



PRESS RELEASE

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Content or form? The two possible paths of our memories

A UNIGE team has shown that memories are more strongly triggered by the deeper meaning of a situation than by its form.

If memories are the black box of our past, they can also shed light on the present by giving meaning to new situations. But how does memory retrieve either surface matches (based on same places, same people) or deeper, more conceptual ones (based on similar intentions or actions)? A team from the University of Geneva (UNIGE) has shed light on this question, showing that memory tends to favour the substance of a situation — its concept or underlying problem — when it can be linked to familiar mental categories. Otherwise, it defaults to surface-level cues. These findings open up new possibilities for enhancing analogical learning, particularly in educational settings. The results have been published in *Wiley Interdisciplinary Reviews: Cognitive Science*.

Proust's famous "madeleine" is a striking example of our brain's tendency to connect present situations with past experiences to make sense of them. It illustrates a well-known phenomenon in psychology, in which sensations — also called surface similarities — can bring a memory back to life. More recently, in 2020, the IDEA team (Instruction, Development, Education and Learning) at the UNIGE's Faculty of Psychology and Educational Sciences showed that more abstract cues — known as structural similarities, such as similar actions, problems or intentions — can sometimes take precedence and guide memory retrieval.

For example, when we invite someone to dinner at a restaurant and they decline, saying they have another appointment. Our memory may bring back a surface memory: the memory of a dinner with this friend a few weeks earlier, in the same restaurant. Or a structural memory: the time when we used knee pain as an excuse to avoid sports training. In the latter case, the context is different but the concept is similar: it's all about finding an excuse to decline the invitation.

The end of a debate

When does memory rely on one type of cue over another? This question has long fueled debate within the scientific community. Now, the IDEA team has offered a decisive insight. "We've discovered that memory favours structural connections when it can draw on a familiar mental category — such as excuses, superstitions, or conflicts — and surface connections when no such category is available. Structural memories reflect a higher level of abstraction, and therefore deeper understanding," explains Lucas Raynal, postdoctoral researcher with the IDEA team and lead author of the study.

High resolution pictures

These results were obtained by analysing around a hundred studies published over the past fifty years on memory mechanisms. “This literature review allowed us to identify consistent patterns and to develop a psychological model explaining the contexts in which memory favours one type of cue over another,” explains Emmanuel Sander, full professor with the IDEA team and lead researcher on the project.

These conclusions have practical implications for promoting knowledge transfer in schools. Previous research has shown that difficulties in applying a concept learned from one example to a superficially different example often stem from challenges in recalling cases based on structural similarities. For instance, when presented with a math problem involving a customer at a bakery, a student might not recognize that it requires the same type of calculation as another exercise about a sporting event, simply because the context of the story has changed.

These results highlight the importance of anticipating pupils’ difficulties when they lack the necessary knowledge to connect different examples of an unfamiliar concept. They thus call for the development of teaching tools designed to introduce new mental categories, encouraging the formation of deep conceptual links.

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