



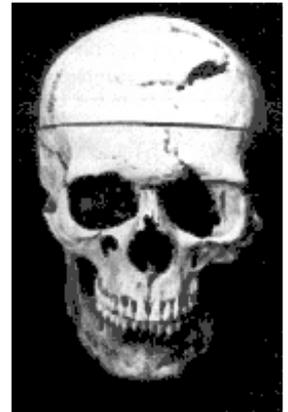
The Amazing Case of Phineas Gage



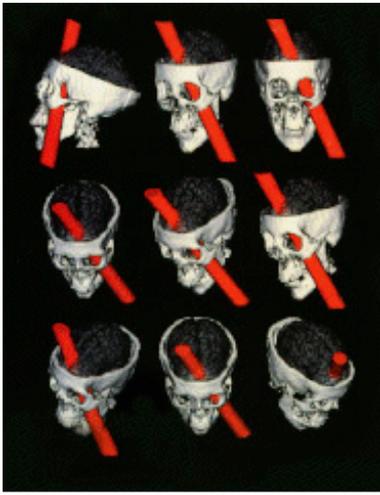
Phineas Gage was a young railroad construction supervisor in the Rutland and Burland Railroad site, in Vermont. In September 1848, while preparing a powder charge for blasting a rock, he inadvertently tamped a steel rod into the hole. The ensuing explosion [projected the tamping rod](#), with 2.5 cm of diameter and more than one meter of length against his skull, at a high speed. The rod entered his head through his left cheek, destroyed his eye, traversed the frontal part of the brain, and left the top of the skull at the other side. Gage lost consciousness immediately and started to have convulsions. However, he recovered conscience moments later, and was taken to a local doctor, Jonh Harlow, who took care of him.

Amazingly, he was talking and could walk. He lost a lot of blood, but after a bout with infection, he not only survived to the ghastly lesion, but recovered well, too.

Months later, however, Gage began to have startling changes in personality in mood. He became extravagant and anti-social, a fullmouth and a liar with bad manners, and could no longer hold a job or plan his future. "Gage was no longer Gage", said his friends of him. He died in 1861, thirteen years after the accident, penniless and epileptic, and no autopsy was performed on his brain. His former physician, John Harlow, interviewed his friends and relatives, and wrote two, reporting Gage's reconstructed medical history, one in 1948, entitled "*Passage of an Iron Rod Through the Head*", and another in 1868, titled "*Recovery from the Passage of an Iron Rod Through the Head*".



Phineas Gage became a classical case in the textbooks of neurology. The part of the brain which he had lost, was forever associated to the mental and emotional functions which he had lost. Harlow believed that, as he wrote that "The equilibrium between his intellectual faculties and animal propensities seems to have been destroyed.



His skull was recovered however, and [preserved in the Warren Medical Museum](#) of Harvard University. Much later, two Portuguese neurobiologists, Hanna and [Antonio Damasio](#) of the University of Iowa, used computer graphics and neural imaging techniques to plot the trajectory of the steel rod as it coursed through Gage's brain, and [published the results](#) in *Science*, in 1994. They discovered that most of the damage was done to the ventromedial region of the frontal lobes on both sides. The part of



the frontal lobes responsible for speech and motor functions was apparently spared, so they concluded that the changes in social behavior observed in Phineas Gage were probably due to this lesion, because the Damasios have observed the same sort of change in other patients with similar lesions, causing a defect in rational decision making and the processing of emotion.

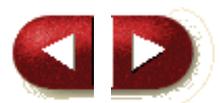
"Gage's story was the historical beginnings of the study of the biological basis of behavior," said Antonio Damasio.



To Know More

- Damasio H., Grabowski T., Frank R., Galaburda AM., Damasio AR. The return of Phineas Gage: clues about the brain from the skull of a famous patient. *Science*. 264(5162):1102-5, 1994.
- See also Dr. Antonio Damasio's book "*Descartes's Error: Emotion, Reason and the Human Brain*", Avon Hearst, New York, 1995, with exposes fascinating material on the relationships between brain, mind and emotion (see the [on-line reviews](#) on Serendip server, also in the [Times Literary Supplement](#))
- Macmillan, M. [Phineas Gage's Contribution to Brain Surgery](#) .*Australia Journal of the History of Neurosciences* 5(2), 1995.
- [What Happened to Phineas ?](#) *Discover Magazine*, January 1995.
- For an interesting modern case, similar to Gage's, but caused by a bullet injury, see: [A Bullet to the Mind](#), by Franck Vertosick Jr. *Discover Magazine*, October 1996

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