

What Happened to Phineas Gage?

Due to an accident while he was working, Phineas Gage made a contribution to the understanding of how the brain works. In 1848, 25-year old Phineas Gage worked for the Rutland and Burlington Railroad Company laying railroad tracks across Vermont. Before railroad track could be laid, however, the uneven ground needed to be leveled. Gage and coworkers had to drill holes in the stone, put explosive in the holes, cover the explosive with sand, and then use a fuse and tamping iron to trigger an explosion. One day, an accident occurred that changed Gage's life forever. The explosive went off early sending the tamping iron, which was 1.25 inches in diameter and 43 inches long, shooting into Gage's face, through his skull and brain, and out the top of his head. The tamping iron landed about 25 yards away. Gage regained consciousness within a few minutes. Amazingly, he not only survived the blast, but he was able to talk and to walk! His coworkers took him to the doctor who cleaned and bandaged the wounds, the standard medical treatment at the time.

Although Gage survived the physical injuries from the blast, he was a changed man. He appeared to be just as intelligent as before the accident, and he did not have any impairment in movement, speech, or memory. But, something was different. Prior to the accident, he was a responsible, intelligent and likeable person. After the accident, he was irresponsible, used profanity extensively, and demonstrated no respect for social customs. His friends commented that "Gage was no longer Gage." He could not hold the responsible jobs that he had prior to the accident and apparently wandered for the next several years. Phineas Gage ended up in San Francisco in the custody of his family where he died approximately 12 years after the accident.

Twenty years after the accident, the physician who treated Gage correlated the behavioral changes with damage to the frontal region of the brain. At the time, the brain was thought to control language and movement, but the suggestion that the brain functioned to process emotions and social behavior was new. In addition, scientists at the time believed the brain lacked localized functions. Unknowingly, Phineas Gage contributed to our understanding of how the brain processes information.

In the 1990s, scientists used their improved understanding of brain function, computer modeling techniques, and new data from Gage's skull. Based on this information, they found that the accident damaged both hemispheres of the frontal lobe, which is the part of the brain that influences social behavior. Today, physicians see patients with damage to the frontal lobe that has occurred through motor vehicle accidents, gun accidents, or major falls. These individuals, like Phineas Gage, often have dramatic changes in their emotional and decision-making abilities.

1. How did Phineas Gage change after the accident?
2. How did Phineas Gage's accident change scientists' understanding of the brain?