

The lemon you reach for is not the lemon you taste

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When looking for a lemon in the fridge, its colour is a useful characteristic to think about—the bright yellow will stand out from the green of the salad or the red of the tomatoes. However, when putting the lemon in your drink, its colour is a less relevant characteristic than, for example, its taste. Does the brain's representation of the concept “lemon” actually change depending on what you're doing? Might it even change depending on what you were doing?

Although it is known that the brain organises objects by their shapes, functions, and even by how they are manipulated with the hands, until now, scientists have failed to show that colour is also important to how the brain stores object knowledge. Now, however, Basque Center on Cognition, Brain and Language (BCBL) researcher, Eiling Yee, together with colleagues Sarah Ahmed and Sharon Thompson-Shill, from the University of Pennsylvania, has shown that the brain does organise objects according to colour, and furthermore, that colour's significance depends on what we have recently been doing. This dependence on context explains why it has been so difficult, until now, to show that colour does influence how the brain organizes concepts.

The conclusions of this research shed light on how the brain manages information, and also show that people may vary in how their individual brains do this. In the future, this will be useful for understanding how knowledge develops, and how it breaks down as we age or suffer brain damage.

The study that Yee and colleagues conducted has been published in the journal *Psychological Science*.

“The study shows that after a person performs a task in which colour is important, the brain weighs colour more heavily immediately afterwards. In other words, if a person had just been thinking about which colour to paint their living room, then when subsequently thinking about lemons, yellowness is a more prominent part of the ‘[lemon](#)’ concept than if they had just been tasting a sauce, in which case a lemon’s sourness might be more prominent”, explains Yee.

In short, recent experience influences the brain’s conceptual representations of objects.

To draw these conclusions, the researchers designed an experiment with 120 participants who took part in behavioural tests. Half of the participants first performed a task which conditioned the brain to concentrate on colour, and then were tested on whether reading a word like “canary” helped them to recognise the meaning of words referring to objects of the same colour, like “lemon”. The other half of participants skipped the colour conditioning task (until later). Yee and colleagues showed that words referring to objects with similar colours do “activate” each other, but only if the brain has recently been thinking about colour.

The results of the experiment indicate that colour plays a role in how the brain organises knowledge. According to Yee, concepts such as “lemon” and “canary” overlap in the brain.

Changing Conceptualisation

However, according to Yee, the most interesting part of the experiment is the demonstration that the brain’s concepts of objects change depending on the context. “Our brains seem to make the “lemon” and

“canary” concepts more similar if we have recently been concentrating on colour. This shows how malleable the [brain](#)’s representations of the objects around us are.”

What’s more, Yee says that there are individual differences between people in the conceptualisation of colour. This may be because some people tend to concentrate more than others on the colour of things, so that colour is more important in these people’s brains than in other people’s when organising knowledge.

Provided by Basque Center on Cognition, Brain and Language

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