How We Make Memories - Crash Course Psychology #13

Crash Course: Psychology
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Clive Wearing was playing the piano alone in his room. When his wife came into the room, he immediately leapt up and embraced her with joyful enthusiasm.

A minute later, she slipped out to grab a glass of water, and when she returned, he gave her that same bright greeting, as if she'd been gone for days.

And then he did again. And again.

Clive was an accomplished London musician, until, in 1985 at the age 47, he contracted a rare Herpes encephalitis virus that ravaged his central nervous system. Since then he's been unable to remember almost any of his past, or to make any new memories. His wife is the only person he recognizes, but he can never recall the last time he saw her. This may be the most profound case of extreme and chronic amnesia ever recorded.

Our memory helps make us who we are. Whether recognizing loved ones, recalling past joys, or just remembering how to, like, walk and talk and fry an egg, memory is the chain that connects our past to our present. If it breaks, we're left untethered, incapable of leaving the present moment, and unable to embrace the future.

But memory isn't an all or nothing thing, of course. Wearing can't remember any details about his personal past, but he still remembers how to speak English, get dressed, and play the piano.

Some memories you process automatically, and they are stored differently than your more personal or factual memories, like, your first kiss, or how to recite pi to twelve places, or who won the Peloponnesian War.

Speaking of ancient Greeks -- and to help demonstrate what I'm talking about -- I want you to have a look at our Spartan friend here, and remember his name. 'Cause we're gonna test your memory in just minute.

[INTRO]

Technically, memory is learning that has persisted over time -- information that has been stored and, in many cases, can be recalled. Except of course during the exam!

Our memories are typically accessed in three different ways; through **recall**, **recognition**, and **relearning**.

And if you think about all the different kinds of tests you've taken in school, they're all actually designed to size up how you access stored information in these ways. Like, **recall** is how you reach back in your mind and bring up information, just as you do in fill-in-the-blank tests. So if i say, BLANK is the capital of Greece, your brain would hopefully recall the answer as Athens.

Recognition, meanwhile, is more like a multiple-choice test -- you only need identify old information when presented with it. As in: which of the following was NOT an ancient city in Greece: Athens, Marathon, Pompeii, or Sparta.

And **relearning** is sort of like refreshing or reinforcing old information. So when you study for a final exam, you relearn things you half-forgot more easily than you did when you were first learning them, like, say, a basic timeline of the Greek empire.

But how? How does all of that data that we're exposed to, all the time, every day, become memory?

Well, in the late 1960s, American psychologists Richard Atkinson and Richard Shiffrin figured out enough about the process of memory-formation to break it down into three stages:

First, it's first **encoded** into brain, then stored for future use, and then eventually **retrieved**.

Sounds simple, but by now you've figured out that, just because you take a lot of stuff about your mind for granted, that doesn't mean it isn't complicated.

By Atkinson and Shiffrin's model, we first record things we want to remember as an immediate, but fleeting, sensory memory. Think back to the image I showed you a minute ago. Do you remember his name? If you do, it's because you successfully managed to shuffle it into your short-term memory, where you probably encoded it through rehearsal. This is how you briefly remember something like a password or phone number-- hey Tommy, what's Jenny's number? Okay. 867-5309...867-5309...8-6-7-5-3...see, you're getting it in your head there.

Or in this case, I told you to remember that guy's name, so maybe you were thinking “Leonidas” repeatedly over and over, even if you didn't think you were doing it. But this information really only stays in your short-term memory for under thirty seconds without a lot of rehearsal. So, if you weren't repeating “Leonidas,” you'd probably have forgotten it already.

Because your mind, amazing as it is, can really only hold between four to seven distinct bits of information at a time--at which point, the memory either decays, or gets transferred into long-term memory.

Long-term memory is like your brain's durable and ridiculously spacious storage unit, holding all your knowledge, skills, and experiences. Now, since the days of Atkinson and Shiffrin, psychologists have recognized that the classical definition of short-term memory didn't really capture all of the processes involved in the transfer of information to your long-term memory. I mean, it's more than just being able to remember some Greek guy's name. So, later generations of psychologists revisited the whole idea of short-term memory and updated it to the more comprehensive concept of working memory.

Working memory involves all the ways that we take short-term information and stash it in our long-term stores. And increasingly, we think of it as involving both explicit and implicit processes.

When we store information consciously and actively, that's an explicit process. We make the most of this aspect of working memory when we study, for instance, so that we can know that Athens is the capital of Greece, and that Pompeii was a Roman town, and not a Greek one. This is how we capture facts and knowledge that we think we're going to need -- like I told you specifically to remember Leonidas's name, you concentrated on that detail and filed it away, if briefly.

But of course we're not conscious of Every. Tiny. Thing that we take in. Yet, our working memory often transfers stuff we're not aware of to long-term storage. We call that an implicit process, the kind you don't have to actively concentrate on. A good example might be classically conditioned associations, like if you get all sweaty and nervous at the dentist because you had a root canal last year.

You don't need to pull up that file on the last time you got your face drilled to think oh hey, oral surgery! Not my favorite! Instead, implicit processes cover all that stuff automatically.

This kind of automatic processing is hard to shut off. Unless you've got something unusual going on in your brain, you may not have much choice but to learn this way, like how you learned how to not

put your hand into a fire. That learning would have happened pretty much automatically as soon as you first yanked your hand away from an open flame.

Whether those things are lodged in there explicitly or implicitly, or both, there are also different kinds of long-term memory. For instance, procedural memory refers to how we remember to do things like riding a bike or reading. It's effortful to learn at first, but eventually you can do it without thinking about it.

Long-term memory can also be episodic, tied to specific episodes of your life -- like “remember that time that Bernice fell out of her chair in chemistry and started laughing uncontrollably?” Man, good times.

There are other types of long-term memory, too, and we're continually learning more about the biology and psychology of the whole complex phenomenon. For instance, while Clive Wearing's episodic memories--among others--seem to be deeply affected, his procedural memories for things seems to be in one piece. This has to do with neuroanatomy that we don't have time to explore here, and that we don't yet fully understand. Wearing and others have a lot to teach us about the different types of long-term memory storage.

Now, for healthy memories, there are lots of little tricks you can use to help remember information. Mnemonics, for one, help with memorization, and I'm sure you know a few that take the form of acronyms--ROY G. BIV for the colors of the rainbow, for instance. Mnemonics work in part by organizing items into familiar, manageable units, in a process called **chunking**. For example, it may be hard to recall a seven-digit number, but it'll be easier to commit it to memory in the rhythm of a phone number: 867-5309. Or you could just, you know, write a song about it.

Strategies like mnemonics and chunking can help you with explicit processes, but how well you retain your data can depend on how deep you dig through the different levels of processing.

Shallow processing, for instance, lets you encode information on really basic auditory or visual levels, based on the sound, structure or appearance of a word. So if you're trying to commit the name Leonidas to your explicit memory using shallow processing, you might encode the word by recalling the cool font you saw it in.

But to really retain that information, you'd want to activate your deep processing, which encodes semantically, based on actual meaning associated with the word. In this case, you might remember the story of the mega-tough yet very scantily clad warrior of ancient Greece. Or you might remember that “leon” means “lion” in Greek, that lions are tough fighters, and that Leonidas was a tough Spartan warrior-king.

And then to really, really make it stick, you want to connect it to something meaningful or related to your own personal, emotional experience. Like maybe Gerard Butler's bronzed eight-pack torso and unconquerable blood-lust helped lock down the words Spartan and Leonidas in your memory forever. I mean, maybe. If...if that helps you.

In the end, how much information you encode and remember depends on both the time you took to learn it and how you made it personally relevant to YOU.

Memory is extremely powerful. It's constantly shaping and reshaping your brain, your life, and your identity. Clive Wearing is still himself on the outside, but in his inability to recall who he was, or process what has happened, he has lost some critically important part of himself. Our memories may haunt us or sustain us, but either way, they define us. Without them, we are left to wander alone in the dark.

If you were committing this lesson to memory, you learned about how we encode and store memory, the difference between implicit, automatic, and effortful explicit processing, how shallow and deep processing work, and a few types of long-term storage.

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