

# Michael Gazzaniga

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**Michael S. Gazzaniga** (born December 12, 1939) is a professor of psychology at the University of California, Santa Barbara, where he heads the new SAGE Center for the Study of the Mind. He is one of the leading researchers in cognitive neuroscience, the study of the neural basis of mind. He is a member of the American Academy of Arts & Sciences, the Institute of Medicine, and the National Academy of Sciences.

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## Michael Gazzaniga

|                          |  |
|--------------------------|--|
| <b>Born</b>              | December 12, 1939  |
| <b>Residence</b>         | Santa Barbara, California  |
| <b>Citizenship</b>       | United States  |
| <b>Nationality</b>       | United States  |
| <b>Fields</b>            | Psychology, neuroscience   |
| <b>Institutions</b>      | University of California, Santa Barbara, SAGE Center for the Study of the Mind |
| <b>Alma mater</b>        | Dartmouth College, Caltech   |
| <b>Doctoral advisor</b>  | Roger Sperry   |
| <b>Doctoral students</b> | Joseph E. LeDoux   |
| <b>Known for</b>         | Split-brain research, cerebral lateralization, cognitive neuroscience          |
| <b>Notable awards</b>    | Elected to the National Academy of Sciences (2011)                             |

## Biography

In 1961, Gazzaniga graduated from Dartmouth College. In 1964, he received a Ph.D. in psychobiology from the California Institute of Technology, where he worked under the guidance of Roger Sperry, with primary responsibility for initiating human split-brain research. In his subsequent work he has made important advances in our understanding of functional lateralization in the brain and how the cerebral hemispheres communicate with one another.

Gazzaniga's publication career includes books for a general audience such as *The Social Brain*, *Mind Matters*, *Nature's Mind*, *The Ethical Brain* and *Who's in Charge?*. He is also the editor of the *The Cognitive Neurosciences* book series published by the MIT Press, which features the work of nearly 200 scientists and is a sourcebook for the field. His latest monograph is entitled *Who's in Charge?: Free Will and the Science of the Brain*. It was published by HarperCollins in 2011.<sup>[1]</sup>

Gazzaniga founded the Centers for Cognitive Neuroscience at the University of California, Davis and at Dartmouth College, the Neuroscience Institute, and the *Journal of Cognitive Neuroscience*, of which he is the Editor-in-Chief Emeritus. Gazzaniga was a member of U.S. President George W. Bush's Council on Bioethics. He was also the Director of the Law and Neuroscience Project, a project to study the intersection of law and neuroscience.

## Cultural influence

Gazzaniga's work is referenced in the book *Peace on Earth* by Stanisław Lem.

In 2010 a tribute volume to the work of Gazzaniga was published, containing contributions by Joseph LeDoux, Stephen Kosslyn, Steven Pinker and others.<sup>[2]</sup>

## Studies

Dr. Gazzaniga has led pioneering studies in learning and understanding split brained patients and how their brains work.<sup>[3]</sup> He has performed numerous studies and done large of amounts of research on split brain patients to provided a much higher quality understanding into the lives of those affected by this rare phenomenon. He has studied how people who have the two halves of the brain separated function in comparison to those who do not. Dr. Gazzaniga has looked into what bodily functions are controlled by each half of the brain. He has looked at what split brained patients are able to do as a result of their condition such as the ability to draw two different objects with each hand, an ability that a person with a non split brain is unable to do. They study how those with split brain act emotionally and physically in comparison to those who do not have a split brain. Through Gazzaniga's studies a much greater understanding of the split brain phenomenon has been brought to other physiologists as well as the general population of the world.<sup>[4][5]</sup>

### Patient W.J.

Patient W.J. was a World War II paratrooper who got hit in the head with a rifle butt, after which he started having seizures. Before his operation to try to fix the seizures, Gazzaniga tested his brain functions. This included presenting stimuli to the left and right visual fields and identifying objects in his hands that were out of view. He was able to perform these tasks perfectly and afterwards he had the surgery that split his corpus callosum and anterior commissure. After his surgery, he was brought in again for testing with Gazzaniga in which they flashed stimuli such as letters and light bursts to the left and right visual fields. The stimuli flashed to the right visual field were processed by the brain's left hemisphere, which contains the language center, so he was able to press the button to indicate he saw the stimulus and could verbally report what he had seen. However, when the stimuli were flashed to the left visual field, and thus the right hemisphere, he would press the button, but could not verbally report having seen anything. When they modified the experiment to have him point to the stimulus that was presented to his left visual field and not have to verbally identify it, he was able to perform this task accurately.<sup>[6][7]</sup>

Patient W.J.'s divided corpus callosum could also cause conflicts between the hemispheres. An example

of this could be seen with his hands, where each hand was controlled by the opposite hemisphere, and there was no communication between the two. This would result in moments where one hand might reach out to open a car door while the other would try to stop that hand from opening the door.<sup>[7]</sup>

## Patient P.S.

Patient P.S. was a teenage boy in which it was shown that language comprehension was possible in the right hemisphere. When the word “girlfriend” was flashed to his left visual field, and thus his right hemisphere, he could not verbally say the name of his “crush”, but he then spelled out the name “Liz” with Scrabble tiles. This suggested that even though verbal language was not possible in the right hemisphere, there was a form of language possible through gesturing and left hand movements.<sup>[6][7]</sup>

## Publications

- Gazzaniga, Michael S. (1970). *The Bisected Brain*. New York: Appleton-Century-Crofts. ISBN 978-0-390-35278-1.
- Gazzaniga, Michael S.; LeDoux, Joseph E. (1978). *The Integrated Mind*. New York: Plenum Pr. ISBN 978-0-306-31085-0.
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- Gazzaniga, Michael S. (1988). *Mind Matters: How Mind and Brain Interact to Create our Conscious Lives*. Boston: Houghton Mifflin. ISBN 978-0-395-50095-8.
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- Gazzaniga, Michael S.; Ivry, Richard B.; Mangun, George R. (2009). *Cognitive Neuroscience: The Biology of the Mind* (3rd ed.). New York: W.W. Norton. ISBN 978-0-393-92795-5.
- Gazzaniga, Michael S. (2009). *Human: The Science Behind What Makes Us Unique* (1st ed.). New York: Harper Perennial. ISBN 978-0-06-089289-0.
- Gazzaniga, Michael S. (2011). *Who's in Charge?: Free Will and the Science of the Brain* (1st ed.). New York, NY: Ecco. ISBN 978-0-06-190610-7.

## See also

- Attentional shift
- Left brain interpreter
- Split-brain

## References

- <sup>^</sup> Gazzaniga, Michael S. (2011). *Who's in charge? free will and the science of the brain*. New York, NY: HarperCollins. ISBN 0062096834.
- <sup>^</sup> *The cognitive neuroscience of mind: A Tribute to Michael S. Gazzaniga*, edited by Patricia A. Reuter-Lorenz, Kathleen Baynes, George R. Mangun, and Elizabeth A. Phelps, Cambridge, Massachusetts: The MIT Press, 2010
- <sup>^</sup> American Psychological Association, "Psychology's best," 2008, Vol 39, No. 9, <http://www.apa.org/monitor/2008/10/honors.aspx>
- <sup>^</sup> Hock, Roger R., "Forty Studies that Changed Psychology Explorations into the History of Psychological Research," Ch. 1 "Biology and Human Behavior", Reading 1: "One Brain or Two?" Copyright 2013, 2009, 2005 by Pearson Education Inc.
- <sup>^</sup> Michael Gazzaniga, on season 7 , episode 3 (<http://www.chedd-angier.com/frontiers/season7.html>) of *Scientific American Frontiers*.
- <sup>^</sup> <sup>a</sup> <sup>b</sup> Wolman, David (14 March 2012), "The Split Brain: A Tale of Two Halves", *Nature* **483**: 260-263
- <sup>^</sup> <sup>a</sup> <sup>b</sup> <sup>c</sup> (2011), "Interview with Michael Gazzaniga", *Annals of the New York Academy of Sciences* **1224**: 1–8

## External links

- University of California Santa Barbara faculty web page (<http://www.psych.ucsb.edu/~gazzanig/>)
- The Law and Neuroscience Project (<http://www.lawandneuroscienceproject.org>)
- Sage Center for the Study of the Mind (<http://www.sagecenter.ucsb.edu/>)
- "The Effects of Crack" (<http://www.druglibrary.org/schaffer/Misc/crack1.htm>) — an exchange between Gazzaniga and the conservative commentator William F. Buckley, Jr.
- Video of Gazzaniga demonstrating the effects of split brain surgery (<http://www.hypnosisschool.org/50.php>)
- Video (and audio) of interview/discussion with Gazzaniga (<http://bloggingheads.tv/diavlogs/9165>) by Carl Zimmer on Bloggingheads.tv



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