The Backwards BIKE

This bike has a twist—when you turn the handles left, the wheel turns right.

by Sarah Roggio

Think grown-ups are better at everything than kids? Think again.

Destin Sandlin is a rocket engineer. He's smart and funny and makes science videos for a website called Smarter Every Day. So he thinks he has a pretty good brain.

One day, a welder at Sandlin's job decided to play a little joke. He built a bike with a twist: when you turn the handlebars to the right, the wheel goes left. When you turn the handles left, the wheel goes right.

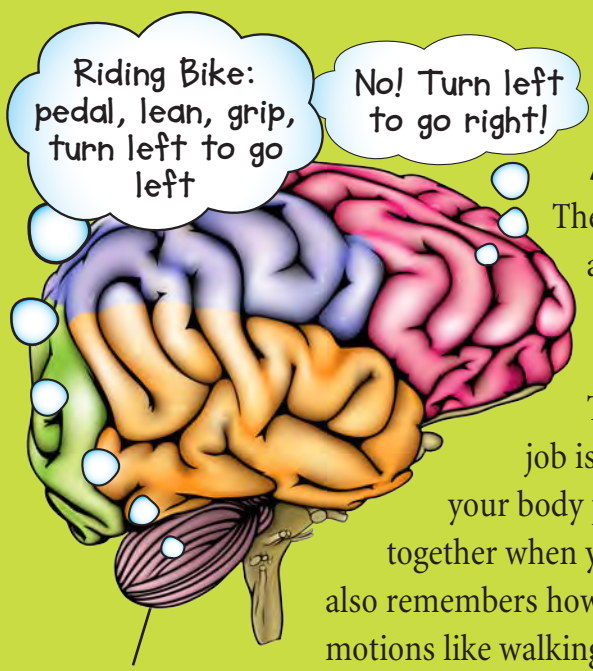
Ha ha! Very funny. But that shouldn't be too hard to ride, right? Once you know the trick, you just have to tell yourself to turn left to go right, or right to go left. Right?

But Sandlin soon found that it wasn't so easy. In fact, it was impossible! Every time he tried to make the bike go straight, he wobbled and fell over. Finally he gave up and took it home.

What was going on? Why couldn't he ride the bike?

STILL A MYSTERY

What makes some people naturally better than others at certain things?



The cerebellum keeps your body balanced and sends commands to body parts when you move. Its name means "little brain"—but although it's small, it contains half of all your brain cells.

The Brain's Autopilot

The answer lies in a special part of the brain called the cerebellum. The cerebellum's job is to keep all of your body parts working together when you move. It also remembers how to do complex motions like walking or swimming.

Riding a bike is actually pretty complicated. You have to push down on the pedals, balance, steer, hold the brakes, and look ahead—all at the same time. How does *anyone* do it? Practice!

If you keep doing the same motions together over and over, like when you practice riding a bike, after awhile your cerebellum will store them as a new, single action: "ride bike." Once an action bundle is stored, you can do it automatically, without thinking. When you walk, you don't have to decide to raise one leg, then set it down, then raise the other. Instead, you just think "walk forward"—and your cerebellum autopilot handles all the details.

But there's a downside, as Sandlin discovered. Once stored, these routines are hard to unlearn. Whenever he got on a bike, his cerebellum started up the "ride bike" set of motions—which didn't work on the backwards bike.

Sandlin was curious—could he learn a new way to ride a bike?

He practiced for five minutes every day in his driveway. "My neighbors made fun of me," Sandlin says. "I had many wrecks." Day after day, week after week. For eight months! Then, suddenly, one day he *could* ride the backwards bike! "It was like I could feel some kind of pathway in my brain that was now unlocked," he says.

New Brains for Old

To learn to ride the backwards bike, Sandlin had to overwrite his brain's "ride bike" motion

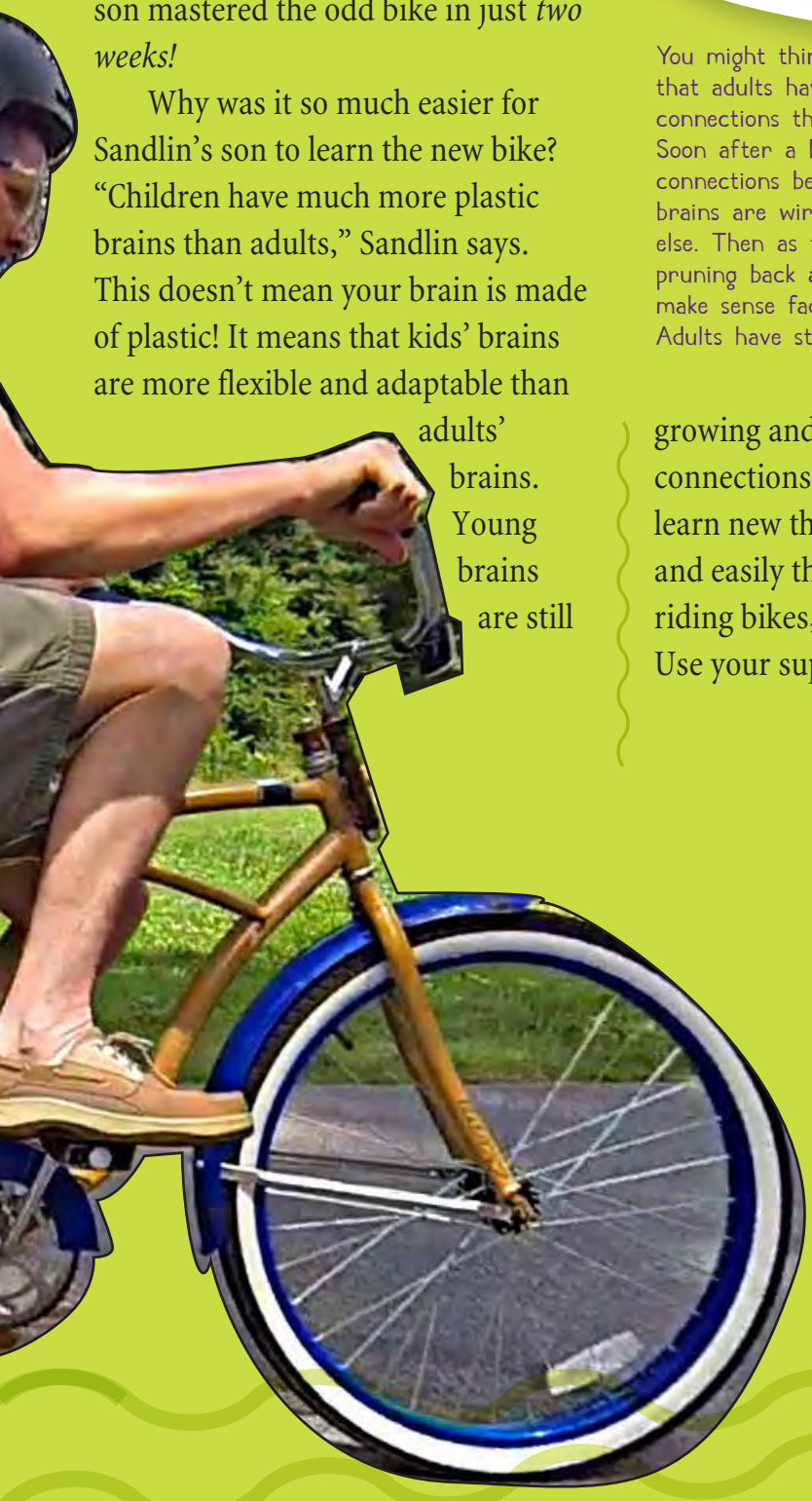
Marvin and Rats with Plush's wagon.

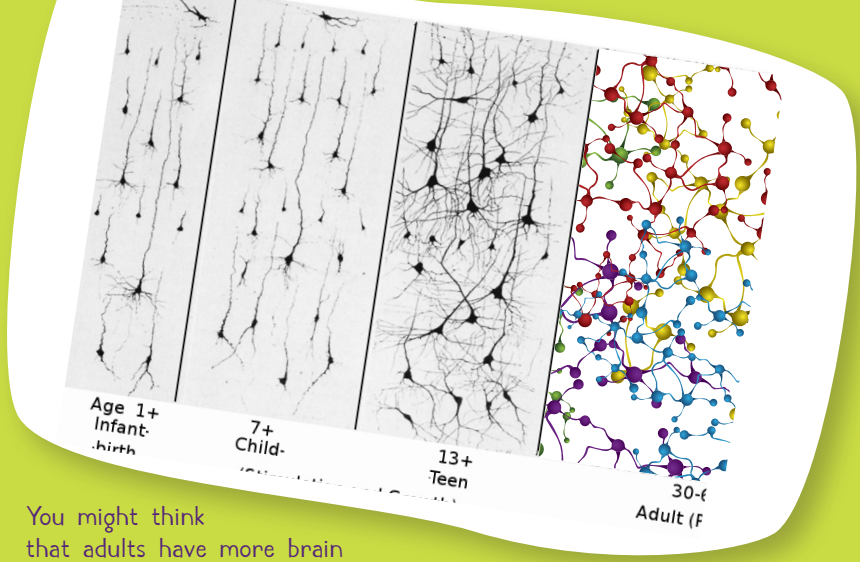
Ha ha! I switched the front wheels with the back!

memory and make a new one. That's hard—but it can be done.

But Sandlin was in for another surprise. He had a small backward bike made for his five-year-old son, who had already learned to ride an ordinary bike. But unlike Sandlin, his son mastered the odd bike in just *two weeks!*

Why was it so much easier for Sandlin's son to learn the new bike? "Children have much more plastic brains than adults," Sandlin says. This doesn't mean your brain is made of plastic! It means that kids' brains are more flexible and adaptable than adults' brains. Young brains are still growing and have many more connections between neurons, so kids learn new things much more quickly and easily than adults—not just riding bikes, but all kinds of things. Use your superpower wisely!





You might think that adults have more brain connections than kids. But the opposite is true! Soon after a baby is born, his or her brain starts making connections between neurons as it explores the world. Toddlers' brains are wired up like crazy—everything connects to everything else. Then as the brain matures and learns more, it actually starts pruning back all those crazy connections. The ones that don't make sense fade, and pathways that get used a lot get stronger. Adults have stronger pathways, but fewer of them.

Plush walking away with wagon.

Marvin saying to Rats: Uh... I know, what if we swap the left wheels with the right wheels?

Once Sandlin had mastered the backward bike, he found that he couldn't ride a normal bike anymore! It took 20 minutes of trying before his brain remembered how. "I felt like the only person on the planet who had ever unlearned how to ride a bike," Sandlin says.