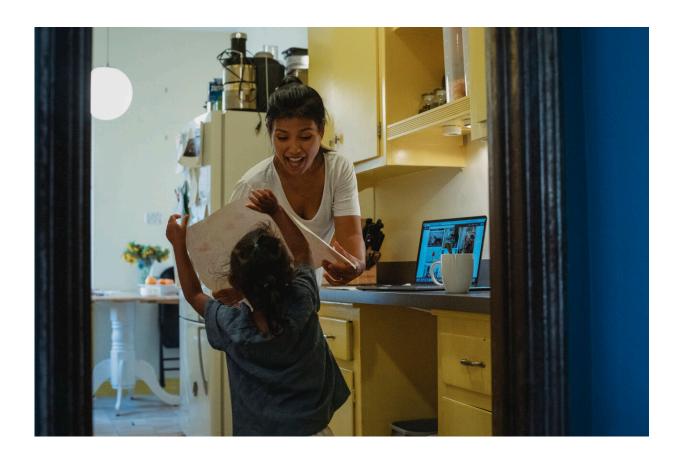# Drawing a better picture of global cognition in older adults

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Credit: Kamaji Ogino from Pexels

Cognitive impairments, like those that eventually lead to Alzheimer's disease, have large social and economic impacts and often decrease people's quality of life. They're also relatively underdiagnosed, partly

because their diagnosis relies on clinical tests, which aren't always easy to access. In a study published last month in *JMIR Formative Research*, researchers from the University of Tsukuba, University of California San Diego, and IBM Research have revealed that they could estimate global cognition in older adults from both Japan and the U.S. by automatically analyzing key drawing features while a drawing task was performed using a digital pen and tablet.

Only about 25% of all dementia cases receive a diagnosis worldwide, and this percentage is even lower in developing countries. To add to this problem, access to cognitive screening was difficult during much of the COVID-19 pandemic. To improve diagnostic rates, there's a real need for cognitive screening methods that don't require administration by a medical professional—this is especially important as new therapies become available. Researchers from the University of Tsukuba decided to investigate whether any drawing traits could be used to estimate cognition in an automatic way, using a commercially available tablet.

"As well as the relatively low access to cognitive testing worldwide, another problem is that most tests rely on language and are often sensitive to cultural differences," explains senior author of the study Professor Tetsuaki Arai. "We really wanted to find a way to estimate cognition in older adults that would work in any part of the world, with people who speak any language."

To do this, the researchers developed a software that automatically analyzed key traits as people completed the Trail Making Test part B, which is a simple task that involves drawing a line between 25 numbers and letters in alternating order. The research team then looked at the relationship between these drawing traits and scores on the Montreal Cognitive Assessment (MoCA), which evaluates global cognition. They also wanted to know whether findings were similar between adults in the U.S. and those in Japan.

"The results were remarkably similar between the two countries," says Professor Arai. "People with lower scores in the cognitive assessment had more variability in their drawing speed, less variability in the angle of their pen, and more time spent paused relative to time spent drawing."

In addition, a machine learning model that used drawing features to estimate MoCA scores was able to generalize from older adults in the U.S. to those in Japan. This suggests that the automated analysis of drawing traits to estimate global cognition is applicable across different populations.

Given the relatively low diagnostic rates of cognitive impairment worldwide, and especially in developing countries, this self-administered method of estimating cognitive function in older adults may lead to earlier diagnosis and better treatment options for patients.

Provided by University of Tsukuba