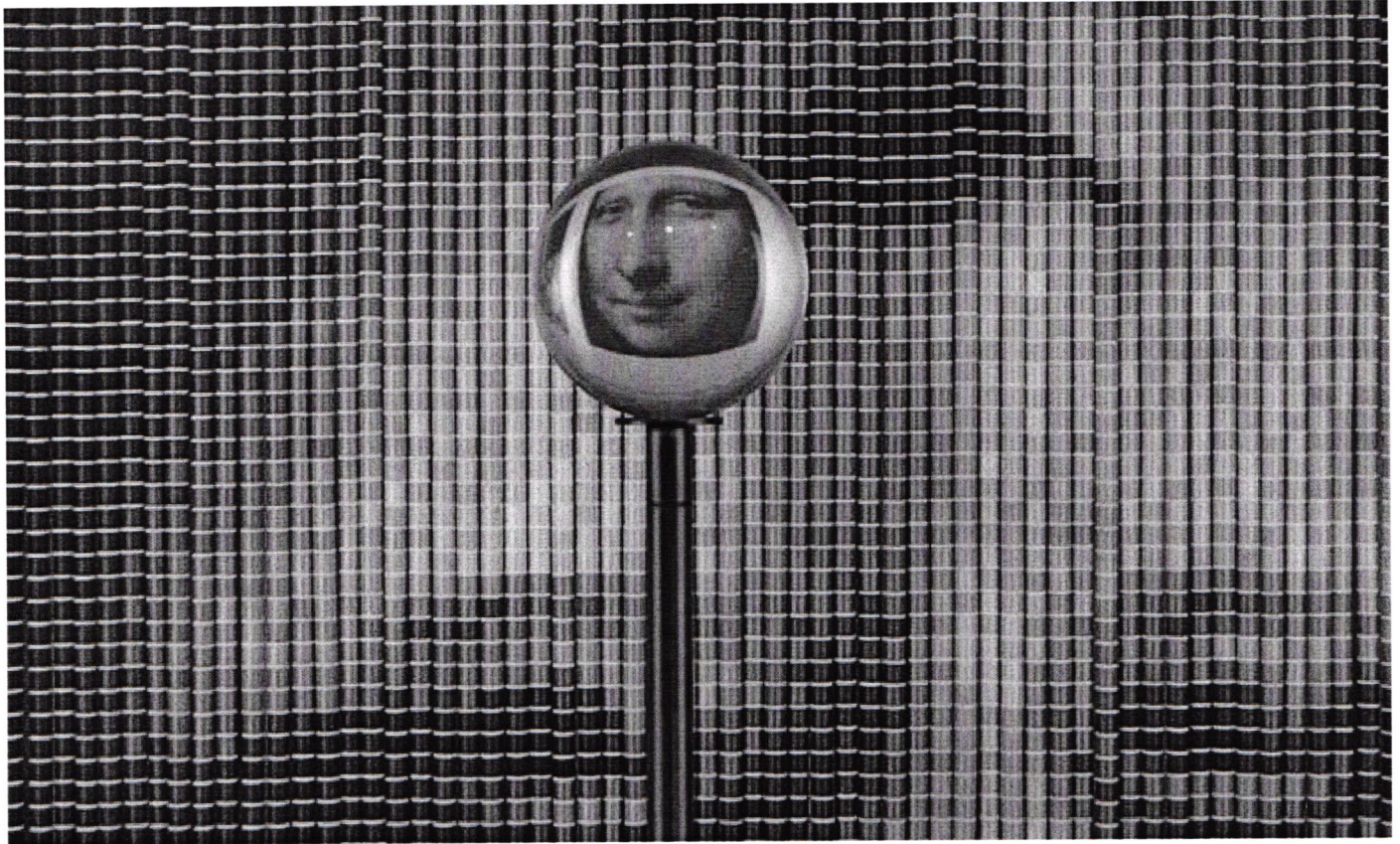
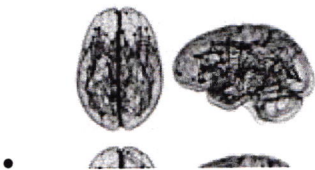


How Men's Brains Are Wired Differently Than Women's



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Men aren't from Mars and women aren't from Venus, but their brains really are wired differently, a new study suggests.

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The research, which involved imaging the brains of nearly 1,000 adolescents, found that male brains had more connections within hemispheres, whereas female brains were more connected between hemispheres. The results, which apply to the population as a whole and not individuals, suggest that male brains may be optimized for motor skills, and female brains may be optimized for combining analytical and intuitive thinking.

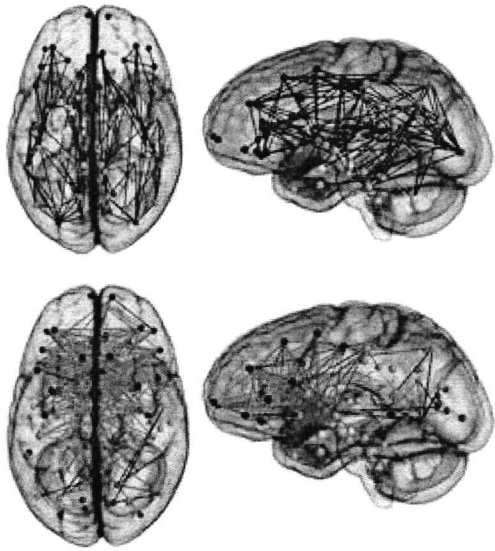
"On average, men connect front to back [parts of the brain] more strongly than women," whereas "women have stronger connections left to right," said study leader Ragini Verma, an associate professor of radiology at the University of Pennsylvania medical school. But Verma cautioned against making sweeping generalizations about men and women based on the results. [10 Surprising Facts About a Man's Brain]

Previous studies have found behavioral differences between men and women. For example, women may have better verbal memory and social cognition, whereas men may have better motor and spatial skills, on average. Brain imaging studies have shown that women have a higher percentage of gray matter, the computational tissue of the brain, while men have a higher percentage of white matter, the connective cables of the brain. But few studies have shown that men's and women's brains are connected differently.

In the study, researchers scanned the brains of 949 young people ages 8 to 22 (428 males and 521 females), using a form of magnetic resonance imaging (MRI) known as diffusion tensor imaging, which maps the diffusion of water molecules within brain tissue. The researchers analyzed the participants as a single group, and as three separate groups split up by age.

As a whole, the young men had stronger connections within cerebral hemispheres while the young women had stronger connections between hemispheres, the study, detailed today (Dec. 2) in the journal *Proceedings of the National Academy of Sciences*, found. However, the cerebellum, a part of the brain below the cerebrum that plays a role in coordinating muscle movement, showed the opposite pattern, with males having stronger connections between hemispheres.

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Brain networks showing significantly increased intra-hemispheric connectivity in males (Upper) and i ...

Roughly speaking, the back of the brain handles perception and the front of the brain handles action; the left hemisphere of the brain is the seat of logical thinking, while the right side of the brain begets intuitive thinking. The findings lend support to the view that males may excel at motor skills, while women may be better at integrating analysis and intuitive thinking.

"It is fascinating that we can see some of functional differences in men and women structurally," Verma told LiveScience. However, the results do not apply to individual men and women, she said. "Every individual could have part of both men and women in them," she said, referring to the connectivity patterns her team observed.

When the researchers compared the young people by age group, they saw the most pronounced brain differences among adolescents (13.4 to 17 years old), suggesting the sexes begin to diverge in the teen years. Males and females showed the greatest differences in inter-hemisphere brain connectivity during this time, with females having more connections between hemispheres primarily in the frontal lobe. These differences got smaller with age, with older females showing more widely distributed connections throughout the brain rather than just in the frontal lobe.

Currently, scientists can't quantify how much an individual has male- or female-like patterns of brain connectivity. Another lingering question is whether the structural differences result in differences in brain function, or whether differences in function result in structural changes.

The findings could also help scientists understand why certain diseases, such as autism, are more prevalent in males, Verma said.

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