

Case studies

A **case study** involves the detailed study of a single individual, institution or event. It uses information from a range of sources, such as from the person concerned and also from their family and friends. Many techniques may be used – the people may be interviewed or they might be observed while engaged in daily life. Psychologists might use IQ tests or personality tests or some other kind of questionnaire to produce psychological data about the target person or group of people. They may use the experimental method to test what the target person/group can or can't do. The findings are organised to represent the individual's thoughts, emotions, experiences and abilities. Case studies are generally *longitudinal*, in other words they follow the individual or group over an extended period of time.

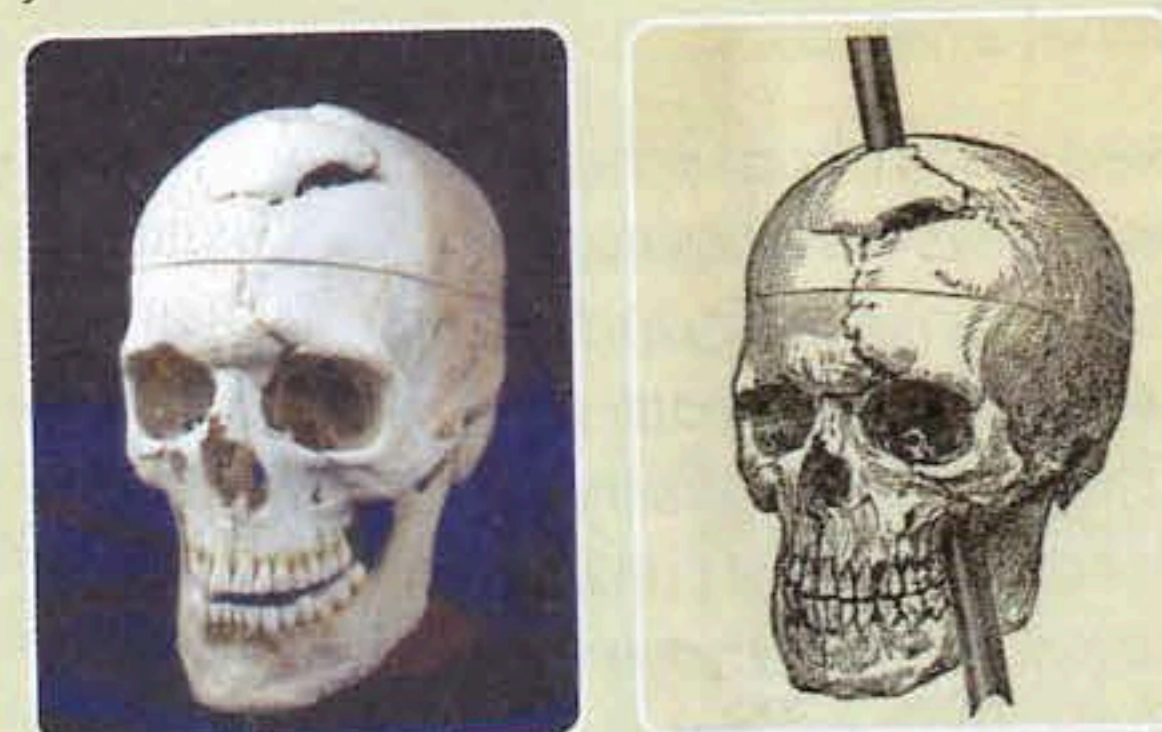
On this spread we are going to look at some case studies which provide insights into human memory and the workings of the brain.

KEY TERM

Case study A research method that involves a detailed study of a single individual, institution or event. Case studies provide a rich record of human experience but are hard to generalise from.

THE CASE OF PHINEAS GAGE

In 1848 Phineas Gage was working on the construction of a railway track in Vermont USA, blasting rock with gunpowder. He would fill a hole with dynamite, then cover the dynamite with sand and insert a tamping iron which was 3 feet 7 inches long. This was then hammered into the hole to pack down the gunpowder, only on one occasion he forgot to put in the sand, and as soon as he hammered the tamping iron it exploded, driving the tamping iron right through his skull. It went in under his left cheek bone and completely out through the top of his head. Not only did he survive, but he was able to speak, despite massive bleeding and substantial loss of brain tissue. After a short spell in hospital he went back to work, and he lived for a further 12 years. Some years after he died, his body was exhumed (along with the tamping iron which he had kept) and his skull placed on display at Harvard University.



▲ Phineas' skull on display and an artist's impression of how the tamping iron would have passed through his head.

Phineas Gage was able to function fairly normally, showing that people can live despite the loss of large amounts of brain matter. However, the accident did have a significant effect on Phineas' personality. Before the accident he was hard-working, responsible, and popular, whereas afterwards he became restless and indecisive and swore a lot.

This case was important in the development of brain surgery because it showed that parts of the brain could be removed without having a fatal effect. Thus surgeons started to remove brain tumours, no longer fearful that this would cause a patient's death. Phineas' injury also suggested that damage to the frontal lobe leads to personality changes. This may have influenced the development of frontal lobotomies – a form of psychosurgery to disconnect the frontal lobes from the rest of the brain.

THE CASE OF HM

In the 1940s psychosurgery was at its peak. Dr William Scoville was one of the surgeons at the forefront of this work, performing over 200 lobotomies. Scoville used the operation to help a patient known simply as Henry M or HM. On his sixteenth birthday HM experienced his first severe epileptic fit. For the next few years these fits became progressively more debilitating and uncontrollable by medication. Scoville believed that HM's epilepsy might be cured by removing the parts of his brain thought to be causing the fits.

The effect on HM's epilepsy is not clear, but it seems to have got slightly better – however this was overshadowed by a much greater problem. HM was no longer able to form any new memories. His personality and intellect remained intact but he had lost some of his memories from the ten years prior to the operation (anterograde amnesia). More importantly, he lost the ability to form any new long-term memories (retrograde amnesia). For many years he reported that his age was 27 and the year was 1953. After a while he realised this was absurd and tried guessing the answer. He happily reread magazines with no loss of interest. He couldn't memorise lists of words or recall faces of people he met. He didn't remember that his mother had died and every time they told him, he mourned all over again.

HM only vaguely understood: 'Right now, I'm wondering, have I done or said anything amiss? You see, at this moment everything looks clear to me, but what happened just before? That's what worries me. It's like waking from a dream.' (Hilts, 1995)

HM's loss was psychology's gain. For the next 50 years he was tested by different psychologists at MIT in Boston. On one occasion, when he arrived at the lab, a researcher asked him if he remembered the way to the testing rooms. He said he didn't, but as he said it, his body turned in the right direction (Hilts, 1995). This suggests that his memory for skills (*procedural memory*) was intact but his memory for the events of life (*episodic memory*) was not, supporting the distinction between different types of long-term memory (see page 25).

HM also provided some interesting evidence in relation to STM. If HM was asked to estimate time he seemed to be able to do so for a maximum of 20 seconds, which fits with the estimates given by Peterson and Peterson concerning the duration of short-term memory (see page 20).

Ethical issues

If HM had no memory for things that happened to him, how could he have given his consent for psychologists to study him? He did not understand what was being done to him (which included electric shocks) or who was doing it. Psychologists need to ask themselves whether the means justify the ends.

HM himself (who is still alive) adopts a philosophical stance on his problems: 'It does get me upset, but I always say to myself, what is to be is to be. ... what I keep thinking is that possibly I had an operation. And somehow the memory is gone. ... it isn't worrisome. ... to me, because I know that if they ever performed an operation on me, they'd learn from it. It would help others.'

THE CASE OF CLIVE WEARING

One of the difficulties with a case study is that it concerns a unique case and therefore generalisations should be made with caution. The conclusions drawn from the study of HM have, however, been confirmed by another case study. Baddeley (1990) described the same symptoms in a British man, Clive Wearing, who contracted a viral infection which attacked his brain, damaging the hippocampus and associated areas. Like HM, Wearing lost all his ability to transfer memories from STM (or working memory) to LTM. He remembers some aspects of his life before the infection, but not others. For example, he knows that he has children from an earlier marriage, but cannot remember their names. He recognises his second wife, Deborah, and greets her joyously every time they meet, believing he has not seen her in years, even though she may have just left the room to fetch a glass of water. Like HM his *procedural memory* is intact – he had been a conductor and pianist, working for the BBC and can still conduct a choir and play the piano but he has no recollection of his musical education (*episodic memory*). Also like HM, his STM is functional and he is perpetually convinced that he has only just recovered consciousness. In his diary, page after page is filled with entries like this:

8:31 AM: Now I am really, completely awake.

9:06 AM: Now I am perfectly, overwhelmingly awake.

9:34 AM: Now I am superlatively, actually awake.



▲ Clive Wearing and his wife, Deborah, who divorced him after he developed amnesia but decided she couldn't live without him and they have remarried.

WWW Two videos of Clive Wearing at www.learner.org/resources/series150.html#

THE CASE OF KF

In contrast to HM and Clive Wearing, KF's brain damage (from a motorcycle accident) left him with normal long-term recall but variable problems with short-term memory. He has a digit span of one (i.e. when given a string of 20 numbers to recall in sequence he usually can only remember one of them). This suggests he has almost no short-term recall. These deficits support the *multi-store model* because they show that STM and LTM are separate.

However, other of KF's deficit support the *working memory model*. If KF is given a paired associates task (he is given time to learn pairs of unrelated words such as 'nail' and 'map', and later prompted with the first word and asked to recall the second), KF's performance is only slightly poorer than normal control participants. This shows that only some areas of his STM are damaged. In addition KF does better on short-term recall tasks if material is presented visually than when it is presented auditorally, which again fits the working memory model.

Evaluation of case studies

Advantages	Weaknesses
<ul style="list-style-type: none"> The method offers rich, in-depth data so information that may be overlooked using other methods is likely to be identified. Can be used to investigate instances of human behaviour and experience that are rare, for example investigating cases of children locked in a room through childhood to see what effects such disruption of attachment has on emotional development. It would not be ethical to generate such conditions experimentally. The complex interaction of many factors can be studied, in contrast with experiments where many variables are held constant. 	<ul style="list-style-type: none"> It is difficult to generalise from individual cases as each one has unique characteristics. It is often necessary to use recollection of past events as part of the case history and such evidence may be unreliable. Researchers may lack objectivity as they get to know the case, or because theoretical bias may lead them to overlook aspects of the findings. There are important ethical issues such as confidentiality – many cases are easily identifiable because of their unique characteristics, even when real names are not given.

Evaluation VALIDITY

It is difficult to make generalisations to the wider population from a case study of one or a few individuals. In the case of the brain-damaged individuals this is especially true for a variety of reasons. First, we don't know how 'normal' their abilities were before the damage occurred. HM's disabilities may have been due to his epilepsy. Without causing deliberate damage to a normal brain (which would be unethical) we cannot claim to demonstrate a causal relationship between specific cognitive functions and brain areas.

Second, just because an area of the brain (such as the hippocampus) is *associated* with an inability to create new long-term memories doesn't mean that part of the brain is responsible. It may be that the hippocampus acts as a relay station and thus damage to the hippocampus has an effect. So we cannot demonstrate with certainty that one area of the brain is the causal component.

However, on the plus side, such case studies do provide additional evidence to support existing experimental studies.

RESEARCH METHODS Qs No.3.22

- Consider your understanding of the topic of memory after reading this spread. In what way has the information here enhanced your understanding?
- Why do you think there are so many case studies related to memory?
- Describe what research methods were likely to be used in the case studies described on this spread.
- Suggest **two** advantages of using case studies rather than experiments to collect data about memory.
- Suggest **two** limitations.
- A hospital is interested to find out why some patients with head injuries recover faster than others. *Why* would you recommend using a case study and *how* would you do it?