**Behaviourism**

The study of cognition was not always popular with psychologists. A very influential 20th century movement in psychology was based on the premise that mental processes could not be studied scientifically. Supporters of this movement contended that such processes should be ignored by a scientific psychology because they believed that you cannot study scientifically what you cannot observe directly or measure accurately. It can be doubted you can do either when studying the mind, but many psychologists felt you could do both while studying behaviour. Thus, psychologists who concentrated on the scientific study of external behaviour are known as **behaviourists** and their brand of psychology is called **behaviourism**. They were very influential from the mid-1910s to the 1950s, especially in the USA.

The beginning of psychology as a separate discipline was helped considerably by the work, towards the end of the 19th century, of Wundt and his colleagues (pages vii–viii). Although using experimental methodology, Wundt’s data collection relied all too often on his participants’ introspective reports about how they were carrying out the various tasks he was asking them to perform. The subjective nature of the data collected in this way gave rise to disputes about several issues relating to the mind. Many psychologists felt these disputes could not be resolved from within introspectionistic psychology.

Watson (1913), in the USA, reacted to this state of affairs by rejecting not only introspectionism but also the study of the mind in general as a legitimate subject matter for scientific psychology. According to him, only external behaviour should be studied. He was influenced by the work of the Russian physiologist Pavlov, who, in the early decades of the 20th century, was studying in dogs a basic form of learning now called **classical conditioning** (Pavlov, 1928).

Later, another form of conditioning (**operant conditioning**) was added by Skinner, based on his studies of learning in rats and pigeons (Skinner, 1938). What should be emphasized here is that, according to the behaviourists, one can predict and control an organism’s behaviour simply by observing and measuring what is observable from the outside. There is no need to speculate about what (if anything) goes on inside the mind. They attempted to base an entire psychology on the premise that psychology should make no reference to anything that could not be observed.

Both forms of conditioning are simple types of **associative learning**. This is learning based on the gradual building up of associations between stimuli (classical conditioning) or behaviour and its consequences (operant conditioning).

In one of Pavlov’s experiments studying classical conditioning, a dog learns to salivate to the sound of a bell by being presented for around a dozen times with the following contingency: the sound of the bell is followed shortly by food. Pairing the two stimuli (bell and food) for around a dozen times results in the bell producing salivation when presented on its own. The pairing of two stimuli in this way is called **reinforcement** and it is this that forms the basis of classical conditioning.

In a demonstration of Skinner’s **operant conditioning**, a hungry rat is trapped in a box containing a bar which, when pressed, operates a mechanism that delivers some food. With time, the rat presses the bar with increasing frequency revealing the learning of a behaviour (bar-pressing)–consequence (food) association. The animal’s learning of this association has been reinforced by the food.

In both types of conditioning the learning is direct, as is the reinforcement (which could be reward or punishment). In operant conditioning, for instance, it is the animal that behaves and the animal that receives the reward or the punishment. This distinguishes traditional
**EMPIRICAL RESEARCH**

*Schemas and eyewitness testimony (Loftus and Palmer, 1974)*

Participants in this study watched seven film clips of different car accidents. After each clip, participants described what they saw and answered a number of questions about it. One of the questions, the **critical question**, asked about the speed of the cars in the accident. The experiment involved five experimental conditions which were defined by the verb used to ask the question about the cars’ speed. The critical question in one of the conditions was: About how fast were the cars going when they hit each other? For the other conditions the verb *hit* was replaced with *contacted, collided, bumped* and *smashed into*. Loftus and Palmer found that the speed estimates were influenced by the wording used. The average estimates in each of the five conditions are reported below:

- contacted – 31.8 mph
- hit – 34 mph
- bumped – 38.1 mph
- collided – 39.3 mph
- smashed into – 40.8 mph.

Loftus and Palmer’s findings can be explained by Bartlett’s view of memory as an active reconstructive process. It can be argued that the verbs used in the various conditions activated slightly different schemas which influenced the speed estimates. Typical schemas of cars smashing into one another contain, in all likelihood, the assumption that the cars are moving faster than cars just hitting each other.

In Loftus and Palmer’s study, information was received after witnessing the accident. The information took the form of a **leading question**. This is a question that contains hints about what the right answer to it may be. The accident seems to have been reconstructed in the participants’ minds in ways reflecting schematic influences, a finding easily accountable by Bartlett’s views on how reconstructive memory works.

Further support for this explanation comes from Loftus and Palmer’s findings in a second, similar, experiment. Once more, after participants were presented with a one-minute film depicting a multiple car accident, they were asked questions about it, including a critical question about the speeds of the cars involved. Three conditions were used: two groups were asked questions about the speed by using either *smashed* or *hit*. Participants in the third group, the control group, were asked no questions about the speed of the cars. One week later, all participants were asked: Did you see any broken glass? There was no broken glass in the film. Still, 32% of those who had been asked about the cars’ speed with the verb *smash* claimed they had seen broken glass compared to only 14% of the participants in the *hit* group. The schema activated by the verb *smashed* must have aroused a stronger expectation of broken glass than that activated by the verb *hit*. Of those in the control group, 12% claimed to have seen broken glass.

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**EXERCISES**

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<td>3</td>
<td>Identify the independent and dependent variables in the two studies.</td>
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<td>Comment on the ecological validity of these studies.</td>
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Another important aspect of Loftus’s research on eyewitness testimony is the demonstration of the **weapons effect**. In a study by Loftus et al. (1987), participants heard a discussion going in the room next to the one they were in. There were two conditions:

- no-weapons condition – a man with greasy hands emerged from the next room holding a pen
- weapons condition – a man came out of the next room holding a paperknife covered in blood.
Autopsies reveal two characteristic abnormalities in these acetylcholine-producing neurons. The brains of AD patients show abnormal levels of amyloid plaques and neurofibrillary tangles.

**Amyloid plaques**

These are caused by deposits in the brain of a sticky protein called amyloid-β protein. This protein results from the faulty breakdown of its precursor. Amyloid-β protein accumulates and damages the membranes of axons and dendrites (Lorenzo et al., 2000). The amyloid plaques are formed from the degenerating axons and dendrites and contain a dense core of amyloid-β protein. These plaques accumulate in the spaces between neurons. There is a lot of evidence for the involvement of amyloid-β protein in the onset of AD. In fact, most AD patients accumulate amyloid plaques before the onset of disease (Selco, 1990).

**Neurofibrillary tangles**

The brains of AD patients also show the accumulation of an abnormal form of the tau protein. This protein normally forms part of the support structure of neurons. In Alzheimer’s disease, the tau protein is abnormal and, as a result, the structural support of neurons collapses. The abnormal protein produces neurofibrillary tangles – tangles in which microtubules (tiny rods) are twisted around each other. They are found in the cell body and dendrites of neurons (Kensinger and Corkin, 2003).

The formation of amyloid plaques and neurofibrillary tangles are thought to contribute to the degradation of the neurons in the brain and the subsequent symptoms of Alzheimer’s disease. As a result of this degradation, the cerebral cortex and the hippocampus, as well as additional areas, suffer from widespread atrophy (shrinking).
What is the current status of Brown and Kulik’s theory?

The studies discussed above, and additional research, demonstrate that FBM:
- are long lasting but not permanent
- may not be any longer lasting than important everyday memories
- are more vivid than most ordinary memories
- are recalled with a higher degree of confidence than other memories.

As to the causes of FBM, we now have a better idea than Brown and Kulik did when formulating their theory. Luminet and Curci conducted a study with the goal of comparing four theoretical models accounting for FBM formation, including Brown and Kulik’s model (Luminet, 2009). The data involved US and non-US participants and related to the terrorist attacks of 11 September in the USA. According to their analysis, high importance/consequences and strong emotional feelings are the only two conditions that are required for the formation of an FBM. Surprise, on the other hand, has produced mixed findings. It is noteworthy that FBM have been found for expected events such as the first moon landing (Winograd and Killinger, 1983).

So what can we conclude about Brown and Kulik’s theory? Williams et al. (2008) conclude their discussion of FBM by noting that Brown and Kulik identified two important determinants of FBM: event importance and event emotionality. The third factor, surprise, is not so well supported by relevant research, whereas the properties Brown and Kulik ascribe to FBM, like permanence and consistency, are disputed, whereas others, like confidence and vividness, are better supported by the relevant research. The claim that has fared least well is their assumption that FBM is a special memory system based on a dedicated neural mechanism. Few nowadays would accept this aspect of Brown and Kulik’s theory. The important point, though, is that their pioneering work has generated a lot of research about the relation between emotion and cognition.

But how does emotionality affect the formation and maintenance of FBM? Despite what Brown and Kulik believed, there is little evidence that emotionality has much of an impact during the initial encoding of the event. Rather, emotionality seems to exert its effects at a later stage by affecting rehearsal and social sharing. This is further discussed below.

3.9 The effects of social or cultural factors on cognitive processes

Learning outcomes
- Discuss how social or cultural factors affect one cognitive process.

Bartlett’s work (1932) demonstrating how schemas originating in one particular culture can affect how text from another culture is recalled is directly relevant to this learning outcome. His participants relied on schematic knowledge, acquired within their culture, to understand and later recall a story from a very different culture. Bartlett’s work showed that our past is, to a significant extent, a construction; moreover, one that relies heavily on the ideas and knowledge we develop in the cultural settings we inhabit. The role of social or cultural factors in memory is further discussed by examining how one particular cultural dimension (individualism/collectivism) affects FBM.
Case studies
Case studies, like the neuropsychological case studies discussed in Chapter 2 (e.g. HM), have made substantial contributions by providing in-depth information about phenomena that cannot be studied experimentally. It is not always easy to generalize from case studies, but as more and more case studies relevant to the same phenomenon accumulate and point to the same conclusions, so our confidence in those conclusions increases. Needless to say, the eagerness of scientists to investigate individuals with unusual characteristics should never lead to a situation where liberties are taken with the studied individuals’ time and comfort. Finally, confidentiality and anonymity, more perhaps than in other studies, should always be promised and delivered.

Interviews
Several of the studies covered in this chapter made use of interviewing procedures. The fact that we rely on interviews in the cognitive level of analysis should not come as a surprise. The subjective data collected are not the type of introspectionistic data that led to the demise of introspectionism. Participants are not asked about the minutiae of the workings of their mind; they are asked to report on subjective experiences (e.g. FBMs) that are readily accessible and to a great extent easy to communicate to others. The value of the data collected by interviews does, of course, depend on the type of interview used, the sensitivity of the issues addressed, and the validity of the data analysis techniques employed. Likely ethical issues relate to the immediacy and power relations inherent in the types of social interaction interviewing requires, the sensitivity of what is being discussed and confidentiality issues.

In conclusion
Different methods have their respective strengths and weaknesses. It is, therefore, necessary to use triangulation – that is, apply a variety of methods to the study of the same cognitive phenomenon.

PRACTICE QUESTIONS

**Short answer questions**

1. Outline one model of one cognitive process.
2. Describe one theory of how emotion may affect one cognitive process.
3. Explain how technology can be used to investigate cognitive processes.
4. Analyse how social or cultural factors affect one cognitive process.

**Essay questions**

1. Evaluate schema theory with reference to research studies.
2. Discuss the extent to which cognitive and biological factors interact in emotion.