the long run; you might as well be in for the complexity.”

[1]Behrmann, Dr. Marlene. “Science Writing: Dr. Marlene Behrmann.” Carnegie Mellon University, Pittsburgh, 5 Mar. 2019.
[2]“NeuroDevelopment Program.” CrossRoads Institute, 1 Apr. 2019, www.crossroadsinstitute.org/neurodevelopment.html.

[3]“NeuroGeniSys Procedure.” CrossRoads Institute - NeuroGeniSys Procedure, 5 Apr. 2019, www. crossroadsinstitute.org/neurogenisys-procedure.html.

[4]Parvizi, Josef et al. “Electrical stimulation of human fusiform face-selective regions distorts face perception” Journal of neuroscience : the official journal of the Society for Neuroscience vol. 32,43 (2012): 14915-20.

[5]Van Nortwick, Ana Karina, and Dr. Marlene Behrmann. “Neural Plasticity.” 21 Mar. 2019.