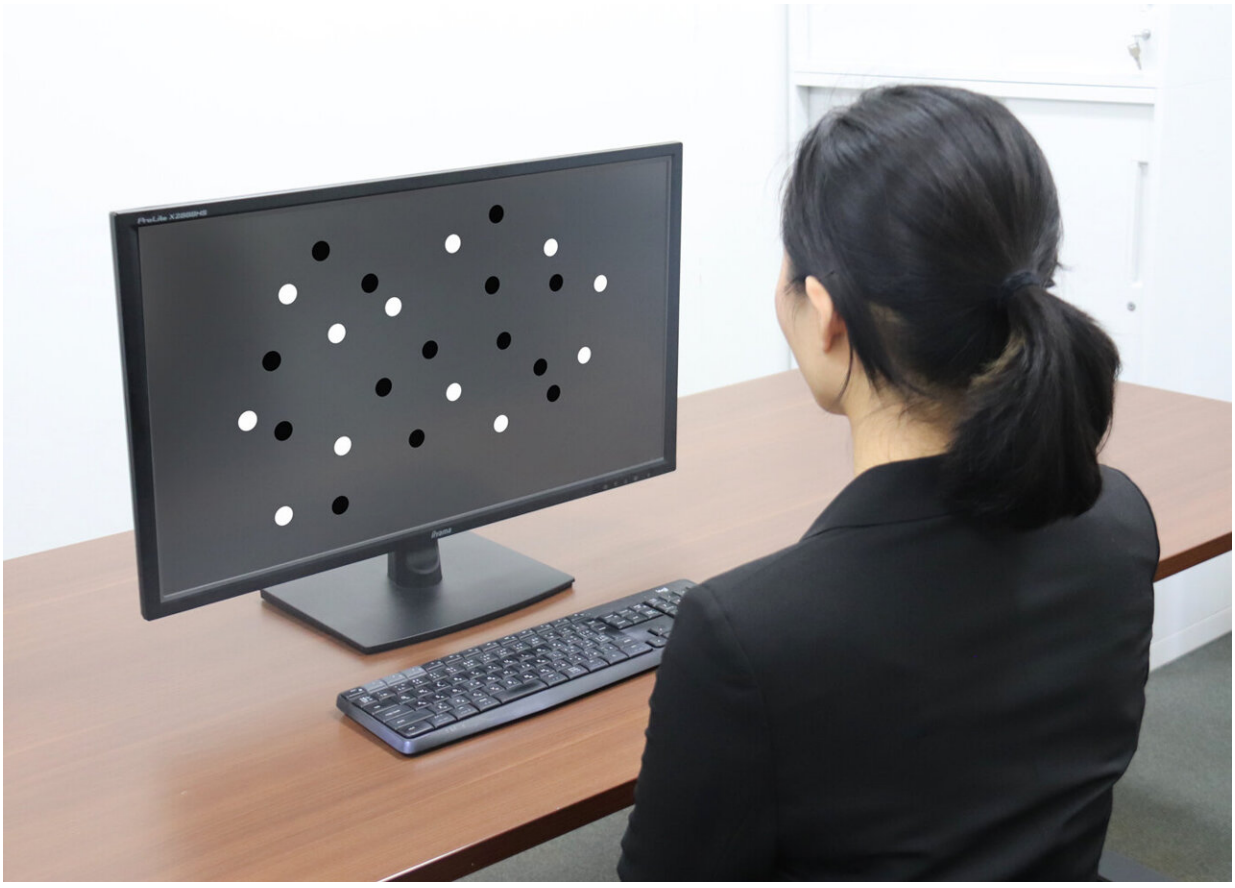
Guessing game: Response may bias understanding of future scenarios

March 12 2024



Participant estimates how many dots are shown on a screen. Credit: Osaka Metropolitan University

Does previous experience bias a person in future estimations? Yes, say

Osaka Metropolitan University researchers in Japan, but only if the person engages higher processing powers by responding, as opposed to simply observing.

They made their findings through experiments involving participants estimating the number of dots flashed on a screen. Participants either had to input their estimate before making another estimate on a new set of dots or were not prompted to do anything but observe. The researchers found that those asked to respond demonstrated serial dependence.

"What we see or hear is influenced by what we saw or heard before," said Professor Shogo Makioka at the Graduate School of Sustainable System Sciences, Osaka Metropolitan University. "The way we are influenced depends on the stimulus and time interval. If we are influenced toward what came before, meaning we are biased toward believing that separate items are more similar, we call that serial dependence."

The findings were published in *Scientific Reports*.

In the first experiment in this paper, 35 participants were shown dots for a quarter of a second then prompted to provide their estimated answer for the number before being shown another set of dots. Later, the same participants were shown dots but not prompted to provide an answer, before being shown another set of dots and again prompted to estimate.

In the second experiment, 23 participants were prompted for an answer at random. The researchers found that participants who were prompted to respond were more likely to provide an answer closer to their most recent observation.

"The experiments demonstrated that the influence of serial dependence

is stronger immediately after a response is requested," said co-author Yukihiro Morimoto, a third-year doctoral student at the university. "This is an important finding when considering how to present information to prevent human error."

The researchers noted, however, they did not find a correlation between serial dependence and accuracy, likely because the number of dots were random, rather than in intentional groupings or patterns.

According to Professor Makioka, stronger serial dependence following response is due to the higher processing the participant must use to observe and estimate the number of dots, then translate that into an answer.

"We are now investigating whether serial dependence related to numbers also occurs in children and whether it occurs when numbers are presented through sound," Professor Makioka said. "Through these studies, we aim to provide clearer guidelines for preventing human error by uncovering, in detail, the ways in which serial dependence arises and how number-related processes work."

More information: Yukihiro Morimoto et al, Response boosts serial dependence in the numerosity estimation task, *Scientific Reports* (2024). DOI: 10.1038/s41598-024-52470-0

Provided by Osaka Metropolitan University

https://phys.org/news/2024-03-game-response-bias-future-scenarios.html