

# Want to solve a problem? Don't just use your brain, but your body too

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When we've got a problem to solve, we don't just use our brains but the rest of our bodies, too. The connection, as neurologists know, is not unidirectional. Now there's evidence from cognitive psychology of the same fact. "Being able to use your body in problem solving alters the way you solve the problems," says University of Wisconsin psychology professor Martha Alibali. "Body movements are one of the resources we bring to cognitive processes."

These conclusions, of a new study by Alibali and colleagues—Robert C. Spencer, also at the University of Wisconsin, and Lucy Knox and Sotaro Kita of the University of Birmingham—are augmented by another, counter-intuitive one – even when we are solving problems that have to do with motion and space, the inability to use the body may force us to come up with other strategies, and these may be more efficient.

The findings will be published in an upcoming issue of *Psychological Science*, a journal of the Association for Psychological Science.

The study involved two experiments. The first recruited 86 American undergraduates, half of whom were prevented from moving their hands using Velcro gloves that attached to a board. The others were prevented from moving their feet, using Velcro straps attached to another board. The latter thus experienced the strangeness of being restricted, but also had their hands free. From the other side of an opaque screen, the experimenter asked questions about gears in relation to each other—e.g., "If five gears are arranged in a line, and you move the first gear

clockwise, what will the final gear do?" The participants solved the problems aloud and were videotaped.

The videotapes were then analyzed for the number of hand gestures the participants used (hand rotations or "ticking" movements, indicating counting); verbal explanations indicating the subject was visualizing those physical movements; or the use of more abstract mathematical rules, without reference to perceptual-motor processes.

The results: The people who were allowed to gesture usually did so—and they also commonly used perceptual-motor strategies in solving the puzzles. The people whose hands were restrained, as well as those who chose not to gesture (even when allowed), used abstract, mathematical strategies much more often.

In a second experiment, 111 British adults did the same thing silently and were videotaped, and described their strategies afterwards. The results were the same.

The findings evince deeper questions about the relationship of mind and body and their relationship to space, says Alibali. "As human thinkers, we use visual-spatial metaphors all the time to solve problems and conceptualize things—even in domains that don't seem physical on their face. Adding is 'up,' subtracting is 'down.' A good mood is 'high,' a bad one is 'low.' This is the metaphoric structuring of our conceptual landscape."

Alibali, who is also an educational psychologist, asks: "How we can harness the power of action and perception in learning?" Or, conversely: What about the cognitive strategies of people who cannot use their bodies? "They may focus on different aspects of problems," she says. And, it turns out, they may be onto something the rest of us could learn from.

**More information:** "Spontaneous Gestures Influence Strategy Choices in Problem Solving", *Psychological Science*.

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