

Memory: what we think the psychiatrist should know in a forensic context

Clodagh Commane  & Michael D. Kopelman

ARTICLE

SUMMARY

This article offers a selective review of memory and of issues relevant for a psychiatrist thinking about memory in a forensic context. It considers the development of our knowledge of memory, some of the ways in which memory can be erroneous and some evidence that this fallibility may sometimes be overstated. It concludes with a section on good practice in psychiatric assessment and in medico-legal work, looking at memory assessment, malingering/exaggeration and guidance for expert witnesses.

LEARNING OBJECTIVES

After reading this article you will be able to:

- outline some of the prominent landmarks in the development of the study of memory
- appreciate the fallibility of human memory
- refer to applications in medico-legal work in relation to memory.

KEYWORDS

Forensic mental health services; memory; psychological testing; memory and the law; psychiatry and law.

on the one hand and ‘recall’/‘recognition’ on the other). Consequently, we think it important to begin this article with a reiteration of the evolution of these more scientific notions, although our account will inevitably be sketchy and selective. Next, we look at aspects of memory within a forensic framework. We consider the fallibility of memory, then offer a brief glance at some aspects of memory disorders and forensic psychiatry. Finally, we discuss memory assessment and outline guidance in relation to good practice generally and in medico-legal work.

The article offers a highly selective review of some issues relevant for a psychiatrist thinking about memory in a forensic context. It does not provide a comprehensive discussion of memory disorders.

Selected landmarks in the study of memory

‘Our memories might be less reliable than those of the average computer but they are just as capacious, much more flexible, and a good deal more user friendly.’ (Baddeley 2015)

Memory can be defined as the effects of experience on thought, action and feeling (McNally 2005) or as the ability to store and retrieve information over time (Schachter 2016).

The laboratory-based study of memory is often said to have begun with Hermann Ebbinghaus, a German psychologist who in the 1880s sought to explore the general laws of memory. He used lists of nonsense syllables consisting of a consonant–vowel–consonant, such as *zug*, *huz*, *jix*, as material to test his own memory. He made an effort to keep his testing conditions constant, always presenting the material to himself in the same room, at the same time of day and reciting the syllables to himself at the same speed. He demonstrated several principles of memory, including the total time hypothesis, the distributed practice effect, and primacy and recency effects [Box 1]. He showed that information loss after learning is initially very rapid and then levels off.

At around the same time that Ebbinghaus was seeking to distil quantitative, objective features of the workings of normal human memory, clinical

Clodagh Commane, BA, MSc, LLM, MRCPsych, trained in general adult and in forensic psychiatry. She is currently a consultant liaison psychiatrist in East London NHS Foundation Trust, working in Newham University Hospital.

Michael Kopelman, PhD, FBPSS, FRCPsych, FMedSci, is Emeritus Professor of Neuropsychiatry, King’s College London (Institute of Psychiatry, Psychology & Neuroscience), based at St Thomas’ Hospital, London, UK. He was a founder member of the Society of Expert Witnesses and of the Memory Disorders Research Society (both were founded in 1989) and President of the British Academy of Forensic Sciences (2011–2013), and is a current member of Forensic Psychiatry Chambers.

Correspondence Clodagh Commane. Email: clodagh.commane@nhs.net

First received 14 May 2020

Final revision 23 Oct 2020

Accepted 29 Oct 2020

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‘How wonderful, how very wonderful the operations of time, and the changes of the human mind! [...] If any one faculty of our nature may be called more wonderful than the rest, I do think it is memory. There seems something more speakingly incomprehensible in the powers, the failures, the inequalities of memory, than in any other of our intelligences. The memory is sometimes so retentive, so serviceable, so obedient; at others, so bewildered and so weak; and at others again, so tyrannic, so beyond control! We are, to be sure, a miracle every way; but our powers of recollecting and of forgetting do seem peculiarly past finding out.’

Jane Austen, *Mansfield Park* (1814)

Traditional clinical notions of memory have often been far removed from modern scientific concepts, both in general framework and the descriptors employed (e.g. varying notions of ‘short-term’ and ‘long-term’ memory; the use of ‘registration’/‘recall’ versus ‘encoding’/‘consolidation’/‘retrieval’

BOX 1 Principles of memory established by Ebbinghaus

Total time hypothesis The amount of information retained depends on the time spent learning.

Distributed practice effect Learning is more efficient when divided up over time.

Several shorter sessions are more effective for remembering than one longer session.

Primacy and recency effects The first few items and the last few items of a list are better remembered than the items in the middle.

cases were described which demonstrated that memory could be damaged in isolation, leaving other cognitive faculties relatively intact. Amnesia can be defined as an abnormal mental state in which memory and learning are impaired out of proportion to other cognitive functions. In 1878, Robert Lawson published an article ‘On the symptomatology of alcoholic brain disorders’ in which he noted that in some patients with a history of excessive drinking there is:

‘almost absolute loss of memory for recent events. The patients are cheerful, attentive, understand what is said to them, and show little dementia as far as simple processes of reasoning are concerned, but are absolutely destitute of memory for passing events. When the medical officer makes his visit (perhaps the third in the course of the day), and asks “Have you seen me before?” the patient asserts that he or she has not; and the constant, ineffectual repetition of this question at short intervals, shows that the capability of retaining new impressions has completely disappeared’ (Lawson 1878).

The amnesia delineated by Lawson was also described by Sergei Korsakoff in a series of articles that outlined the mental features frequently accompanying alcoholic polyneuropathy (Korsakoff 1887, 1889). Korsakoff described a marked disturbance of memory in a setting of clear consciousness and postulated that the syndrome might be due to a toxin. It was later understood that Korsakoff syndrome is due to thiamine deficiency.

The laboratory-based standardised methods introduced by Ebbinghaus continued with the development of the behaviourist approach in the 20th century. A different tradition emerged in Germany in the 1930s, when Gestalt psychologists stressed the importance of internal mental processes and moved the focus away from observable stimuli and responses. They emphasised the active role of the rememberer in organising the material to be learned.

In 1932, the British psychologist Frederic C. Bartlett published his book *Remembering*, which accentuated the importance of the rememberer’s ‘effort after meaning’ (Bartlett 1932). Bartlett studied memory in naturalistic settings, using stories and pictures rather than meaningless nonsense syllables. He emphasised the importance

of the rememberer’s pre-existing knowledge of the world, which he suggested was organised as ‘schemas’, in determining how new information would be remembered. For Bartlett,

‘Remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction, or construction, built out of the relation of our attitude towards a whole active mass of organized past reactions or experience, and to a little outstanding detail which commonly appears in image or in language form. It is thus hardly ever really exact, even in the most rudimentary cases of rote recapitulation, and it is not at all important that it should be so’ (Bartlett 1932).

During and after the Second World War, the development of computers led to the growth of an information-processing approach to the study of memory. The digital computer provided an analogy which suggested that the functions of human memory might be described in terms of registering or encoding, storage and retrieval. Atkinson & Shiffrin (1968) proposed a very influential model that comprised a sensory register, a short-term store and a long-term store.

However, Craik & Lockhart (1972) questioned the adequacy of using a multi-store model, in which information is transferred from one store to another, to understand human memory. They emphasised processes rather than stores and suggested that the memory trace is better described in terms of depth of processing. Items that are more deeply processed will be better remembered.

Partly in response to this, and also to work by Shallice & Warrington on the isolated impairment of short-term memory (Warrington 1969; Shallice 1970), Baddeley & Hitch (1974) developed a model of working memory. Working memory is a system that combines temporary storage and executive processing of material in order to perform a range of complex activities. For example, when mental arithmetic involves several digits, we use our working memories to hold and manipulate the temporary subtotals: ‘Working memory sits at the interface of perception, long- and short-term memory and attention, making bound chunks of information available for conscious manipulation’ (Baddeley 2019). The original 1974 model of working memory proposed by Baddeley & Hitch had three components: a phonological loop specialised for holding sequences of acoustic or speech-based items, a visuo-spatial sketchpad, which is responsible for the temporary maintenance of visual and spatial information, and a central executive, which acts as a control mechanism. The current Baddeley & Hitch model (Baddeley 2019) also includes an episodic buffer, which serves to allow

the various subcomponents of working memory to interact with long-term memory.

The biology of memory

Hebb (1949) suggested, among many other things, that when one nerve cell fires another repeatedly, a growth process or metabolic change takes place at synapses, so that the efficiency with which that cell fires the other is increased. Hebb's postulate is often summarised as 'cells that fire together, wire together'.

Beginning in the 1960s, Kandel (2007) used the gill-withdrawal reflex of the giant marine snail *Aplysia* to demonstrate that, as the snail learned, chemical signals changed the structure of synapses in its nervous system. Kandel showed that learning was related to an increase in the electrical strength of the connections at synapses. He went on to show that short-term and long-term memories are formed by different signals. Unlike short-term memory, long-term memory requires protein synthesis.

Following this, Bliss & Lomo (1973) described how repeated electrical stimulation of an axonal pathway led to a long-term increase in the size of potentials in the post-synaptic neuron. This form of synaptic strengthening, known as long-term potentiation (LTP), is thought to play an important role in memory.

Many forms of memory

The study of individual clinical cases has been particularly fruitful in the development of our understanding of memory. Scoville & Milner (1957) published a paper describing the memory loss evident in HM following bilateral resection of his medial temporal lobes. HM became probably the most comprehensively studied patient in neuroscience. He was 27 when the neurosurgeon Scoville operated with the aim of controlling his intractable epilepsy. Scoville's operation notes recorded 'bilateral resection of medial surface of temporal lobe, including uncus, amygdala, and hippocampal gyrus' (Scoville 1957; Corkin 2013). Twenty months after the operation, Milner carried out a wide range of cognitive tests on HM, which indicated that his overall intelligence was above normal and his capacities for perception, abstract thinking and reasoning were normal. However, his ability to remember experiences for more than a few minutes was profoundly impaired. When Milner switched to a new task, HM could no longer recall or recognise the preceding task. He could remember and repeat a string of digits immediately but could not remember whether he had eaten breakfast. During the course of a 15 min conversation, he told the same story several times without realising that he was repeating himself (Scoville 1957; Milner 1966).

The study of HM's memory impairment illustrated not only the dissociation of memory from other cognitive functions (in that HM's memory was impaired but his other cognitive functions were intact) but also the dissociation of several different components of memory. First, although HM's ability to learn new information was impaired, his immediate recall and his memory of his childhood were relatively undamaged (this latter point was disputed in later studies but, by then, HM was likely to have been in the early stages of the dementia that blighted his later years, and he had suffered many years of continuing epileptic seizures). Second, and perhaps more surprisingly, Milner discovered that the destruction of HM's ability to acquire new knowledge pertained to explicit information (he could not remember a new brief story or recall a list of words) but did not prevent him from learning new skills. Over three consecutive days in 1959, Milner engaged HM in a mirror tracing activity. The task involved moving a pencil to trace the diagram of a star while looking at his hand only as a reflection in a mirror (Milner 1966). Most people initially find this visual and motor activity difficult but improve with practice. On the first day, HM performed with many errors, but he improved over the course of the day and continued to improve over subsequent days, so that on the third day, he performed almost perfectly. Although he did not remember that he had done any mirror tracing in previous days, his skill improved markedly through practice (Milner 1966; see also Corkin 1968). Similarly, in 1986 when he was given a walking frame following a hip replacement operation, HM succeeded in learning several procedures necessary to use the walker without remembering that he had had a hip replacement, when or why he had been given a walker or that he had been taught how to use it (Corkin 2013).

The striking dissociation between explicit/declarative memory and implicit/non-declarative/procedural memory, vividly illustrated by HM, emphasises that memory is not a single unitary process but rather a collection of several distinct abilities. Such dissociations have also been reported in many other patients (e.g. Cermak 1983; Rosenbaum 2005; Wilson 2008; Kopelman 2015). Explicit memory provides the basis for the conscious recollection of facts and events. Tulving (1972) suggested that explicit/declarative memory could be divided into episodic memory, which includes 'autobiographical' memories and underpins our ability to remember events (specific in time and place), and semantic memory, which refers to our knowledge of the world (facts, concepts, language). Implicit memory refers to a number of non-conscious memory abilities, including skill-based procedural

learning such as mirror-drawing. It also includes priming, which involves the improved facility to detect or process perceptual or semantic items as a result of (recent or past) experience. Your implicit/procedural memory enables you to ride a bicycle. Your episodic memory enables you to relive the experience of falling off your bicycle on one particular day in Paris. Your semantic memory includes the knowledge that Paris is the capital city of France (Baddeley 2014).

The fallibility of memory

'The public in the main suspects that the witness lies, while taking for granted that if he is normal and conscious of responsibility he may forget a thing, but it would not believe that he could remember the wrong thing.' 'Justice would less often miscarry if all who are to weigh evidence were more conscious of the treachery of human memory.' (Munsterberg 1908)

As he approached his 60th birthday, the neurologist Oliver Sacks began spontaneously to remember experiences from his boyhood. He collated the memories in his book *Uncle Tungsten*. In an article 'On Memory' published in *The Threepenny Review*, Sacks (2005) wrote that he had expected to notice deficiencies in his memory but instead was surprised to discover that his beliefs about some of his memories were entirely mistaken:

'I assumed that the memories I did have, especially those which were very vivid, concrete, and circumstantial, were essentially valid and reliable, and it was a shock to me when I found that some of them were not.

A striking example of this, the first that came to my notice, came up in relation to the two bomb incidents that I describe in *Uncle Tungsten*, both of which occurred in the winter of 1940–1941, when London was bombarded in the Blitz:

"One night, a thousand-pound bomb fell into the garden next to ours, but fortunately it failed to explode. All of us, the entire street, it seemed, crept away that night (my family to a cousin's flat) – many of us in our pajamas – walking as softly as we could (might vibration set the thing off?). The streets were pitch dark, for the blackout was in force, and we all carried electric torches dimmed with red crepe paper. We had no idea if our houses would still be standing in the morning.

On another occasion, an incendiary bomb, a thermitic bomb, fell behind our house and burned with a terrible, white-hot heat. My father had a stirrup pump, and my brothers carried pails of water to him, but water seemed useless against this infernal fire – indeed, made it burn even more furiously. There was a vicious hissing and sputtering when the water hit the white-hot metal, and meanwhile the bomb was melting its own casing and throwing blobs and jets of molten metal in all directions."

A few months after the book was published, I spoke of these bombing incidents to my brother, Michael.

Michael is five years my senior and had been with me at Braefield, the boarding school to which we had been evacuated at the beginning of the war (and in which I was to spend four miserable years, beset by bullying schoolmates and a sadistic headmaster). My brother immediately confirmed the first bombing incident, saying, "I remember it exactly as you described it." But regarding the second bombing, he said, "You never saw it. You weren't there."

I was staggered at Michael's words. How could he dispute a memory I would not hesitate to swear on in a court of law and had never doubted as real?

"What do you mean?" I objected. "I can see the bomb in my mind's eye now, Pop with his pump, and Marcus and David with their buckets of water. How could I see it so clearly if I wasn't there?"

"You never saw it," Michael repeated. "We were both away at Braefield at the time. But David [our older brother] wrote us a letter about it. A very vivid, dramatic letter. You were enthralled by it." Clearly, I had not only been enthralled, but must have constructed the scene in my mind, from David's words, and then taken it over, appropriated it, and taken it for a memory of my own.'

Reflecting on his memory of the second bomb after accepting that his older brother was correct and he had not been present when it fell, Sacks wrote:

'I tried to persuade myself that it had a different quality from the first, that it bore evidences of its appropriation from someone else's experience and its translation from verbal description into image. But although I now know, intellectually, that this memory was "false," secondary, appropriated, translated, it still seems to me as real, as intensely my own, as before. Had it, I wondered, become as real, as personal, as strongly embedded in my psyche (and, presumably, my nervous system) as if it had been a genuine primary memory?'. Excerpts from "On Memory" by Oliver Sacks. Originally published in THE THREEPENNY REVIEW. Copyright © 2005, Oliver Sacks, used by permission of The Wylie Agency (UK) Limited.

Many studies have demonstrated that memory can be manipulated and distorted. Loftus & Palmer (1974) described experiments that involved asking people questions about films of car accidents that they had been shown. If people were asked 'About how fast were the cars going when they smashed into each other?', they gave higher estimates of speed than if they were asked how fast the cars were going when they collided, bumped or hit each other. A week later, people who had been asked the question using the verb 'smashed' were more likely to answer 'yes' when asked if they had seen any broken glass in the video even though no broken glass had been visible in the film.

Loftus & Pickrell (1995) carried out an experiment that used what became known as the 'familial informant false narrative' procedure or, more briefly, the 'lost in the mall' procedure. They sent

24 participants a booklet containing four accounts of events from the person's childhood. Relatives of the participants had assisted the researchers in compiling the accounts. Three of the four accounts were true and one was false. The false account described the person getting lost for an extended period at around the age of 5 in a mall or department store, crying, and then being found and helped by an elderly woman and subsequently reunited with their family. The relative of each participant confirmed for the researchers that the person had not been lost in a mall at around the age of 5. After the participants were sent the booklets and asked to record the details of their memories of each of the four events, they were interviewed on two occasions, first 1–2 weeks after receiving the booklets and then 1–2 weeks after the first interview. Participants remembered 68% of the true events. During both interviews, 6 of the 24 participants claimed that they remembered the false event. In their discussion, Loftus & Pickrell (1995) stated that they made no claims about the percentage of people who might be able to be misled in this way, only that they were providing 'existence proof' for the phenomenon of false memory formation. In other studies, participants have been misled into remembering a 'yield' sign as a stop sign and hammers as screwdrivers. False memories have been implanted of having had an accident as a child at a family wedding, or of nearly drowning and being rescued by a lifeguard.

Clinical syndromes of false memory

Various clinical syndromes ('disorders') can give rise to false memories, as reviewed by Kopelman (2010).

Neurological confabulation arises only very occasionally in forensic practice. In one instance overseas, a man with severe alcohol dependency and alcoholic Korsakoff syndrome was found at home with his deceased wife's body. She had been dead several days, and he gave a completely confabulated account of how her body came to be there.

Delusional memories are also uncommon in medico-legal work. They resemble confabulations in many (not all) respects, but they arise in the context of psychosis. Kopelman (2010) gave three examples of delusional memories giving rise to allegations of offences: in one case, the patient claimed falsely to have been a participant in an offence; in a second, the offender's delusional memories resulted in the extension of his prison 'tariff' and a prolonged delay in his (ultimately successful) appeal; in the third, the delusional memories resulted in multiple accusations of child sexual abuse.

In the somewhat unsatisfactory syndrome of *pseudologia fantastica*, people spin a web of fantasies,

lies and untruths about themselves, almost compulsively (Kopelman 2010), with the characteristics that the stories often contain a kernel of truth, have an enduring quality, are disproportionate to any personal gain obtained except for a sense of self-aggrandisement, and are not held with delusional intensity (King 1988). Nevertheless, the web of fantasies can result in false confessions to offences and even criminal convictions (Kopelman 2010).

Finally, there are errors of ordinary forgetfulness (or the 'fallibility' of memory), such as misattributions, source memory errors and suggestibility (Schachter 2001), which can give rise to false confessions (Gudjonsson 2003, 2018).

False confessions

In his book *The Psychology of False Confessions*, Gudjonsson (2018) provides detailed accounts of several wrongful convictions in which false confessions played an important role. He stated that false confessions have occurred in 14–25% of cases of miscarriage of justice in the USA. Gudjonsson & MacKeith (1988) described the circumstances in which false confessions tend to arise, and Gudjonsson (2003) developed a model based on these. False confessions often arise in a person of low self-esteem, commonly associated with some degree of depression, and the person may show high scores on measures of suggestibility (the tendency to internalise suggestions) and/or compliance (the tendency to comply with external suggestions). In the past in the UK (particularly before the Police and Criminal Evidence Act 1984), this often occurred in the context of some degree of police pressure or persuasion. The result was that the confessor started to distrust their own memory (not being able to distinguish 'real' from other memories, a form of 'source amnesia'), and this resulted in a faulty self-attribution and a false confession. The confession might be held with different degrees of conviction but, if 'internalised', Gudjonsson called it a 'confabulation'.

Memories for child sexual abuse

Questions related to the fallibility of human memory have been an element in the controversy which developed in the 1980s, with claims that an increasing number of people, sometimes while seeing a therapist, began to describe memories of childhood trauma, often childhood sexual abuse, which they had not previously disclosed. This resulted in the formation of groups such as the False Memory Syndrome Foundation in the USA. (For a balanced account of the controversies that arose at the time, see Schachter 2011.)

The susceptibility to false memories, particularly with respect to memories of alleged sexual abuse in

childhood, still remains a contentious issue and the subject of rancorous dispute. One issue that is sometimes debated in court is childhood amnesia and the age from which memories can be retrieved, together with the quality of that retrieval. Conway et al (2014) showed that the age of reported first memories is very variable, but is between ages 3 and 5 in 84% of people. Another issue concerns the putative implantation of memories. In a paper entitled 'Creating memories for false autobiographical events in childhood: a systematic review', Brewin & Andrews (2017) wrote that some recollective experience for suggested events is induced in a mean of 47% of participants in memory implantation studies, but only in 15% are these experiences likely to be rated as full memories. They argued that the data were inconsistent with claims that it is easy to create false memories of childhood in others. In response, Otgaar et al (2017) wrote that 'although Brewin and Andrews are to be commended with executing such an arduous exercise, we disagree with their central message that "susceptibility to false memories of childhood events appears more limited than has been suggested"'. They went on to conclude that 'the picture is much more complex than what Brewin and Andrews want the reader to believe on the basis of their selective review of the extant literature'. Nash et al (2017) argued that 'scholarly opinions about the fragility of memory derive from many different types of studies that go far beyond what Brewin and Andrews reviewed'. Andrews & Brewin responded to the commentary on their review in a paper entitled 'False memories and free speech: Is scientific debate being suppressed?', arguing that: 'The objections appear to be more about the implications of the data than the data themselves [...]. Our critics appear only to be concerned with the consequence that therapist-induced false memories might be perceived as less common or less important than what was previously thought' (Andrews 2017). More recently, Brewin & Andrews (2019) have argued that, within limits and under normal circumstances, memory operates with a reasonably high degree of accuracy and that there are risks in overemphasising the fallibility of memory.

Eyewitness testimony

The fallibility of memory is relevant not only in considering allegations by an accuser but also in considering eyewitness testimony. In 1908, Hugo Munsterberg published his collection of essays 'On the Witness Stand'. As well as an account of the litany of inadvertently false statements he made himself while acting as a witness in a trial related to the burglary of his own house, he described an early German study that vividly illustrated the unreliability of eyewitness testimony:

'A few years ago a painful scene occurred in Berlin, in the University Seminary of Professor von Liszt, the famous criminologist. The Professor had spoken about a book. One of the older students suddenly shouts, "I wanted to throw light on the matter from the standpoint of Christian morality!" Another student throws in, "I cannot stand that!" The first starts up, exclaiming, "You have insulted me!" The second clenches his fist and cries, "If you say another word –" The first draws a revolver. The second rushes madly upon him. The Professor steps between them and, as he grasps the man's arm, the revolver goes off. General uproar. In that moment Professor Liszt secures order and asks a part of the students to write an exact account of all that has happened. The whole had been a comedy, carefully planned and rehearsed by the three actors for the purpose of studying the exactitude of observation and recollection. Those who did not write the report at once were, part of them, asked to write it the next day or a week later; and others had to depose their observations under cross-examination. The whole objective performance was cut up into fourteen little parts which referred partly to actions, partly to words. As mistakes there were counted the omissions, the wrong additions and the alterations. The smallest number of mistakes gave 26 per cent of erroneous statements; the largest was 80 per cent. The reports with reference to the second half of the performance, which was more strongly emotional, gave an average of 15 per cent more mistakes than those of the first half. Words were put into the mouths of men who had been silent spectators during the whole short episode; actions were attributed to the chief participants of which not the slightest trace existed; and essential parts of the tragi-comedy were completely eliminated from the memory of a number of witnesses' (Munsterberg 1908).

The contemporary literature on eyewitness testimony is now a huge topic, beyond the scope of the present review. However, modern studies of eyewitness identification and testimony have been well summarised elsewhere in books edited by Heaton-Armstrong et al (2006) and by Nadel & Sinnott-Armstrong (2012); and Fitzgerald et al (2018) have reviewed scientific investigations of live, photographed and video line-ups.

Memory disorders and forensic psychiatry

Amnesia for the offence is reported in 25–45% of people charged with homicide (Pyszora 2003). Amnesia for an offence may be related to a medical disorder, which may involve automatism, intoxication, psychosis or so-called 'crimes of passion'. Except in the case of automatism, there is no potential legal advantage in English law for a defendant to claim amnesia for an offence.

Automatism is a common law defence that is available for all crimes. Lord Denning defined automatism as 'an act which is done by the muscles without any control by the mind such as a spasm, a reflex or a convulsion; or an act done by a person who is not conscious of what he is doing

such as an act done whilst suffering from concussion or whilst sleep-walking' (*Bratty v Attorney-General for Northern Ireland* [1963]). An automatism may be defined pragmatically as an abrupt change of behaviour, in the absence of conscious awareness or memory formation, associated with certain specific clinical disorders such as epilepsy, parasomnia, hypoglycaemia and head injury (Kopelman 2013). The distinction in English law between sane and insane automatisms is notoriously problematic. A sane (or non-insane) automatism involves an external factor such as a blow to the head or an overdose of insulin, and when successfully argued, leads to an acquittal. An insane automatism results from an intrinsic problem such as brain disease. In a discussion paper entitled "Criminal Liability: Insanity and Automatism", the Law Commission (2013) outlined several problems with the current law.

High blood alcohol levels have been associated with an impairment in the encoding/consolidation of memories. An alcoholic 'blackout' refers to a dense amnesia for significant events that have occurred during a drinking episode when, at the time, the drinker's behaviour may have seemed relatively normal (Goodwin 2020). An amnesic gap of a few minutes to an hour may also occur in so-called 'crimes of passion'. These unpremeditated violent offences are generally committed against a partner or lover in a state of extreme emotional arousal. The amnesia may be associated with other features of 'dissociation' either preceding or following the amnesic gap, but not with evidence of neuropsychological impairment, a repressive coping style, post-traumatic stress disorder or shame (Pyszora 2014). Such losses of memory do not in themselves affect criminal responsibility in England and Wales, but the credibility of such amnesia is often challenged in court by the prosecution (seeking to undermine a defendant's credibility more generally) (Kopelman 2013).

Good practice in psychiatric assessment and in medico-legal work

Assessment of memory

In general, the purpose of any assessment of memory is to examine whether specific components of memory are impaired, the severity of any such impairment and whether or not other (non-memory) cognitive functions are also affected, relative to a person's peak educational/occupational accomplishments (Kopelman 1994). Clinically, it is important to distinguish between anterograde episodic memory (the ability to learn new information) and retrograde episodic memory (recall of previously acquired information).

Kopelman (1994) and Hodges (2019) provide helpful guides to clinical cognitive assessment. Most of the tests listed in Box 2 can be done at the 'bedside'. Alternatively, the Addenbrooke's Cognitive Examination, ACE-III, is widely employed (Hsieh 2013); this includes a memory component. More formal memory assessment instruments used in neuropsychological assessment (see Wilson 2004) include the Wechsler Memory Scale-III, the Doors and People Test and the Rivermead Behavioural Memory Test (designed to assess function and to predict problems in everyday life). The wide range of neurological and psychiatric disorders that can affect memory, either transiently, persistently or progressively, have been reviewed elsewhere (e.g. Kopelman 2002; Cope 2020).

More specifically, in an assessment of whether a defendant is cognitively fit to plead or stand trial, a full neuropsychological assessment is often required, in the context of a thorough clinical history and mental state examination and relevant physical investigations, which are likely to include blood tests and a magnetic resonance imaging (MRI) scan. Video simulations of the court process have

BOX 2 Testing of memory

Episodic memory testing

Anterograde verbal memory

- Orientation in time, place and person
- Recall of events, e.g. journey to hospital, topics previously discussed, three recent news events (prompts might include an accident/catastrophe, or political, Royal family or sports event)
- Name and address learning (e.g. Mr John Brown, 12 Brighton Road, Edinburgh, Scotland: eight items, up to five learning trials or perfect recall + delayed recall after 5 minutes); recall and recognition from the Addenbrooke's Cognitive Examination-III

- Formal tests: story recall (logical memory/Anna Thompson story), word-list learning

Anterograde non-verbal memory

- Recall of shapes and designs

Retrograde memory

- Famous past (premorbid) events, e.g. sporting or political events, scandals or disasters
- Autobiographical Memory Interview (events/facts from different life periods)

Semantic memory testing

- Naming everyday items of variable difficulty (easy: jacket/shirt/sleeve/pen/watch; difficult: cuff/cap or nib of pen/skirting board)
- Names of clinical team (if met before and properly introduced)
- Category fluency, e.g. naming animals, fruit
- Naming pictures
- Defining words or pictures
- Picture pointing in response to spoken names
- Non-verbal tests from the Cambridge Semantic Memory Battery

(Adapted from Kopelman 1994 and 2019)

recently been developed for the purpose of assessing fitness to plead, but these in turn have been validated against (relatively brief) neuropsychological test findings; consequently, it is probably more pertinent, as well as more practical, to ensure that a thorough neuropsychological assessment is conducted. In cases of memory loss specifically for an offence (whether in the offender, victim or an eyewitness), it is important to determine whether such memory loss is partial or complete, and to ask about the onset of any amnesia (the last thing the person can recall beforehand), the return of normal, continuing memories (the first thing recalled subsequently) and whether there are any preserved 'islets' of memory in between. This is similar to obtaining an account of the duration of an amnesic gap following a head injury.

Malingering/exaggeration

Questions may arise about the possibility of malingering or feigning memory problems. It is essential to note inconsistencies in a person's account of events or facts, and between a person's own account and that of other witnesses or sources of information. However, it is important to exert caution in interpreting these inconsistencies and to consider that there are many potential reasons for poor test performance. In a legal context, the credibility of a defendant or a witness is ultimately an issue for the court to determine.

Several symptom validity tests have been developed that aim to evaluate the authenticity of symptoms. They usually involve having the participant choose between two (relatively simple) options, one of which is correct, and they rely on the assumption that even random answering should produce roughly 50% correct responses.

A score of less than 50% thus suggests that the participant may have deliberately selected incorrect responses. The Test of Memory Malingering (TOMM) is a widely used test that involves a participant indicating which one of two objects they have seen shortly beforehand. During a first test, the participant is told whether each response is correct. A score of less than 45/50 on the second test is considered consistent with malingering. There is now a wide variety of other tests of exaggeration or malingering, and Tracy (2014) has previously reviewed this topic in more detail in this journal.

Medico-legal work

Psychiatric assessment should be non-judgemental, open-minded and dispassionate. Psychiatrists, like all doctors, should know the limits of their competence and not work in areas in which they are not sufficiently qualified. In medico-legal work and more generally, useful habits to encourage include vigilance against bias and an effort to distinguish explicitly between fact and opinion. The law makes a distinction between an ordinary witness who provides factual evidence and an expert witness whose specialist knowledge entitles them to give evidence on their opinion. An expert witness should seek to assist the court but should not usurp the role of the court in determining the ultimate issue, which it is the court's role to decide.

In a 2017 lecture, Lord Hodge, then Justice, now Deputy President of the Supreme Court, discussed the use, abuse and boundaries of expert evidence in court. He wrote that 'in many cases, expert evidence is an essential component of the attempt by the courts to get to the truth and thus achieve justice', but also warned that 'because an expert enjoys a

BOX 3 The Criminal Procedure Rules 19.4: Content of an Expert's Report

'An expert's report must

- (a) give details of the expert's qualifications, relevant experience and accreditation;
- (b) give details of any literature or other information which the expert has relied on in making the report;
- (c) contain a statement setting out the substance of all facts given to the expert which are material to the opinions expressed in the report, or upon which those opinions are based;
- (d) make clear which of the facts stated in the report are within the expert's own knowledge;
- (e) where the expert has based an opinion or inference on a representation of fact or opinion

made by another person for the purposes of criminal proceedings (for example, as to the outcome of an examination, measurement, test or experiment) –

- (i) identify the person who made that representation to the expert,
 - (ii) give the qualifications, relevant experience and any accreditation of that person, and
 - (iii) certify that that person had personal knowledge of the matters stated in that representation;
- (a) where there is a range of opinion on the matters dealt with in the report –

- (i) summarise the range of opinion, and
 - (ii) give reasons for the expert's own opinion;
- (b) if the expert is not able to give an opinion without qualification, state the qualification;
 - (c) include such information as the court may need to decide whether the expert's opinion is sufficiently reliable to be admissible as evidence;
 - (d) contain a summary of the conclusions reached;
 - (e) contain a statement that the expert understands an expert's duty to the court, and has complied and will continue to comply with that duty; and contain the same declaration of truth as a witness statement.'

(Reproduced from HM Government 2019)

BOX 4 Research findings concerning the reliability of a witness's testimony

- Human memories are good at extracting the gist of an event, but tend to discard the sort of detail that might be highly relevant in court.
 - People retain very few memories before the age of five, so called infantile amnesia. Beyond this age, children can be a valuable source of information, given appropriate interview methods. Memory for specific events tends to improve up to the late teens and gradually declines, with a steeper decline beyond the age of 60.
 - Memory of a traumatic event may be intrusive as in the case of flashbacks in post traumatic stress disorder. In other cases, the traumatic event may fail to be retrieved, which may or may not be intentional. High levels of emotion may also reduce the capacity of the witness to recall detail.
 - Memory tends to decline over time, particularly for detail. There is a greater likelihood of forgetting specific details for a particular event when similar events have occurred either before or after the event in question.
 - The process of interviewing a witness can interfere with memory, particularly if leading questions press the witness to come up with inaccurate memories. For instance, people asked whether broken glass was present when two cars 'crashed' are less likely to falsely report that there was broken glass if 'crashed' is replaced by a word that does not imply that there probably was broken glass, such as collided. False memories are particularly likely to occur in situations of heightened suggestibility (eg in therapy), and when memories are sought from many years ago, as in some memories of child abuse.'
- (Reproduced from Royal Society 2011: p. 27)

privileged position in the forensic process, he or she can cause significant harm by failing to be reflective and balanced in approach, by going beyond his or her expertise, by adopting a crusading approach to a subject, by being partisan, and by straying into the role of advocate' (Hodge 2017).

Various forms of guidance are available for doctors carrying out medico-legal work and more specifically for medico-legal work in relation to memory. Hodge's (2017) lecture and all of the guidance mentioned below are available online.

The General Medical Council (GMC) has produced guidance for doctors giving evidence in court (General Medical Council 2020). A doctor may give evidence as a witness of fact (i.e. a professional witness), who provides professional

evidence of clinical findings, observations and actions, or as an expert witness, whose role is to help the court on specialist or technical matters within his or her expertise. In either case, the first duty of all witnesses is to the court and not to the person providing instruction and payment. Evidence must be honest and impartial.

Part 19 of The Criminal Procedure Rules (amended April 2019) outlines rules about the provision of expert evidence. Section 19.4 specifies the necessary content of an expert's report (Box 3).

In 2011, the Royal Society published four reports on a project called Brain Waves, which investigated developments in neuroscience and their implications for society and public policy. The fourth report, on neuroscience and the law

BOX 5 The British Psychological Society guidelines on memory and the law: key points

- Memories are records of people's experiences of events and are not a record of the events themselves.** In this respect, they are unlike other recording media such as videos or audio recordings, to which they should not be compared.
 - Memory is not only of experienced events but it is also of the knowledge of a person's life, i.e. schools, occupations, holidays, friends, homes, achievements, failures, etc. As a general rule memory is more likely to be accurate when it is of the knowledge of a person's life than when it is of specific experienced events.
 - Remembering is a constructive process.** Memories are mental constructions that bring together different types of knowledge in an act of remembering. As a consequence, memory is prone to error and is easily influenced by the recall environment, including police interviews and cross-examination in court.
 - Memories for experienced events are always incomplete.** Memories are time-compressed fragmentary records of experience. Any account of a memory will feature forgotten details and gaps, and this must not be taken as any sort of indicator of accuracy. Accounts of memories that do not feature forgetting and gaps are highly unusual.
 - Memories typically contain only a few highly specific details.** Detailed recollection of the specific time and date of experiences is normally poor, as is highly specific information such as the precise recall of spoken conversations. As a general rule, a high degree of very specific detail in a long-term memory is unusual.
 - Recall of a single or several highly specific details does not guarantee that a memory is accurate or even that it actually occurred. In general, the only way to establish the truth of a memory is with independent corroborating evidence.
 - The content of memories arises from an individual's comprehension of an experience, both conscious and non-conscious. This content can be further modified and changed by subsequent recall.
 - People can remember events that they have not in reality experienced.** This does not necessarily entail deliberate deception. For example, an event that was imagined, was a blend of a number of different events, or that makes personal sense for some other reason, can come to be genuinely experienced as a memory, (these are often referred to as 'confabulations').
- (Reproduced in part from British Psychological Society Research Board 2008, revised 2010: p. 2)

MCQ answers

1 c 2 d 3 e 4 b 5 e

(Royal Society 2011), contains a section on memory which outlines a number of research findings concerning the reliability of a witness's testimony (Box 4).

The British Psychological Society has produced guidelines on memory and the law (British Psychological Society Research Board 2008, revised 2010), the key points of which are shown in Box 5.

Conclusions

'Has it ever struck you that life is all memory, except for the one present moment that goes by you so quick you hardly catch it going?'

Tennessee Williams: *The Milk Train Doesn't Stop Here Anymore* (1963)

Memory is central to our existence. Bartlett (1932) described memory as 'one achievement in the line of the ceaseless struggle to master and enjoy a world full of variety and rapid change', and autobiographical memory provides the foundation of our sense of personal identity. In this article, we have looked at the development of our knowledge of memory, and we have reviewed some of the ways in which memory can be erroneous, as well as some evidence that this fallibility may sometimes be overstated. We have briefly sketched some of the issues with which the psychiatrist should be familiar when thinking about memory in a forensic context. By its very nature, memory is not a well-circumscribed topic, but we hope we have conveyed some of its fascination.

Author contributions

Both authors made substantial contributions to the design, drafting, revision and final approval of the article and both are accountable for all aspects of the work.

Funding

This work received no specific grant from any funding agency, commercial or not-for-profit sectors.

Declaration of interest

None.

ICMJE forms are in the supplementary material, available online at <https://doi.org/10.1192/bja.2020.89>.

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MCOs

Select the single best option for each question stem

1 Amnesic syndrome:

- a is a form of dementia
- b should only be diagnosed after a magnetic resonance imaging (MRI) head scan has been done
- c refers to a disproportionate impairment of learning and memory, with other cognitive functions relatively intact
- d tends to involve a severe impairment of procedural memory
- e is always associated with excess thiamine.

2 With regard to the fallibility of human memory:

- a people can be persuaded to misremember minor details, but it is almost impossible for a person to remember a major event that did not happen
- b false memories usually have a clearly different subjective quality to true memories
- c repeated questioning is a good method to encourage a witness to remember events accurately
- d false confessions have played an important role in several wrongful convictions
- e studies have shown that when defendants claim they cannot remember committing acts of violence, they must be lying.

3 Automatism:

- a is a legal term coined by Lord Denning which refers to an increased rate of accidents attributable to drivers of automatic cars tending to fall asleep at the wheel
- b is a common law defence that can apply only in murder cases
- c refers to an electroencephalogram finding seen in temporal lobe epilepsy
- d is divided in English law into sane automatism, which is due to an intrinsic factor, and insane automatism, which is due to an external factor
- e refers to an abrupt change of behaviour, in the absence of conscious awareness or memory formation, associated with specific clinical disorders such as epilepsy, parasomnia, hypoglycaemia and head injury.

4 An expert witness:

- a is another term for a professional witness
- b should assist the court with specialist or technical matters that are within their expertise
- c should not contradict the solicitor who has instructed them
- d should form a view as to whether the defendant is guilty
- e should always use statistics to illustrate their evidence.

5 Human memory:

- a works like a video recorder
- b was described by Atkinson & Shiffrin using a model that includes short-term, medium-term and long-term stores
- c cannot be usefully studied with single case descriptions
- d tends to recall the details better than the overall gist of an incident
- e involves a constructive process.