

Awareness biases information processing

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How does awareness influence information processing during decision making in the human brain? A new study led by Floris de Lange of the Donders Institute for Brain, Cognition and Behaviour at Radboud University Nijmegen, offers new insight into this question, and is published November 22 in the online, open-access journal *PLoS Biology*.

When making a decision, we gather evidence for the different options and ultimately choose on the basis of the accumulated evidence. A fundamental question is whether and how [conscious awareness](#) of the evidence changes this decision-making process. To address this question, De Lange and colleagues devised an experimental paradigm in which participants were shown a series of arrows in quick succession, each arrow pointing either to the left or to the right. The arrows were easy to see in half of the trials, but they were masked in the other half, strongly reducing their visibility. At the end of each trial, participants decided about the predominant direction in which the arrows pointed.

They showed that while participants were able to accumulate evidence over time in both cases, the [level of awareness](#) led to marked changes in decision making, both in terms of [brain activity](#) and behavior. Crucially, evidence accumulation changed from a linear to a non-linear integration strategy with increasing level of awareness. Specifically, the impact of later evidence was reduced when more evidence had been accrued, but only for clearly visible information. By contrast, barely perceptible arrows contributed equally to a decision because participants needed to continue to accumulate evidence in order to make an accurate decision. "These results suggest that consciousness may therefore play a role in

biasing one's perception and decisions based on a person's expectations and goals" explains De Lange.

De Lange and colleagues show that evidence of which participants are hardly aware is processed 'automatically', with all incoming information being treated equally. However, when subjects are clearly aware of the evidence, the weight of new information is modulated depending on what they already know.

More information: de Lange FP, van Gaal S, Lamme VAF, Dehaene S (2011) How Awareness Changes the Relative Weights of Evidence During Human Decision-Making. PLoS Biol 9(11): e1001203.
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