

Measuring risk-taking—by watching people move computer mice

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How you move a computer mouse while deciding whether to click on a risky bet or a safe choice may reveal how much of a risk-taker you really are.

Researchers found that people whose mouse drifted toward the safe option on the computer screen—even when they ended up taking the risky bet—may be more risk-averse than their choice would indicate. Those who moved the mouse toward the risk before accepting the safe option may be more open to risk than it seems.

"We could see the conflict people were feeling making the choice through their hand movements with the mouse," said Paul Stillman, lead author of the study who received his Ph.D. in psychology at The Ohio State University.

"How much their hand is drawn to the choice they didn't make can reveal a lot about how difficult the decision was for them," said Stillman, who is now a postdoctoral researcher in marketing at Yale University.

Stillman conducted the study with Ian Krajbich, associate professor of psychology and economics at Ohio State, and Melissa Ferguson, professor of psychology at Yale. It was published today in the *Proceedings of the National Academy of Sciences*.

The researchers were surprised at how accurate mouse tracking was at predicting how people would react to other similar risk choices.

"In many cases, we could accurately predict how people would behave in the future after we observed them just once choosing to take a gamble or not," Krajbich said.

"It is rare to get predictive accuracy with just a single decision in an experiment like this."

The researchers conducted three studies with a total of 652 people. They measured participants' mouse movements as they made 215 decisions on various gambles. Each gamble was different, with some being bigger

risks than others.

Each participant's mouse always started at the bottom center of the screen. Each trial began with two boxes appearing on the top left and right corners of the screen.

One box offered them a 50/50 gamble, such as a 50% chance of gaining \$10 and a 50% chance of losing \$5. The other box contained a certain option that was usually equal to \$0.

The question was: How would people move the mouse toward their ultimate choice?

In some cases, participants took a relatively straight path from where they started to the choice they made. The researchers interpreted that as indicating the person was confident about their choice from the start and didn't have much internal conflict.

But sometimes, they veered toward one option or the other before settling on the other choice. That suggests they did feel some conflict.

This tells the researchers much more about the participants than simply observing what they finally chose, Krajbich said.

"Choice data is not very useful for many purposes. You don't know the strength of a person's preference or how close they were to making the other choice," he said. "And that's what the mouse-tracking measure can give us."

For example, in one analysis, the researchers looked at people who all made the same choice on one gamble. Could they tell which ones would flip to the opposite choice on a similar gamble?

It turns out they could, simply by measuring the mouse trajectories to see if they had veered toward the opposite choice the first time.

"We could very nicely differentiate between people, even when they made the same choice," Stillman said. "It gives us a much richer picture of risk aversion and loss aversion in people."

In one of the studies, the researchers tested whether they could manipulate how much risk people were willing to take—and whether it would be visible in their mouse trajectories.

In this study, the researchers told some participants to treat the gambles like a stock trader would. They were told not to focus so much on individual gambles, but to see if they could build a "portfolio" of winning choices.

"When we told them to think like a trader, we could see from the mouse tracking that they were less conflicted when they accepted gambles and more conflicted when they rejected them—just as we would expect," Krajbich said.

While this study looked at [mouse](#) trajectories, the results suggest other motor movements might also provide information about our decision-making, according to the researchers.

"Scrolling on a phone may also provide information on how people are making a decision," Krajbich said.

"What we're measuring is a physical manifestation of hesitation. Anything like that, such as scrolling, could yield a similar glimpse of this internal conflict."

More information: Paul E. Stillman et al., "Using dynamic monitoring

of choices to predict and understand risk preferences," *PNAS* (2020).
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