Gestures provide a helping hand in problem solving

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Talking with your hands can trigger mental images that help solve complex problems relating to spatial visualization, an important skill for both students and professionals, according to new research published by the American Psychological Association.

Spatial visualization is the ability to mentally rotate or move an object to a different position or view. An air traffic controller uses spatial visualization to mentally track planes in the air based only on a two-dimensional radar screen. An interior decorator needs spatial visualization to picture how a living room will look with a sofa in different positions without actually moving the sofa.

"Hand gestures are spontaneous and don't need to be taught, but they can improve spatial visualization," said psychologist Mingyuan Chu, PhD, who conducted the research with psychologist Sotaro Kita, PhD, at the University of Birmingham in England. "From Galileo and Einstein to da Vinci and Picasso, influential scientific discoveries and artistic masterpieces might never have been achieved without extraordinary spatial visualization skills."

The research findings appear in the February issue of the Journal of Experimental Psychology*: General*. Three studies examined the relationship between hand gestures and spatial visualization using various mental rotation tests:

- In the first experiment, 132 students at the University of Birmingham were tested individually. Using a hidden camera, researchers recorded the number of hand gestures and found that spontaneous gestures increased as the problems became more difficult.

- A second experiment divided 66 students into three groups. One group was encouraged to use gestures, the second was given no instructions, and the third had to sit on their hands to prevent any gestures. The gesture-encouraged group performed significantly better on the tests than the other groups and also fared better on later tests where all of the participants had to sit on their hands, showing that the benefits of gestures may become internalized.

In a final experiment with 32 students, a gesture-encouraged group performed better on several tests, which demonstrated that gestures may help solve a range of spatial visualization problems.

Hand gestures may improve spatial visualization by helping a person keep track of an object in the mind as it is rotated to a new position. Since our hands are used so much in daily life to manipulate objects, gestures also may provide additional feedback and visual cues by simulating how an object would move if the hand were holding it, said Chu, who now works as a research fellow at the Max Planck Institute for Psycholinguistics in the Netherlands.

Spatial visualization is important in many scientific fields, including mathematics, physics and engineering, but it also helps in any occupation that requires the use of images or diagrams. The research should have practical implications for education, according to Chu and Kita.

Students in a physics class could be encouraged to use hand gestures to help understand invisible forces such as magnetic fields. Art students

could talk with their hands in a still-life class to picture a bowl of fruit or a nude model from a different angle to create a more vivid painting that creates the illusion of three dimensions on a flat canvas.

More information: "The Nature of Gestures' Beneficial Role in Spatial Problem Solving," Mingyuan Chu, PhD, and Sotaro Kita, PhD, University of Birmingham; *Journal of Experimental Psychology: General*, Vol. 140, No. 1.

Provided by American Psychological Association

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