National Geographic Daily News

Math Can Be Truly Painful, Brain Study Shows

For math-phobes, anticipation of math work activates pain centers in brain.

Newsletters »

Actually doing math, as a girl in Cambodia does here, seems to be less painful than contemplating it.

Photograph by Justin Guariglia, National Geographic

Jeremy Berlin
for National Geographic News

Published November 8, 2012

Does the thought of 1+1=ouch?

If you hate math, it might—literally. According to a new study, the mere prospect of a math problem causes pain centers to light up in number-phobic brains.

Researchers at the University of Chicago measured the neural activity of 28 adults—14 who'd been identified with high math anxiety and 14 with low math anxiety. Each subject was given a series of word and math questions (some of which are below) while his or her brain was scanned.

Result: When those in the high-anxiety group saw a math task was coming, their dorso-posterior insulas and mid-cingulate cortexes—the parts of the brain that perceive pain and bodily threats—reacted as if the subject's hand had been burned on a hot stove. Those in the low-anxiety group showed no such response.

(Related: "Electric Jolt to Brain Boosts Math Skills.")

MORE FROM NAT
Total Solar Ec
Among Most F
Visible Online

What's more, said study co-author Ian Lyons, "the anxiety occurred only during antic did the math problems, they didn't seem to experience pain. That suggests it's not the thought of it that's painful."

Previous studies have shown that psychologically stressful events—like the end of a romantic relationship—can cause physical discomfort. This study, published last week by Lyons and co-author Sian Beilock in the journal *PLOS ONE*, may be the first to show that anticipation alone can register in the brain as pain. (See brain pictures.)

"It's purely a psychological interpretation," Lyons said. "Math is just numbers on a page—there's no way that they can actually hurt you."

Still, he says, "People who have high math anxiety typically do badly at math, on everything from SAT scores to laboratory tasks. And they tend to avoid math-related career paths."

(See "Mental Math Linked to Eye Motion, Brain Scans Show.")

Could some of us have evolved that way?

"We don't think so," Lyons said. "Math is a relatively recent cultural invention—it's just a few thousand years old. So this response seems to be driven by a person's direct experiences. But if those experiences have been bad, the person interprets the notion of math as being threatening, and in this case, even painful."

(Related: "Monkeys Can Subtract, Study Finds.")

Lyons thinks his team's findings might apply to things beyond math. "We would not at all be surprised to see this generalized to other phobias—fear of heights, for instance—or other types or testing anxiety."

Can anything quell a math hater's brain pain?

"The initial step is to get over the anxiety," Lyons said. And this is one case where practice doesn't make perfect: "If you're math-anxious, just doing piles of math homework isn't a good idea. But finding a way to be more comfortable with the idea of math is."

Does fear of math hurt your head?

Take this quiz and see. (Note: In the actual experiment, problems were presented one at a time. Each one had to be solved in five seconds. And participants couldn't use scratch paper—they had to solve everything in their heads.)

1) Does 8×9-16=56?

2) Does 7×8-19=37?

3) Does 5×9-16=27?

4) Does 8×5-19=23?

5) Does 6×7-17=27?

6) Does 9×4-17=19?

Scroll for answers.

More: Read "Beyond the Brain" from National Geographic magazine >>

Answers

1. *yes*
2. *yes*
3. *no*
4. *no*
5. *no*
6. *yes*

(0)

Like 1k 1.5K 47

More »

© 1996-2012 National Geographic Society. All rights reserved.