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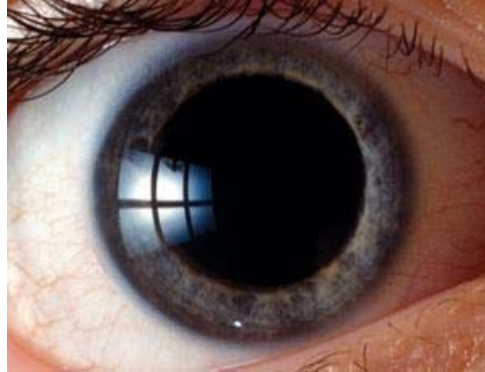
Decision-makers betrayed by their wide eyes

- › 09 March 2010 by [Ewen Callaway](#)
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WHY can't teachers keep a secret? Because their pupils give them away. It turns out that when people make decisions, their pupils dilate, a subtle cue that could be used to predict a person's intentions, or even converse with people with locked-in syndrome.

It is well known that pupils dilate as it gets darker, and in stressful situations as part of the "fight-or-flight" response. The reflex is mediated by the release of the hormone noradrenalin, which in animals has also been implicated in memory and decision-making.

[Olivia Carter](#), a neuroscientist at the University of Melbourne in Australia, wondered if noradrenalin - and by implication pupil dilation - might also be linked to human cognition.



Dither no more (Image: Adam Hart-Davis/SPL)

To investigate, her team asked volunteers to pick one of five random digits that displayed on a monitor one after another for 2 seconds each, and to press a button indicating their choice after the final number vanished. An eye scanner revealed that volunteers' pupils were at their widest during the 2 seconds that corresponded to their eventual number choice. Carter's team found that they could eventually predict with 62 to 100 per cent accuracy which of the five numbers people would choose, depending on the volunteer, based only on when their pupil dilated (*Frontiers in Human Neuroscience*, DOI: [10.3389/fnhum.2010.00018](#)).

In 2008, Carter's team found that people's pupils dilate when they switch between two alternative ways of viewing an optical illusion, such as the video-based [spinning woman illusion](#), in which the woman seems to switch direction but in fact does not. The effect results from the viewer swapping how they view her. Carter concludes that, rather than driving decisions, noradrenalin helps us to cement decisions we are veering towards anyway, and that pupil dilation is an outward sign of this. "Once you've made a decision, you may as well make it," she says. "You don't want to dither."

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[Christopher Summerfield](#), a cognitive neuroscientist at the University of Oxford, isn't convinced that the dilation - and therefore noradrenalin - is related to decision-making. Pupils dilate when people are excited, and Carter's team could be capturing that, he suggests.

Carter points out that in some of her trials volunteers earned 10 cents when they chose certain numbers, while in others there was no option to win a prize. But in both scenarios, volunteers' pupils tended to dilate when they made their choice, indicating that dilation isn't related to excitement. Even if pupil dilation isn't a sign of decision-making per se, pupils could still be used to deduce when someone is making a decision, or to help predict their choices, says Carter.

[John-Dylan Haynes](#) at the Bernstein Center for Computational Neuroscience in Berlin, Germany, has used brain activity picked up by an MRI scanner to determine when a decision is being made. He says pupil dilation may reveal a person's concealed thoughts without having to put them into contact with a machine.

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That might make for a low-tech way of reaching out to people who cannot communicate due to brain damage or paralysis, such as those with [locked-in syndrome](#). [Steven Laureys](#) at the University of Liège in Belgium says that pupil dilation persists in locked-in syndrome. Responses to yes/no or multiple-choice questions could be inferred from pupil dilation if choices were read out or displayed on a monitor. Laureys's team is using MRI to [attempt communication with people with brain damage](#), but he says that eye-tracking gear is more portable and cheaper.

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