BOOKS: NEUROSCIENCE

Iron in the Soul

John C. Marshall

The name Phineas Gage sounds as if it should belong to the preacher man in a spaghetti Western. Instead, physicians and neuroscientists have been preaching about him for a century and a half. According to Malcolm Macmillan, they have been getting most of their facts wrong in the process. What all can agree on is this: On the afternoon of 13 September 1848, the 25-year-old Gage was working on the railroad just south of Cavendish, Vermont. Specifically, Phineas was "tamkin for a blast"; he was packing an explosive charge to fracture a rock. An accident happened and a large metal bar—the tamping iron—was blasted through his head and landed some 20 meters away. Other than the fact that Phineas lived on, all else about this remarkable event has been subject to dispute and wildly varying interpretations.

An Odd Kind of Fame
Stories of Phineas Gage
by Malcolm Macmillan

MIT Press, Cambridge, MA, 2000. 576 pp. $39.95, £27.50. ISBN 0-262-13363-6.

But why, the reader might ask, would anyone want to write well over 500 pages on the unfortunate Gage? The conventional answer is that his survival provided an unparalleled opportunity for studying the powers of the frontal lobes and their role in complex personality traits. In short, this "experiment of nature" was seminal in the development of knowledge about the higher functions of the human brain. And as such, Gage has entered the textbooks as an essential human interest story to whet the student's appetite for neuropsychology.

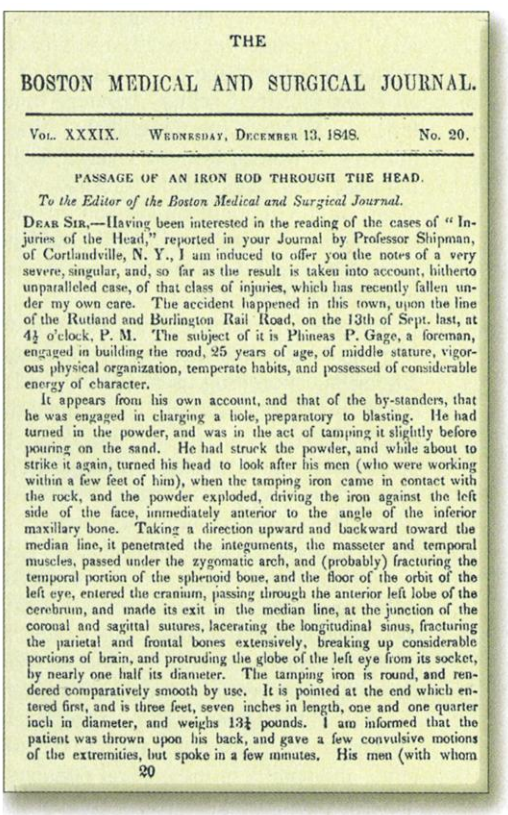
Macmillan (an adjunct professor in psychology at Deakin University, Australia) has looked somewhat deeper, and *An Odd Kind of Fame* is the record of his discoveries. The basic information comes from John M. Harlow, M.D., who saw Gage within 90 minutes of the accident and dressed his wounds. At that time, Gage was fully conscious and "spoke rationally with those around him, describing the accident accurately and insisting he would be back at work in a day or two." In a series of fascinating appendices, Macmillan reproduces the first papers on Gage: Harlow's report to the *Boston Medical and Surgical Journal* (1848); a follow-up examination by Henry Bigelow, professor of surgery at Harvard (published in 1850); Harlow's 1868 account of Gage's recovery, published seven years after Gage had died; and J. B. S. Jackson's 1870 descriptive catalogue of the Warren Anatomical Museum, where Gage's skull resided.

A good case could be made for reading these appendices before the main body of Macmillan's text. Harlow is extremely careful and precise in what he wrote in 1868. Even by that early date, he remarks, the case had been frequently cited "as one of complete recovery…without any impairment to the intellect." In contrast, Harlow notes that, although physical recovery was complete, Gage's intellectual faculties were "decidedly impaired," in particular "being perfect in kind, but not in degree or quantity." Harlow's explanation is that "while the anterior and a part of the middle lobes of the left cerebrum must have been destroyed as to function, its functions suspended, its fellow was left intact, and conducted its operations singly and feebly."

Subsequently, the life and death of Phineas Gage seems to have taken on a life of its own. In an analogy to Borges's garden of forking paths, neuroscientists of varied persuasions have read their own concerns into the case and seen their own pet theories confirmed by the protean patterns of deficit and preservation purportedly manifested by Gage. Scholars have disagreed, and continue to disagree, about where the rod entered and left the skull, about how much brain was thereby destroyed and where, and about how Gage's personality and cognitive abilities were (or were not) changed by his injuries. Secondary sources describe an upright, responsible, and hard-working young man who, after his accident, changed into a psychopath without foresight, moral sense, or concern for social conventions despite intact intelligence, learning, and memory. Perhaps this was so, writes Macmillan, but because "next to nothing is known about his birth, his education, his personality characteristics, and his working life before and after the accident that thrust him into fame," these stories reflect their authors' preoccupations more than the facts of the case.

Macmillan sets these interpretations against a changing background of the development of sensory-motor psychology, the emergence of the practice of modern brain surgery, and a variety of theories of the localization of brain functions. Of particular concern to Gage's story are the still unresolved questions of the physiological bases of attention, inhibition, and the interaction of intellect and emotion. That the frontal lobes are implicated in such functions is beyond dispute, but exactly how they are implicated remains profoundly unclear. Macmillan notes that in the 19th century "one of the main problems in interpreting the changes like those in Phineas Gage was that there was no explanatory framework into which they could be placed." To a large extent, this remains true at the beginning of the 21st century.

But as a historical document, Macmillan's book provides one of those rare occasions on which one can truly say that further research is not necessary: *An Odd Kind of Fame* is the definitive account of Phineas Gage and the stories that have been told about him. It provides a welcome wake-up call for students, their teachers, and researchers to read the original sources, and it will interest the more rational exponents of the social construction of science. The last words on Gage should accordingly be those of his physician, John Harlow: "I dressed him, God healed him."



THE

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PASSAGE OF AN IRON ROD THROUGH THE HEAD.

To the Editor of the Boston Medical and Surgical Journal.

DEAR SIR,—Having been interested in the reading of the cases of "Injuries of the Head," reported in your Journal by Professor Shipman, of Cortlandville, N. Y., I am induced to offer you the notes of a very severe, singular, and, so far as the result is taken into account, hitherto unparalleled case, of that class of injuries, which has recently fallen under my own care. The accident happened in this town, upon the line of the Rutland and Burlington Rail Road, on the 13th of Sept. last, at 4¼ o'clock, P. M. The subject of it is Phineas P. Gage, a foreman, engaged in building the road, 25 years of age, of middle stature, vigorous physical organization, temperate habits, and possessed of considerable energy of character.

It appears from his own account, and that of the by-standers, that he was engaged in charging a hole, preparatory to blasting. He had turned in the powder, and was in the act of tamping it slightly before pouring on the sand. He had struck the powder, and while about to strike it again, turned his head to look after his men (who were working within a few feet of him), when the tamping iron came in contact with the rock, and the powder exploded, driving the iron against the left side of the face, immediately anterior to the angle of the inferior maxillary bone. Taking a direction upward and backward toward the median line, it penetrated the integuments, the masseter and temporal muscles, passed under the zygomatic arch, and (probably) fracturing the temporal portion of the sphenoid bone, and the floor of the orbit of the left eye, entered the cranium, passing through the anterior left lobe of the cerebrum, and made its exit in the median line, at the junction of the coronal and sagittal sutures, lacerating the longitudinal sinus, fracturing the parietal and frontal bones extensively, breaking up considerable portions of brain, and protruding the globe of the left eye from its socket, by nearly one half its diameter. The tamping iron is round, and rendered comparatively smooth by use. It is pointed at the end which entered first, and is three feet, seven inches in length, one and one quarter inch in diameter, and weighs 13¼ pounds. I am informed that the patient was thrown upon his back, and gave a few convulsive motions of the extremities, but spoke in a few minutes. His men (with whom

20

Genesis. The first paper on Phineas Gage's accident and the stormy nature of his recovery was this 1848 account by his physician John Harlow.

CREDIT: FROM *AN ODD KIND OF FAME*

The author is in the Department of Clinical Neurology, University of Oxford, Oxford OX2 6HE, UK. E-mail: john.marshall@clneuro.ox.ac.uk