



H.M.

What does the amnesia suffered by Henry Gustav Molaison reveal about memory and motor skills?

For over 50 years he was known in the literature as Henry M., or more commonly, simply as H.M. In 1953, at the age of 27, Henry Gustav Molaison underwent an operation to relieve the debilitating effects of epileptic seizures. The neurosurgeon, William Scoville, removed portions of H.M.'s medial temporal lobes. The surgery was a success in terms of reducing the frequency of the seizures. However, the operation left H.M. with severe amnesia; he could remember things from before 1953, but from that point on he could not form new memories. Over the next 55 years H.M. generated considerable fascination among scientists who were interested in understanding how and why the brain creates some memories but fails to create others. In the story “The Keypad” in chapter 10, I discussed the fact that some people with amnesia can perform previously learned motor skills without much apparent degradation in performance. H.M. represented a rather different case: he could learn new motor skills but had difficulty learning or remembering many other types of information.

Some of the initial experiments in which H.M. was a participant were conducted by Brenda Milner and Suzanne Corkin. These experiments showed some remarkable dissociations in his ability to learn and remember new information. For example, H.M. showed essentially no memory for items that had been shown to him only a few moments earlier (such as prose passages, pictures of faces, and word pairs). Of great surprise to the researchers, however, was the fact that H.M. showed session-to-session improvements in motor learning tasks, such as pursuit tracking and mirror tracing. Moreover, H.M. had good retention of the mirror-tracing task when tested again almost a year later. Perhaps the most astounding finding of all, however, was that H.M. showed retention of these motor skills even though he could not remember ever having practiced them. In fact, he did not remember the names or even the faces of the researchers with whom he had done these experiments.

One explanation for why H.M. could learn motor skills but not other types of information may relate to the differences between explicit and implicit processes, which were discussed in chapter 10 (see “The Keypad”). Explicit processes refer primarily to verbalizable information, which can be remembered in detail (and thus are sometimes called explicit memories). Implicit processes refer to the nonverbalizable procedures that support performance on many tasks, but which are not normally available for

detailed recall. One suggestion is that the operation performed on H.M. left a permanently impaired ability to form explicit memories, but left implicit processes intact.

The explanation for the explicit/implicit process dissociation is a gross oversimplification of an incredibly complex network of neural processes that underlies our capability to function. An interesting personal aspect of H.M. was his willingness to serve as a participant in many experiments over the 50-plus years that he had his disability. Although he did not understand why, H.M. somehow realized that his participation in research was important. As Suzanne Corkin explained, “He is altruistic: when I asked him to tell me about Dr. Scoville (with whom H.M. had several appointments before his operation), he said, ‘He did medical research on people—all kinds of people. What he learned about me helped others too, and I’m glad about that.’” H.M. promised that his body would be available for further neurological examination upon his death, which occurred in 2008. These examinations are ongoing and may help scientists uncover more of the mysteries of H.M.’s brain.

SELF-DIRECTED LEARNING ACTIVITIES

1. Explain amnesia in your own words.
2. What is a memory dissociation? Look up the term if you are not familiar with it and discuss why it is especially revealing about the working of the brain.
3. Compare and contrast the memory impairments of H.M. with the memory impairments of the amnesic patient discussed in “The Keypad.”

NOTES

- H.M. died on December 2, 2008.
www.nytimes.com/2008/12/05/us/05hm.html

SUGGESTED READINGS

- Corkin, S. (2002) What’s new with the amnesic patient H.M.? *Nature Reviews Neuroscience*, 3, 153-160.
- Milner, B., Corkin, S., & Teuber, H.-L. (1968). Further analysis of the hippocampal syndrome: 14-year follow-up study of H.M. *Neuropsychologia*, 6, 215-234.
- Schmidt, R.A., & Lee, T.D. (2011). Retention and transfer. In *Motor control and learning: A behavioral emphasis* (5th ed., pp. 461-490). Champaign, IL: Human Kinetics.