



11/3: R2 PROOF



"The findings are actually shocking and straightforward," says Behrmann, shown left. Granovetter is shown right.

Overheard The brains of kids are astonishingly plastic, it turns out.

Despite scientists' best efforts to inject nuance into the idea, there remains a certain dogged determination in the general public to describe people as "left-brained" or "right-brained," to squeeze personality and inclinations into discrete sections of the noggin. *Are you more analytical? You must be left-brain dominant, the thinking goes. Creative? That's coming from the right side.*

And, to some extent, scientists do tie function to brain hemispheres.

Adults who've suffered significant brain trauma—stroke or traumatic brain injury, for instance—can experience a profound loss of ability to recognize words or faces, depending on where the lesion happens.

New research out of Pitt and Carnegie Mellon, however, suggests that for children, each hemisphere is plastic and capable of mimicking the other when necessary.

The work will shed new light on how brains work and develop.

In an article published online in October in PNAS, **Marlene Behrmann**, PhD professor of ophthalmology who recently joined Pitt from CMU, and **Michael Granovetter**, a PhD and med student in Pitt's Medical Scientist Training Program, showed that younger patients with just one hemisphere were able to perform surprisingly well on tasks typically associated with the opposite hemisphere.

What's the context of your research?

Marlene Behrmann: We wondered, what can one brain hemisphere do? And does it matter if your one hemisphere is just the left hemisphere or just the right hemisphere?

The thinking was, that as the brain matured, and function was already assigned to particular regions, those functions became more consolidated. There was no brain area that was lying fallow, that could take over a new function. You couldn't recruit anything. Everything already had a job.

We do know now, and prior to the study, that the left hemisphere has some superiority in recognizing words, and the right hemisphere has some superiority in recognizing faces.

We examined children with only a single hemisphere, when the other hemisphere had been removed surgically because it was giving rise to very frequent epileptic seizures. [The mean age of children hav-

ing the procedure was 5 and a half.] They all basically grew up with one hemisphere.

What were some of the key findings in your study?

MB: Here we've got kids that don't have just a small lesion, they've got a walloping lesion—the whole hemisphere is gone. If it were the case that the hemispheres were kind of preprogrammed, then you might expect that if the left hemisphere is missing, these kids would never learn to read words. And if the right hemisphere was missing, they'd never learn to recognize faces.

The findings are actually shocking and straightforward: It doesn't matter if the preserved hemisphere is the left one or the right one. When we test the face and word recognition abilities of these patients, they score at about 80% accuracy for both words and faces, in a single hemisphere, and it doesn't matter which hemisphere. This is the shocking part: If you've only got 50% of your brain, you still perform at roughly 80% accuracy.

What are some of the clinical implications?

Michael Granovetter: At the surface of it, you can imagine it being a very shocking and difficult conversation to tell the parents of a 2-year-old child that one of their options for treatment is to remove a large portion, if not the entire hemisphere, of their child's brain. There's a lot of questions that clearly come to mind.

We know that these surgeries very often are curative of children's seizures. You could be on medications for many, many years and continue to have seizures, whereas we know that surgery can in many cases—not all—alleviate patients of these seizures such that they can live a healthy, happy childhood. So the question is less about seizure-freedom when it comes to these procedures, but the question any parent would want to know, and that the medical team takes into very careful consideration, is cognitive outcomes, and quality-of-life outcomes.

This study doesn't answer those questions definitively, but it does attest to a certain amount of plasticity of the child brain to move us one step forward to provide more clear reassurance to families going through this very difficult decision in their child's life. —Evan Bowen-Gaddy