

Why we feel confident about decisions we make

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Doughnut or apple? The confidence we have in these kinds of decisions depends on how attentively we made them. Credit: Colourbox

Buying a second-hand car at a good price feels good. But choosing a delicious-looking doughnut in the supermarket leaves us riddled with doubt. After all, we resolved to eat a healthier diet this year—so wouldn't it be better to buy an apple? We've all experienced this feeling at one time or another: some decisions intuitively feel right, while others leave us feeling doubtful and may even cause us to revise our initial

choice. But where does this feeling come from?

For the first time, a team of researchers at ETH Zurich and the University of Zurich led by ETH Professor Rafael Polanía has investigated this question systematically. The authors used [experimental data](#) to develop a computer model that can predict how an individual will choose between different options and why they might subsequently feel confident or doubtful about the decision they made.

"Using our model, we've successfully shown that decisions are most likely to feel right if we have invested significant attentional effort in weighing up the different options and, what's more, are conscious of having done so," says Polanía, who heads up the Decision Neuroscience Lab at ETH Zurich.

Consequently, the ability to question and revise poor decisions depends on how well we are able to judge for ourselves whether we thoroughly weighed up the options or allowed ourselves to be distracted during the decision-making process. This [self-awareness](#), which experts typically refer to as introspection, is an essential prerequisite for self-control.

Examining subjective evaluations of choice in the lab

The confidence we have in our own decisions is based on subjective value estimations that we typically make automatically and unquestioningly as part of our day-to-day lives. To enable a [systematic analysis](#) of how this process works, Polanía and his team studied how test subjects evaluate and select everyday foods.

The 35 study participants were initially asked to evaluate 64 products from two Swiss supermarket chains. They were presented with a picture of each product on screen and asked how much they would like to eat it at the end of the experiment. In the second part of the experiment, the

[test subjects](#) were shown a series of pictures that showed two products at the same time. In each case, they were asked to choose one of the two options—doughnut or apple, pizza or pear—and then rate how much confidence they had in their decision.

To make the experiment as realistic as possible, the participants had to eat the products after the experiment. The researchers used an eye scanner during both the evaluation and decision-making phases to determine whether the participants spent longer looking at one of the two products, how often their gaze shifted from left to right, and how quickly they made their decision.

Higher attentional effort leads to greater confidence

Using this data and a similar dataset from a different research group, Polanía together with his Ph.D. student Jeroen Brus developed a [computer model](#) that can predict under which conditions people will have confidence—or a lack thereof—in their decisions. "We discovered that people are particularly likely to have a bad feeling about a decision if they introspect that they didn't pay enough attention to comparing the different options," Polanía says.

The model uses the patterns of participants' eye movements to determine how much effort they actually put into evaluating and comparing the different products. Someone who takes their time and always keeps both options in their sights is considered to have invested high attentional effort, while those who tend to fixate on just one option and neglect the other are regarded as having been less attentive.

The best way to illustrate these findings is by considering an example from everyday life: if we unthinkingly add a doughnut to our shopping basket, even after expressing an intention to eat more healthily, and subsequently realize that we didn't even think about healthier

alternatives, we ought to have low confidence in our decision and revise it. If, on the other hand, we are conscious of having carefully considered a series of healthier products but then decided against them because we simply wanted the doughnut more than an apple or pear, we should have confidence in our decision.

Using introspection to revise poor decisions

According to the study's authors, the ability to question poor decisions and have confidence in good ones depends to a large extent on how conscious an individual is of their subjective value judgements and comparisons after making a decision. This is something neuroscientists refer to as introspection.

"Once we've made a decision, we can feel doubtful as to its value and revise it only if we're actually conscious of the fact that we failed to pay enough attention to comparing the options," Polanía says. This capacity for introspection is also a crucial part of our ability to exercise self-control. Without it, Polanía says, we would be far more likely to act on our preferences for, say, unhealthy foods without questioning them. The good news is that we can train this ability through mindfulness exercises and meditation.

Applications in smart glasses and self-driving vehicles

Polanía says this model could eventually be incorporated into [smart glasses](#) that track eye movements. "The glasses could use the model to determine how attentive we're being and let us know when we should question a [decision](#)," he says.

Polanía also believes the model could be useful for self-driving cars. The algorithms used in autonomous vehicles are constantly making decisions

based on a continuous stream of data from the vehicle's sensors. "Our [model](#) could help the vehicle evaluate its decisions and revise them where necessary," Polanía says.

More information: Jeroen Brus et al, Sources of confidence in value-based choice, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-27618-5](#)

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