

## 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. When you do think about what intelligence is, you might think that a person's intelligence is pre-determined at birth – either you are a “math person” or not – and stays that way for life. 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 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. Muscles become larger and stronger with exercise. When you stop exercising, muscles shrink and you get weaker. That's why people say “use it or lose it.”

Most people don't know that when they practice and learn new things, parts of their brain change and get larger just like muscles. This is true even for adults. So, it's not true that some people “just can't learn”. You can improve your abilities as long as you practice and use good strategies.

Inside the outer layer of the brain – 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. , Things 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 animal's brains. They found that animals who lived in a challenging environment with other animals and toys 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 the other animals.

Closer examination found these animals had more connections between nerve cells in their brains. The connections were bigger and stronger, too. In fact, their whole brains was about 10% heavier than the brain of animals living alone without toys. The adult animals who exercised their brains by playing with toys and each other were also “smarter” – they were better at solving problems and learning new things.

## Can adults grow their brains?

Scientists have recently shown that adults can grow the parts of their brains that control abilities – like the ability to do math or 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 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 juggler's 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 weight-lifter's toned muscles.

## The truth about “smart” and “dumb”

People aren't “smart” or “dumb” at math. At first, no one can read or solve equations. But with practice, they can learn to do it. The more a person learns, the easier it gets to learn new things – because their brain “muscles” grow 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 couldn'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.”

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. When you feel yourself get better and stronger, you realize that all the work is worth it.

## A formula for growing brain: Effort + Good strategies + Help from others

Scientists found that learning to juggle is a lot like getting better at math. When people learn and practice new ways of doing algebra or statistics, they can grow their brains – even if they haven't done well in math in the past.

Strengthening the “math” part of your brain usually happens when you try hard on challenging math problems. To grow your brain, you 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. When it comes time to do the test, they don't do well because they didn't work on the problems that stretched their brains and taught them new things. When this happens, they may even say “I'm just not smart at math.”

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, would he get stronger? 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. Luckily, strategies are easy to learn if you get help.

Over the course of the upcoming year, connect with the Office of Student Success to explore and practices strategies to grow your brain.

## References

A similar version of this article was written by Lisa Blackwell and can be downloaded [here](#).

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