YOU CAN GROW YOUR BRAIN
By Lisa Blackwell

New Research Shows the Brain Can Be Developed Like a Muscle

Many people think of the brain as a mystery. We don’t often think about what intelligence is or how it works. And when you do think about what intelligence is, you might think that a person is born either smart, average, or dumb—either a “writer” or not—and stays that way for life. But new research shows that the brain is more like a muscle—it changes and gets stronger when you use it. Scientists have been able to show just how the brain grows and gets stronger when you learn.

Everyone knows that when you lift weights, your muscles get bigger and you get stronger. A person who can’t lift 20 pounds when they start exercising can get strong enough to lift 100 pounds after working out for a long time. That’s because muscles become larger and stronger with exercise. And when you stop exercising, the muscles shrink and you get weaker. That’s why people say “Use it or lose it!” But most people don’t know that when they practice and learn new things, parts of their brain change and get larger, a lot like the muscles do. This is true even for adults. So it’s not true that some people are stuck being “not smart” or “not math people.” You can improve your abilities a lot, as long as you practice and use good strategies.

Inside the outside layer of the brain—called the cortex—are billions of tiny nerve cells, called neurons. The nerve cells have branches connecting them to other cells in a complicated network. Communication between these brain cells is what allows us to think and solve problems. When you learn new things, these tiny connections in the brain actually multiply and get stronger. The more you challenge your mind to learn, the more your brain cells grow. Then, things that you once found very hard or even impossible to do—like speaking a foreign language or doing algebra—become easier. The result is a stronger, smarter brain.

How Do We Know That The Brain Can Grow Stronger?

Scientists started thinking the human brain could develop and change when they studied adult animals’ brains. They found that animals who lived in a challenging environment, with other animals and toys to play with, were different from animals who lived alone in bare cages. While the animals who lived alone just ate and slept all the time, the ones who lived with different toys and other animals were always active. They spent a lot of time figuring out how to use the toys and how to get along with other animals.

The researchers then studied the brains of the animals living in a challenging environment. These animals had more connections between the nerve cells in their brains. The connections were bigger and stronger, too. In fact, their whole brains were about 10% heavier than the brains of the animals who lived alone without toys. The adult animals who were exercising their
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brains by playing with toys and each other were also "smarter"—they were better at solving problems and learning new things.

**Children's Brain Growth**

Another thing that got scientists thinking about the brain growing and changing was babies. Everyone knows that babies are born without being able to talk or understand language. But somehow, almost all babies learn to speak their parents' language in the first few years of life. How do they do this?

From the first day they are born, babies are hearing people around them talk—all day, every day, to the baby and to each other. They have to try to make sense of these strange sounds and figure out what they mean. In a way, babies are exercising their brains by listening hard. Later, when they need to tell their parents what they want, they start practicing talking themselves. At first, they just make goo-goo sounds. Then, words start coming. And by the time they are three years old, most can say whole sentences almost perfectly.

Once children learn a language, they don't forget it. The child's brain has changed—it has actually gotten smarter. This can happen because learning causes permanent changes in the brain. The babies' brain cells get larger and grow new connections between them. These new, stronger connections make the child's brain stronger and smarter, just like a weightlifter's big muscles make them strong.

**The Key to Growing the Brain: Practice!**

Scientists have recently shown that adults can grow the parts of their brains that control their abilities—like the ability to do math or even to juggle. In one study, scientists found a group of adults who were not jugglers. They taught half how to practice juggling in the right way. These people practiced for a long time and got much better at juggling. The other half didn't practice, and didn't get better.

Next, the scientists used a brain scanner to compare the brains of the two groups of people. They found that the people who learned how to juggle actually grew the parts of their brains that control juggling skills—the visual and motor areas. Their brains had changed, so they actually had more ability.

This was surprising because these people said before the study that they couldn't juggle—just like some people say they're "not good at math." But when they learned good strategies for practicing and kept trying, they actually learned and grew their brains.

This can happen because learning causes permanent changes in the brain. The jugglers' brain cells get larger and grow new connections between them. These new, stronger connections make the juggler's brain stronger and smarter, just like a weightlifter's toned muscles.

![In Yellow: Parts of the brain that grew when adults learned to juggle](doi:10.1371/journal.pone.0002669.g001)

Scientists have also found that learning to juggle is a lot like getting better at math or reading. When people learn and practice new ways of doing algebra or writing, it can grow their brains—even if they haven't done well in math or English in the past. Strengthening the "writing" part of your brains usually happens when you try hard on challenging assignments. But it's not just about effort. You also need to learn skills that let you use your brain in a smarter way.

If you use a bad strategy, you may not learn—even if you try hard. A few people study for math by doing the same set of easy problems and skipping the hard ones, or just re-reading the
textbook, because it feels easier. Yet when it comes time to do the test, they don't do well because they didn't work on problems that stretched their brains and taught them new things. When this happens, they may even say "I'm just not smart at math."

But the truth is that everyone can become smarter at math if they practice in the right way. If a weight lifter watched other people exercise all day long, he wouldn't get any stronger. And if someone tried to learn how to juggle by just reading a book about juggling, they wouldn't learn. You actually have to practice the right way—and usually that means the hard way—to get better at something. In fact, scientists have found that the brain grows more when you learn something new, and less when you practice things you already know.

This means that it's not just how much time and effort you put in to studying math, but whether, when you study, you learn something new and hard. To do that, you usually need to use the right strategies. People often learn those good strategies from others, like teachers or students who do well. Luckily, strategies are easy to learn if you get help.

The Truth About “Smart” and “Dumb"

No one thinks babies are stupid because they can’t talk. They just haven’t learned how to yet. But some people will call a person dumb if they can’t solve math problems, or spell a word right, or read fast—even though all these things are learned with practice. And the more a person learns, the easier it gets to learn new things—because their brain “muscles” have gotten stronger. This is true even for adults who have struggled for a long time to learn something. Dr. Wittenberg, a scientist from Wake Forest University, said “We used to think adults can’t form new brain connections, but now we know that isn’t true... The adult brain is like a muscle, and we need to exercise it.”

The students everyone thinks as the “smartest” may not have been born any different from anyone else. But before they started school, they may have started to practice reading. They had already started to build up their “reading muscles.” Then, in the classroom, everyone said, “That’s the smartest student in the class.” They don’t realize that any of the other students could learn to do as well if they exercised and practiced reading as much. Remember, all of those other students learned to speak at least one whole language already—something that grownups find very hard to do. They just need to build up their “reading muscles” too.

People who don’t know this can miss out on the chance to grow a stronger brain. They may think they can’t do it, or that it’s too hard. It does take work to learn, just like becoming stronger physically or becoming a better juggler does. Sometimes it even hurts! But when you feel yourself get better and stronger, you realize that all the work is worth it!

References

About the Author:
Dr. Blackwell has a background in education including leadership coaching as well as design and delivery of professional development in data analysis, curriculum design, intervention program design, implementation and impact assessment. Dr. Blackwell has been featured in Time Magazine, New York Magazine, Good Morning America, National Public Radio programs, as well as in scholarly publications. She holds a Ph.D. in Psychology from Columbia University.