

## 1 ‘Memory is like a dog that lies down where it pleases’

Our memory has a will of its own. We tell ourselves, ‘This is something I must remember, this is a moment I must hang on to, this look, this feeling, this caress’, yet within a few months, or even after just a couple of days, we find that the memory can no longer be summoned up with the colour, smell or savour we were hoping for. ‘Memory’, says Cees Nootboom in *Rituals*, ‘is like a dog that lies down where it pleases.’

Nor does our memory take much notice of our order *not* to preserve something: if only I had never seen that, experienced it, heard of it; if only I could just forget all about it. But it’s no good, it keeps turning up at night, spontaneously and uninvited, when we cannot fall asleep. Then, too, memory is a dog; it retrieves what we have just thrown away, wagging its tail.

Since the 1980s psychologists have been referring to the part of our memory in which we store our personal experiences as our ‘autobiographical memory’. It is the chronicle of our lives, a long record we consult whenever someone asks us what our earliest memory is, what the house we lived in as a child looked like, or what was the last book we read. Autobiographical memory recalls and forgets at the same time. It is as if you are having the notes of your life taken by an obstreperous company secretary, who meticulously documents those things you would rather forget and during your finest hours pretends to be industriously at work when actually he still has the cap of his pen screwed on.

Autobiographical memory obeys some mysterious laws of its own. Why does it contain next to nothing about what happened before we were three or four? Why are hurtful events invariably recorded in indelible ink? Why are humiliations remembered for years on end with the precision of a charge sheet? Why is it invariably set in motion at sombre moments and during sombre events? Depression and insomnia transform our autobiographical memory into a tale of woe: every unpleasant memory is linked to other unpleasant memories by an oppressive network of cross-references. Now and then we are

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taken by surprise by our own memory. A smell suddenly reminds us of something we haven't thought about for thirty years. A street we last saw when we were seven seems to have shrunk beyond all recognition. Memories of youth can seem clearer in old age than they were at the age of forty. And these are mere common or garden recollections. You might also want to know why you still remember exactly where you were when you heard that Princess Diana had been killed, how having a *déjà vu* comes about and why life seems to speed up as you grow older.

It seems odd that psychologists should not have identified something like an 'autobiographical memory' until fairly recently. This is because the ability to store your personal experiences and recall them later is precisely what is meant by 'memory' in common speech. What else could your personal memory possibly contain except 'personal experiences'? This question is, however, based on a misunderstanding. Every psychology textbook distinguishes between dozens of different types of memory. Some forms of memory refer to the duration of the memory storage, for instance short- or long-term memory; others refer to the sense with which different types of memories are linked, for instance auditory or iconic memory, and yet others to the type of information stored, for instance semantic, motor or visual memory. All these types of memory have their own laws and characteristics; you remember the meaning of a word differently from the way you remember the movements you make with your feet when driving a car, Pythagoras' theorem differently from the first time you went to school. On further reflection it is therefore not so remarkable that it was not until the early 1980s that among all the different forms of memory a special technical term was introduced for storing memories of personal experiences. Quite another question is why the study of autobiographical memory should have got under way when it did. *Why so late in the day?*

### In London and Berlin

It could easily have happened a century earlier. The first experiments with what is now called autobiographical memory were made in about 1879 and were conducted by the English scientist Sir

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Francis Galton (1822–1911), who had become interested in his own associations. While on a stroll along Pall Mall, he fixed his attention on the objects he saw and at the same time noted the associations they called to mind. He was surprised to find how varied his associations were and that they often reminded him of things about which he had not thought for a long time. In observing the operation of his own mind, incidentally, Galton was faced with the ‘difficulty of keeping watch without embarrassing the freedom of its action’. Galton solved this problem by allowing his mind to play freely for a while, quietly waiting until a couple of ideas had passed through it. Then he suddenly turned his attention upon them ‘to scrutinise them, and to record their exact appearance’. It resembled a sudden arrest and search. After his walk, Galton decided to repeat his experiment in a more systematic fashion. He drew up a list of seventy-five words that seemed suitable to him, like ‘carriage’, ‘abbey’ and ‘afternoon’, wrote them on sheets of paper and laid one of the sheets under a book in such a way that he could read the next word only by leaning forward. The experiment had a fixed procedure. Galton leaned forward, read the word, pressed a small ‘chronograph’ or stopwatch, waited for a few associations to rise in his mind and stopped his chronograph. He then made a note of his associations and recorded the time it had taken to form them. ‘I soon got into the way of doing all this in a very methodical and automatic manner’, Galton explained, ‘keeping the mind perfectly calm and neutral, but intent and, as it were, at full cock and on hair trigger, before displaying the word.’ This is not to say that Galton enjoyed the experiments; on the contrary, he found them extremely irksome and trying. He had to summon all his resolution to carry on. Galton went through the list on four separate occasions, with intervals of about a month and under very different circumstances. He ended up with a total of 505 associations taking up a total time of 660 seconds. This amounted to a rate of fifty in a minute – ‘miserably slow’, Galton felt, compared to the natural speed of association in reverie. The number of *different* associations was considerably lower than the original list of 505: a mere 289. This surprised Galton and it certainly diminished his admiration for the variety he had noticed in his first experiment, strolling along Pall Mall. His associations seemed to behave like actors staging an endless procession by marching off on one side and running back behind the

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stage to join the procession again on the other side. All this repetition proved that ‘the roadways of our minds are worn into very deep ruts’.

Another discovery was that so many of his associations went back to his youth – no fewer than 39 per cent. Several words had made him recall how, as a boy, he had been allowed to poke around for a couple of days in the laboratory of a chemist he knew. Recent events gave rise to considerably fewer associations – just 15 per cent. Moreover it was, above all, the ‘old’ associations that were responsible for all the repetitions: a quarter of the youthful associations came up four times, that is, ran back three times. Education and training had a marked effect on adult associations. Although Galton had seen a great deal of the world and had made his name as an explorer, he was struck by the fact that his associations had remained typically English; indeed when he examined the list, he also found that they were characteristic of the social background in which he had been born and had grown up.

At the end of his experiments, Galton was a satisfied man. He had demonstrated that fleeting associations can be recorded and registered for statistical analysis, that they can be sorted, dated and categorized. He had penetrated the ‘obscure depths’ of his mind. What he had seen there was not always fit to print. Associations, he wrote, ‘lay bare the foundations of a man’s thoughts with curious distinctness, and exhibit his mental anatomy with more vividness and truth than he would probably care to publish in the world’. The general impression his experiments had left upon him ‘is like that which many of us have experienced when the basement of our house happens to be under thorough sanitary repairs, and we realise for the first time the complex systems of drains and gas and water pipes, flues, bell-wires, and so forth, upon which our comfort depends, but which are usually hidden out of sight, and with whose existence, so long as they acted well, we had never troubled ourselves’.

With his research, Francis Galton might well have become the founder of a promising psychology of autobiographical memory. He was the first to demonstrate the ‘reminiscence effect’: the fact that, as we approach the age of sixty – Galton was fifty-seven – our associations tend to turn to our youth. He was also the first to devise a method for gaining access to compartments of the mind that

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had never before been opened to systematic research. Yet his experiments had no significant sequel. The reason was that, at the same time, in about 1879, someone else was busy conducting memory experiments, again with lists of words and a stopwatch. That man was a German.

Hermann Ebbinghaus (1850–1909) was a philosopher. After working in England and France as a private tutor, he was called to Berlin to teach Prince Waldemar at the Prussian court. The lessons came to an abrupt end when Waldemar died of diphtheria in 1879. Ebbinghaus then decided to try his luck as a private university lecturer in philosophy. His thesis was devoted to the experiments that he had begun while still at the Prussian court. Just like Galton – but independently of him – he had investigated the workings of his own memory.

Ebbinghaus designed his own cues. He inserted one vowel between two consonants, obtaining a stock of 2,300 syllables such as ‘nol’, ‘bif’ and ‘par’. He next wrote these syllables – often called ‘nonsense syllables’, although some of them were real words – on cards. The average experiment went as follows: at a fixed time of day, Ebbinghaus would place his watch on the table and pick up the supply of cards, select a number of them randomly and copy the syllables into a notebook. Next, he would run a piece of string with wooden beads, every tenth bead being coloured black, through his fingers. Then he would start to read the series of syllables to himself at great speed – two or three syllables per second – until he knew the series by heart. Later, after an interval that could vary from twenty minutes to six days or even a whole month, he would repeat the test using the same set of syllables. By deducting the number of repetitions needed to relearn the series from that needed to learn it, Ebbinghaus obtained an index of what he called ‘saving’: relearning demands fewer repetitions than learning, but how many fewer depends on the interval between learning and relearning.

With this method, Ebbinghaus discovered an indirect path to the quantification of the memory. You cannot measure directly what you have forgotten but you can determine the number of repetitions needed to relearn it. In particular, Ebbinghaus was able to express his discovery that people forget more as the time interval since they learned it increases by means of a curve that dips very quickly during

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the first twenty minutes, slopes a little less steeply after an hour, and after a day flattens out – Ebbinghaus’s famous ‘forgetting curve’. Another of his discoveries was that the number of repetitions required increases disproportionately with the number of syllables used. If the series consisted of up to seven syllables, Ebbinghaus was able to learn it in one attempt, but with twelve syllables he needed as many as seventeen repetitions, and with sixteen syllables the figure shot up to thirty. This disproportionate increase is now known as the ‘Ebbinghaus law’.

In 1880, Ebbinghaus presented the report of his experiments as a *Habilitationschrift*, the thesis required of candidates for a university lectureship, to the physicist and mathematician Hermann von Helmholtz. Helmholtz’s opinion was favourable: he praised the approach and the statistical treatment, thought the results ‘not particularly impressive’ but acknowledged that this was something you could not tell in advance, and recommended the appointment of this ‘bright fellow’ as an unsalaried lecturer. With the desired appointment successfully negotiated, Ebbinghaus repeated his experiments and complemented them with new research. He continued to be his own guinea pig. There was no other way. The concentration required, he wrote, the patience the experimental subject needs in order to submit for months to so utterly boring a task as learning series of syllables by heart – these are qualities that in all good conscience you cannot expect of anyone else. So he himself would sit every morning muttering his syllables as the string and the beads ran through his hands. The results of this donkeywork appeared under the title of *Über das Gedächtnis* (On memory) in 1885.

In their experimental approach, Galton and Ebbinghaus had much in common. They both studied their own memory. They both set to work systematically and tried to arrive at precise answers, in quantifiable form, in percentages. And the chief similarity: both were delighted that memory had been opened up successfully to experimental research. Galton wrote that with his experiments he had penetrated the obscure depths of hidden mental processes; Ebbinghaus thought himself fortunate to have discovered a place where ‘the two mighty levers of natural science, experiment and measurement’ could do their work.

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Yet there was also a difference between them. Both series of experiments dealt with the memory, *but Galton’s alone dealt with memories.*

From his ‘forgetting curve’ nothing could be deduced about Ebbinghaus’s youth, nothing about what went on in the obscurity of his mind, or what could be found under the cellar floor. The very associations Galton welcomed so hospitably before suddenly arresting them and ‘booking’ them were kept out of Ebbinghaus’s experimental protocol from the very outset. The syllables he proffered to his memory were intentionally without any meaning; the laws of learning and relearning, saving and forgetting, could only be brought to light in a bright and unoccupied room, free of all distractions. The best material does not recall or release anything, is nothing but a short series of meaningless stimuli. What served Galton as the object of his researches was no more than an interfering factor for Ebbinghaus. But thanks to that restriction, Ebbinghaus’s research has a quality that Galton’s lacked. What Ebbinghaus reproduced from his memory, he could compare with what he had presented to himself. He could express his own exploits in terms of proportions: the influence of the time interval between learning and relearning, the length of the list of syllables, the effect of lists learned earlier, in short, all of that lent itself to very precise quantification, thanks to the fact that the stimuli were recorded. In Galton’s scheme that was impossible. No doubt his associations went back to what had entered his memory at some time. He could not have recalled his days in a laboratory had he not been there in his youth. But the associations did not admit of numerical comparisons. Ebbinghaus was able repeatedly to do just that. What he lost in meaning and content with his artificial syllables, he made up for with tests and precision.

Francis Galton and Hermann Ebbinghaus greatly appreciated each other’s work. Had they been able to look twenty or thirty years ahead in 1885 and to take a bird’s-eye view of the landscape of memory research, they would have been dumbfounded. Their own experiments differed in design and methodology, but were of equal value, each with its own merits and shortcomings. A generation later that equivalence had entirely disappeared. The experimental work in Ebbinghaus’s style quickly created a riverbed into which more and more tributary streams flowed, until finally it became the main stream.

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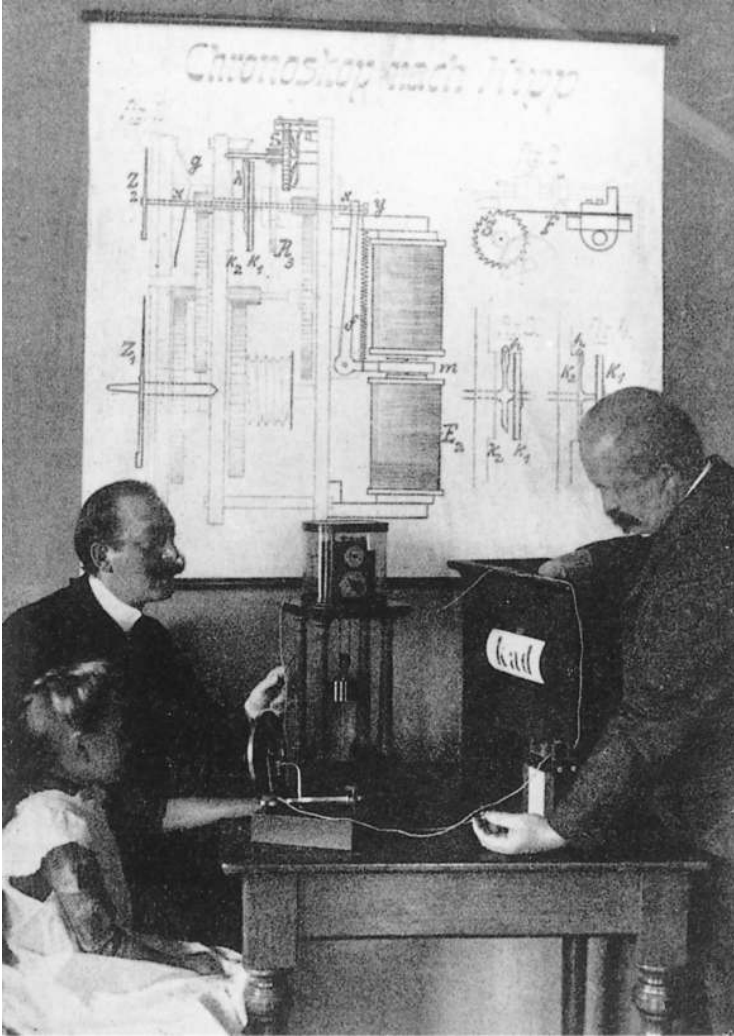


Fig. 1 Memory experiment in the Ebbinghaus style.

Memory experiments assumed a form that a photograph from *Aus der Werkstatt der experimentellen Psychologie und Pädagogik* (1913) typifies. It was taken in a German laboratory; the place and date are not given. It would not have made a great deal of difference if they had been; the experimental protocols had become so well established that not only the instruments and the course of the experiments but even the laboratories were interchangeable to some extent. While Ebbinghaus



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had performed his experiments at his desk at home, with no more equipment than a series of cards with syllables, a string with beads, and a pocket watch, his successors did their experiments in laboratories with refined measuring apparatus. The two men and the girl in the photograph show that the roles of experimenter and experimental subject, still fused in Ebbinghaus, have become separated. It is the memory of the girl that is being put to the test, while the experimenters devote all their attention to operating the instruments. The memory experiment has been subjected to rigorous mechanization. Learning material is being offered with the help of all sorts of ‘mnemometers’ and other ‘memory instruments’, one of which has been placed before the girl on the table. Inside the small box is a mechanism ensuring that she is being fed the stimuli at standardized intervals. She is part and parcel of a closed circuit of equipment. The moment the cue appears, the chronoscope in the bell jar to her left starts to run. It stops as soon as she responds to the word: a sensitive membrane in front of her picks up the vibration of her voice and switches the chronoscope off. The chronoscope used to be the very icon of precision in psychology; it carefully captured the reaction time in milliseconds. The wall chart depicts the electric circuitry of a Hipp chronoscope.

Thirty years after Ebbinghaus’s muttering of syllables in a Berlin study everything had changed: the experimental site, the distinction between experimenter and experimental subject, the advanced apparatus and the standardization of the experiments. The fact that the experiment with the girl is placed firmly in the Ebbinghaus tradition is to do with what she has been asked to memorize: still that one vowel between two consonants, that cue without a meaning: ‘kad’.

### The eclipse

The fate of Galton’s association experiments is quickly told. His findings were overshadowed by the rise of a memory psychology that was an extension of Ebbinghaus’s work. This was true not only of the methods and approach, but also, and logically so, of the research objects: any craftsman will tell you that your tools largely determine the use to which you can put them. The new trend has helped to turn

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the psychology of memory into an authentic science. Most textbooks confirm that a great deal of knowledge about learning and remembering, recognizing and reproducing, has been accumulated during the past century. Research with syllables is still undertaken, but such studies are now part and parcel of a varied repertoire of techniques, applied to the most diverse types of information. What has remained is a predilection for questions that lend themselves to *precise* quantitative answers. And hand in hand with that is the attempt to account for what goes into the memory. The possibility of a numerical comparison of inputs with outputs, as the material we have learned and reproduced has since come to be called, remains a self-evident requirement of memory research.

The price paid for this approach has been that topics difficult to access by experiments and measurement were kept off the research agenda, either temporarily or for good, with crucial repercussions on research into autobiographical memory. Our personal fortunes do not happen to be recorded first in a notebook, nor do they have the ease in use of 'bif' or 'kad'. Under normal circumstances, memories cannot be expressed as ratios, simply because one half of the equation is missing.

It was not until the 1970s that a counter-current emerged. It would be taking us too far afield to outline the background of that turn of events, but one important factor was the disturbingly great distance between the topics in which the main stream of memory research was interested and the questions that can arise concerning the operation of memory in everyday life. Investigators such as Loftus, Neisser, Baddeley, Rubin, Conway, and in Holland Wagenaar, shifted their attention to topics which Neisser classified as 'everyday memory', that is, the working of the memory under natural conditions. The most striking expression of the new approach was the speedy increase in research into autobiographical memory.

The unexpected irony of this development is that experimental methods, once applied to autobiographical memory, should have turned out to be so productive. To take a few examples: the psychologists Crovitz and Schiffman wondered if Galton's method of eliciting associations could not be slightly adapted to their own research. They presented just under a hundred students with twenty words, together with a request that they note down the first memory each