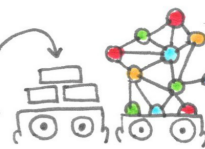


# HOW DO WE LEARN?

So, you want to understand the world, and/or help others understand the world. Sadly, there are a lot of misconceptions about how people learn. Thankfully, **COGNITIVE SCIENCE** is showing us what really works! And the first, core idea to get is...

# It's all about CONNECTIONS

**MYTH:** new ideas can just be "stored" like files in a filing cabinet



**TRUTH:** new ideas have to **CONNECT** with what's already there, like pieces of a jigsaw puzzle



Study after study has shown that just throwing facts & figures at people doesn't work. Instead, you have to **CONNECT** ideas, via...



**METAPHORS:** connect ideas to other ideas and everyday things



**MULTI-MODAL** (multimedia) presentation, to connect multiple ways of understanding a topic. (e.g. words & pics)



dispelling **MISCONCEPTIONS:** make room for new connections

& once you make connections, how do you maintain 'em? well, you have to...

references: Metaphors We Live By (2008), Piaget's constructivism, Papert's constructivism (2001)

# USE IT OR LOSE IT!

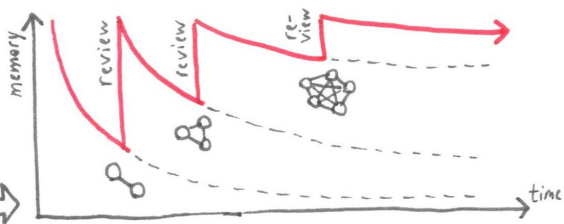
**MYTHS:**

re-reading is effective → re-read (hard) > re-read (easy)  
cramming is effective → it's better to **SPACE OUT** your learning!

**TRUTHS:**

One of the best-replicated findings from cognitive science is the

**SPACING EFFECT** →



which shows that we forget things quickly the first time we see it, but if you exert effort to **RECALL** things, spaced over **INCREASING** intervals of time, you retain a lot more than studying by "cramming".

now, we know how to make & keep connections – but not all connections are equal! finally, we have to make sure that we...

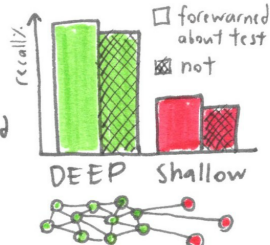
references: The Spacing Effect (Dempster, 1988) What Works, What Doesn't (SciAmMind, 2013)

# CONNECT DEEP.

**MYTH:** highlighting and memorizing keywords are good ways to learn

**TRUTH:** you have to process ideas on a **DEEP** level to make them stick

In a classic 1969 experiment, subjects were shown a list of words. Half were asked to say whether each word had the letter "E" (shallow processing) or was a "pleasant" word (deep processing). When asked later to recall the words, the **DEEP** processors recalled far more – **WHETHER OR NOT** they were forewarned about the recall test in advance!



So – **GO DEEP**. And one of the deepest ways to process an idea is to **EXPLAIN IT** to someone else. That's why I drew this zine – so we can **BOTH** learn how we learn. ❤️

references: Hyde & Jenkins, 1969

drawn by Nicky Case @ncase nmake