

# THE BOSTON GLOBE

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## SOME PEOPLE USE MAPS, SOME PREFER VERBAL DIRECTIONS HOW DO YOU GET THERE?

David Blanchette describes himself as a "map guy," someone who prefers visual images to written directions when getting to a new place. The 38-year-old carpet installer from Plainville said, since he started driving, "maps always work for me."

But a recent study shows that a person's preference for visual images, as opposed to verbal instructions, isn't entirely a matter of free will. Each person's brain, they say, knows its neurological strengths and weaknesses, and directs each person toward the method that gives the most neurological bang for the buck. In Blanchette's case, the part of his brain that processes visual information probably works quickly like a high-speed computer, while the verbal area may lag behind with slow transmission rates.

"It's not just a matter of taste, it's a matter of mental efficiency," said Marcel Just, codirector of the Center for Cognitive Brain Imaging at Carnegie Mellon University in Pittsburgh, and an author of the study.

Just's study, which appeared this month in *Cognitive Psychology*, gives further insight into the ongoing effort to determine just how people use their brains to solve problems from simple tasks to complex reasoning. It has implications for brain-injured patients as well as ordinary people looking for different or better pathways for learning.

"The study shows that, even in solving a simple problem, there's more than one way," said Jordan Grafman, chief of the cognitive neuroscience section at the National Institute of Neurological Disorders and Stroke in Bethesda, Md.

Interestingly, the study's results involving brain scans of 12 college students also happen to reinforce the conventional wisdom that men tend to think more spatially, while women tend to think more verbally, though Just emphasized that the number of subjects is too small to consider this a significant finding.

He said one of the major findings of the study is that regions of the brain in charge of visual and verbal processing get better at their respective jobs the more they are used. Even in the neurological world, it seems, success breeds success, and the brain sends work to those cells that do the job most easily. "It's like your brain gets a favorite chair and heads for it each time," said the psychology professor.

The “chair” in these cases are parts of the brain that happen to be on the left side. Brain scans showed the Broca's area, located roughly behind the left temple, of participants lit up with activity when they were engaged in verbal thinking. The superior parietal cortex, located in the left rear of the head where a woman's headband would rest, was lit up with blood activity when a spatial and visual imagery was used.

So a person assembling a toy scooter or a bookshelf would have an activated Broca's area if relying on the manual's written instruction, or an activated superior parietal cortex if depending on the manual's schematic drawings.

In the study, participants were asked to answer about 50 true-false questions, such as whether a star sign was above the plus sign. In the “verbal” method, they were asked to read and think about the sentence only, then see a picture and answer the true-false question. In the “visual” method, they were asked to read the sentence, visualize the image depicted by it, look at a picture, then answer the question.

Scientists also assessed each student on whether he or she was inherently better at verbal or visual strategies. They found that students who were verbally adept, for instance, could employ their Broca's area with minimal blood flow and still get the right answer, whereas the low-verbal students required much more intense blood flow to that region to get the answer.

It's unclear just how brain areas look differently when they are utilized more, perhaps getting bigger in some cases, or just more internally rich with new cells and neural connections. For instance, scientists recently found that 16 London taxicab drivers developed a larger hippocampus - the area responsible for storing mental maps of places and is roughly located between our ears - after being on the job for two years.

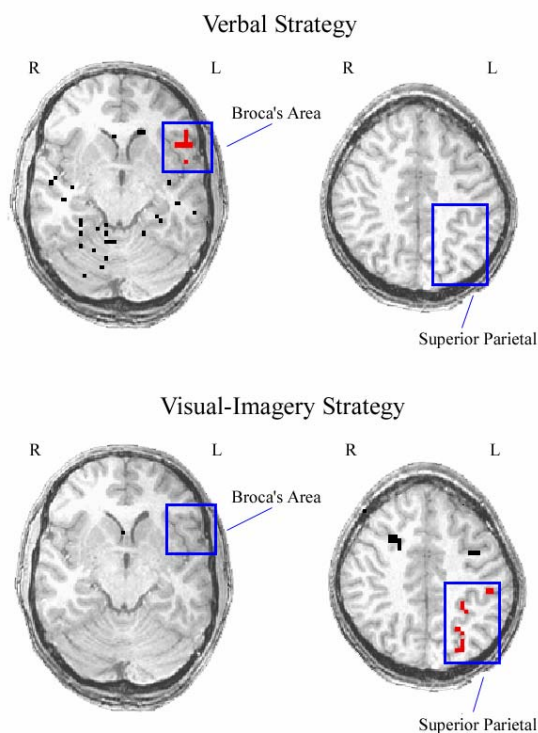
Studies last year on the preserved brain of legendary physicist Albert Einstein found that his parietal lobe was larger than normal, though the overall size and weight of his brain was not out of the ordinary. Still, the parietal lobe is the area responsible for, among other things, spatial and visual imagery and some scientists have speculated that Einstein's large endowment contributed to his genius.

Scientists say it remains unclear whether people have in-born predisposition to visual thinking, for instance, rather than verbal. Federal scientist Grafman said there's a theory that the male tendency to think more spatially - they have been shown to be better at keeping track of east-west-north-south directions even with map rotations - may have to do with their history as the society's explorers and hunters.

Still, there's no question among scientists that upbringing and culture plays a major role in developing different regions. Just said the American education system has a history of rewarding verbal thinking at the expense of visual processing.

When it comes to getting around, officials at electronic mapping Web sites, as well as motor clubs, say most people prefer maps to written directions, perhaps wanting the opportunity to plot their own path to get some place, rather than accept a computer-generated route.

John Paul, spokesman for the Automobile Association of America, said another popular method of getting directions is a combination of verbal and visual, that is, directions delivered with visual landmarks. Many drivers, including a woman who has been driving for the US Postal Service for 13 years, agreed. "I like both maps and written directions, but I want landmarks more than anything else," Veronica Bertrand, 42, said while on her route in Allston last week. "Just tell me to go up Commonwealth Avenue and turn right at the Star Market. Then I'll get there."



The brain of a Carnegie Mellon University undergraduate student while she is deciding whether a sentence like: "It is not true that the star is above the plus" is true or false of a picture that is presented soon after the sentence.

The two slices in the upper panel show her brain activity when she was asked to use a verbal strategy, verbally 'remembering the sentence' until the picture appeared. There is a large amount of brain activity (red voxels) in a language related region, Broca's area, shown in the slice on the left. There is no activity in a spatial processing area, shown in the slice on the right.

SIDEBAR:\nBRAIN SCAN\