

# Introduction

## Everything you know about learning is wrong

In 1885 Herman Ebbinghaus did something incredibly stupid.

He was researching human memory, and – seduced by a trendy new approach called psychophysics – decided that it would be a good idea to create a ‘pure’ stimulus with which to experiment on memory; something for people to remember that had no special significance for them at all, so that their pesky personal experiences wouldn’t interfere with the results. So he created nonsense syllables – three-letter trigrams such as ‘RUP’ and ‘SFH’ – to give people to learn. If you were a participant in his experiments you would be presented with these nonsense syllables, each for a set period of time, then later asked to remember them.

His mistake was rooted in an intellectual tradition stretching as far back as Plato. In this philosophical tradition, reason and emotion are separate. Plato uses the model of the chariot and the charioteer – the charioteer representing rational thought, and the horses the more animalistic emotional aspect of our nature (both positive and negative). The lesson is clear, though: we should use dispassionate reason to steer our emotions.

Centuries later, René Descartes deepens the reason/emotion divide. The arch-rationalist, he describes the mind–body duality, equating the emotions with the misleading physical aspect of our nature and the mind with the true, divine side. Body = bad, mind = good. Emotions = bad, Reason = good. You can still see the impact of this age-old prejudice today in our stereotypes about men and women, for example, with women traditionally perceived as more prone to emotional assessments of situations and men likely to assess them rationally. In Western society we celebrate the ‘dispassionate’ and ‘objective’ nature of business or scientific decisions (all of which turn out to be emotion in disguise).

So Ebbinghaus probably believed he was doing a good thing: by studying information in a ‘pure’ form, devoid of any meaning or emotional significance, he could get a more accurate picture of the way the human mind processes information.

Sadly, though, he achieved precisely the opposite. Human beings are storytellers; our minds are finely tuned to the emotional significance of events. On the other hand, our memory is exceptionally efficient at getting rid of everything boring: stuff with no personal significance. Stuff like Ebbinghaus's trigrams.

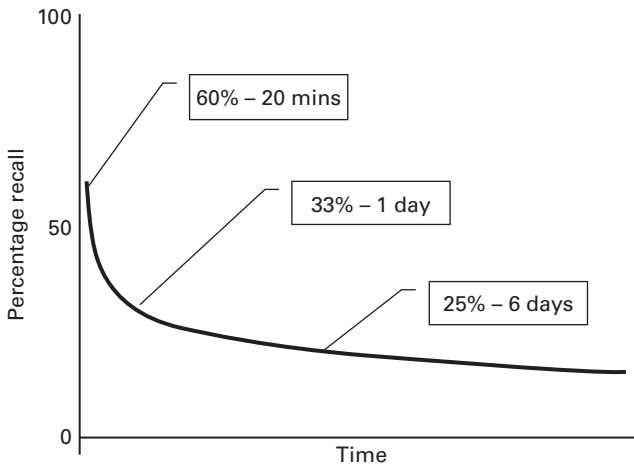
When Ebbinghaus plotted the results he found (predictably) that the majority of the nonsense syllables were forgotten in a short space of time. What Ebbinghaus *thought* he had discovered was something called the 'forgetting curve', a steep curve that illustrated how information is typically lost from memory (Figure 0.1).<sup>1</sup>

But he hadn't. Although he didn't realize it, he had *actually* discovered something far more important: namely that memory is all to do with meaning. He had discovered that information without personal significance is just mental garbage to the mind, and is disposed of as quickly as possible.

At this point the sensible thing to have done would be to concede that personal significance is clearly integral to the process of remembering. Had he introduced meaningful trigrams into his lists – like, for example, FLY or TEA – he would have discovered that these were far more likely to be recalled than the nonsense ones, and our story might have ended happily.

But he didn't. Led astray by his assumptions, he went on to investigate means by which the mind might be *forced* to retain nonsense. He discovered that by repeating the meaningless information over and over again, at intervals, some of it could be retained. He discovered a kind of psychological force-feeding method.

**Figure 0.1** The forgetting curve



What Ebbinghaus accomplished was the metaphorical equivalent of discovering the best way to use a smartphone to hammer in nails: his research was both accurate and grossly misleading at the same time. In other words, while there probably *is* a best way to hammer in nails with a smartphone, if you're doing that in the first place you are a bit of an idiot.

As is often the case with primitive psychology, the patent ridiculousness of the approach didn't prevent it from being widely accepted as a model for memory, learning, and ultimately for education. Today we still employ this barbaric technique in the method known as 'rote learning',<sup>2</sup> both at school and at work, forcing people to repeat things over and over so that they can memorize them just long enough to pass a test. And then forget them.

In our normal lives, many important lessons are learned the first time. There are good reasons for this: a creature that had to be bitten many times by a tiger before learning that tigers are dangerous wouldn't last long. A child doesn't need to burn their hand on a hot stove repeatedly. Of course, some things take a few attempts: but as a rule of thumb, *the deeper the personal significance, the more reliably something is learned*<sup>3</sup> – we don't often repeat our more embarrassing mistakes.

It makes perfect sense for memory to work in this way: your memory needs to be efficient, so it only stores the stuff that matters. But which stuff matters? Answer: the stuff that has an emotional impact. This is rather an elegant system, since what has emotional impact to you can be both programmed from birth and shaped by your development. As an infant you can experience pain, then life introduces you to a whole world of pain you didn't know existed.

Scientists use the expression 'homeostasis' to refer to the way in which creatures are set up from birth to seek out conditions that are good for them and avoid those that are bad; at the most primitive level, pain and pleasure, fear and attraction, steer us in the right direction. As big-brained creatures we have the ability to elaborate and extend these reactions to an extraordinary degree, up to and including our choice of smartphone.

Our starting point for the design of any environment designed to help people learn must therefore be the individual, and those things that matter most to them. This, and only this, forms the basis of their learning. In later chapters we will see how to put the individual at the heart of the design process, in a systematic fashion.

Sadly, what Ebbinghaus ultimately encouraged was ultimately a form of abuse – he had discovered that you *can* fit a square peg into a round hole – if you hit it again, and again, and again (rather than, say, wondering why it

didn't go in the first time). If you point this out to people who work in education, they will usually get quite angry and defensive and come up with all manner of excuses for doing horrible things. At heart – as we shall see in a bit – this is because people tend to get emotionally attached to conventions, and build a set of justifications around them.

## Memory vs remembering

One of Ebbinghaus's contemporaries was also deeply disturbed by his experiments. Frederic Bartlett had spent decades studying cross-cultural transmission of information – the way in which cultures store and pass on learning normally, for example through storytelling. In sharp contrast to Ebbinghaus, he viewed memory as a *constructive* process, in which we continually 're-create' what we know in the light of personal significance and our environment.

In every culture, people tell stories. In fact, this is typically a big proportion of the time they spend talking to one another – perhaps as much as 80 per cent.<sup>4</sup> In no culture are people routinely required to memorize lists of meaningless symbols. To imagine that one could discover anything interesting about learning in this way is quite perverse.

Bartlett pointed out that by stripping a stimulus of any personal meaning, Ebbinghaus had destroyed the very phenomenon – memory – that he was attempting to investigate.

Frederic Bartlett was an unusual chap. Born in 1886 in a small English town, Bartlett spent his early years as a 'normal country boy', playing cricket and helping with the harvest, until the age of around 14 when he attended a private primary school. Owing to illness he was unable to continue his schooling, but he began educating himself. At his father's suggestion, he signed up for a correspondence course and on completing his degree was invited to become a tutor at Cambridge, where he went on to take a further degree at Cambridge University. He was an atypical student – a country boy mixing with the elite upper-class, his peers almost exclusively the product of private tutoring. Ten years later he was to become the director of the Cambridge Laboratory, the most prestigious centre for psychological research at the time.

Bartlett's approach to psychology was heavily influenced by his interest in anthropology. While Ebbinghaus studied 'memory', Bartlett studied 'remembering', which, as he saw it, is an *active* process in which people

reconstruct meaning within their social context. In some of his early experiments he gave people drawings of military men to remember and questioned them about them at intervals of 30 minutes and then later, after a week or two. He noted that things that were particularly interesting to people at the time (during the First World War) – a pipe, a moustache and cap badges – were more likely to be remembered, and that the expressions on people's faces also made a big impact – for example whether someone was smiling or looked stern.

Bartlett was also interested in something he called 'conventionalization' – the process by which stories from one culture get passed on to another. He used a process similar to Chinese whispers, in which people read a Native American folk tale entitled 'The War of the Ghosts', then told the story to someone else, who in turn told it to someone else.<sup>5</sup> Here is the story that they read.

### **War of the Ghosts**

One night two young men from Egulac went down to the river to hunt seals and while they were there it became foggy and calm. Then they heard war-cries, and they thought: 'Maybe this is a war-party.' They escaped to the shore, and hid behind a log. Now canoes came up, and they heard the noise of paddles, and saw one canoe coming up to them. There were five men in the canoe, and they said: 'What do you think? We wish to take you along. We are going up the river to make war on the people.'

One of the young men said, 'I have no arrows.'

'Arrows are in the canoe,' they said.

'I will not go along. I might be killed. My relatives do not know where I have gone. But you,' he said, turning to the other, 'may go with them.'

So one of the young men went, but the other returned home.

And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water and they began to fight, and many were killed. But presently the young man heard one of the warriors say, 'Quick, let us go home: that Indian has been hit.' Now he thought: 'Oh, they are ghosts.' He did not feel sick, but they said he had been shot.

So the canoes went back to Egulac and the young man went ashore to his house and made a fire. And he told everybody and said: 'Behold I accompanied the ghosts, and we went to fight. Many of our fellows were

killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick.'

He told it all, and then he became quiet. When the sun rose he fell down. Something black came out of his mouth. His face became contorted. The people jumped up and cried.

He was dead.

It's a curious story, isn't it? I wonder how you would retell it if I asked you to. I'd be willing to bet you wouldn't forget that ghosts were involved somehow. Ghosts are quite an exciting topic for a story. When Bartlett did just this, his findings were nothing like Ebbinghaus's – it didn't matter whether information was presented at the beginning or the end of the story, and reproduction didn't follow the 'forgetting curve' pattern. Instead, with each retelling the story became simplified and conventionalized around its dominant features – such as the death of the main character. Things that people were largely unfamiliar with, such as seal hunting, became things that people were more familiar with – such as fishing.

In short, Bartlett showed that people process information in terms of the things that are most meaningful to them. We take images, stories, and we store them in terms of what matters to us.

Unlike computers or books, living creatures have something at stake in the world. We are connected to the world via our senses, and by the reactions that those senses engender. Those reactions are not incidental – instead they form the basis of our way of making sense of the world: they tell us what to care about. So humans do not store or acquire information in the way that inanimate objects do – as we have learned by trying to make machines function like people. Instead, they react to the world and those reactions form the basis of what we remember. In the next chapter we will look at the mistakes people have made by thinking about humans as if they were machines, and what these mistakes can teach us about learning.

## Endnotes

- 1 Ebbinghaus, H. (1885/1913). *Memory: A contribution to experimental psychology*. New York: Teachers College, Columbia University.
- 2 A variant of which is called 'spaced repetition'.

- 3 McGaugh, J.L. (1993) *Memory and emotion: The making of lasting memories*. New York: Columbia University Press.
- 4 Emler, N. (1994). *Gossip, reputation, and social adaptation*. In R. F. Goodman & A. Ben-Ze'ev, *Good gossip* (pp. 117–138). Lawrence, KS: University of Kansas Press.
- 5 Bartlett, F.C. (1932/1995). *Remembering: A study in experimental and social psychology*. Cambridge: Cambridge University Press.

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