

Probing Question: Are boys really better at math than girls?

May 20 2010, By Chris Tachibana

In 1992, Mattel sparked a nationwide debate about math and gender when the company released "Teen Talk Barbie." Among the doll's 270 phrases were "Math class is tough!" (often misquoted as "Math is hard"), along with "Will we ever have enough clothes?" and "I love shopping!" In response to criticism, Mattel changed the doll's offending phrases a few months later.

But was there any truth to Barbie's observation? We know that 90 percent of engineers in the United States are male. Is [math](#) more difficult for girls than boys?

"For math in general, I don't think there's much cognitive difference between boys and girls," said Lynn Liben, a psychology professor at Penn State who studies how stereotyping affects educational and career choices.

"However, one relevant area does show gender differences," she said, "and that is spatial thinking." This is the skill used in aptitude tests and puzzles that ask how a two-dimensional drawing of a Tetris-like object would look if rotated or how a flat object would look if folded along dotted lines. It's especially important for geometry and calculus, and for mathematical applications like computer imaging.

Neuroscience research, including MRI studies of male and female brains, suggests that [brain function](#) -- along with related hormonal differences -- creates a tendency for males to have better spatial thinking skills, and females to be stronger in some realms of verbal expression.

Females even tend to use verbal strategies in spatial thinking, whereas in most male brains, verbal and spatial thinking are more distinct. Liben and colleagues published a study in 2008 suggesting that babies as young as three months old show [gender differences](#) in spatial thinking. For the study, researchers showed babies images of the number 1 at various angles. Then, each baby was simultaneously shown two new images, the number 1 at an angle they hadn't seen before, and a mirror image of the number 1.

By monitoring how long the babies looked at each image, the scientists could tell which babies found the new rotated image uninteresting, because it was just another in the series they had just seen. Babies who understood that the mirror image didn't belong in the series, stared at it longer. Boy babies, on average, looked significantly longer at the mirror image. "We had 12 boys and 12 girls," said Liben, "and 11 of 12 boys, and five of 12 girls looked longer at the mirror image." Liben stressed that although the data showed a significant group difference, some girl infants behaved like most of the boys.

Noted Liben, spatial thinking is just a single math-related skill.

"If you look at math achievement, for example in coursework, girls do as well as boys." She and others have found that stereotypes about girls and math affect a student's motivation to study it. "If girls think they don't do well in a subject, they have a diminished interest in it."

With psychologist Margaret Signorella at Penn State Greater Allegheny and engineer Sheryl Sorby at Michigan Tech, Liben is developing a program that will teach spatial skills to middle school students, to see if that increases not only their spatial skills, but also their interest in taking math and science courses and pursuing math and science careers.

Liben said families and schools should recognize that spatial thinking is

a skill that is just as important as reading. If we want our children -- [boys](#) and [girls](#) alike -- to have this skill, "start with blocks, puzzles, building toys, and shape-sorting toys. These all encourage spatial thinking." Keep it up, and those lonely male engineers will soon have a few more female colleagues.

Provided by Pennsylvania State University

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