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New evidence that computers change the way we learn

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People who use computers regularly are constantly mapping the movements of their hand and computer mouse to the cursor on the screen. Now, researchers reporting in *Current Biology* on December 19 have shown that all that pointing and clicking (the average computer user performs an impressive 7,400 mouse clicks per week) changes the way the brain generalizes movements.

"Computers produce this problem that screens are of different sizes and mice have different gains," says Konrad Kording of Northwestern University and the Rehabilitation Institute of Chicago. "We want to quickly learn about these so that we do not need to relearn all possible movements once we switch to a new computer. If you have broad generalization, then you need to move the mouse just once, and there you are calibrated."

And indeed, their studies found that Chinese migrant workers accustomed to using computers made broader generalizations when it comes to movement learning than a group of age- and education-matched migrant workers who had never used a computer before. While both computer users and non-users learned equally quickly how to move a cursor while their hand was hidden from view, computer-experienced individuals more readily generalized what they learned about movement of the cursor in one direction to movements made in other directions.

To get to the bottom of that difference, the researchers studied another group of 10 people unfamiliar with computers both before and after they

spent 2 weeks playing computer games that required intensive mouse use for 2 hours each day. That two weeks of experience was enough to convert the generalization patterns of those computer-naïve individuals to that of regular computer users, the researchers report.

The findings show that computer use not only changes our lifestyle but also fundamentally affects the neural representation of our movements, the researchers say. This new understanding of movement learning might have important real-world implications for people undergoing physical rehabilitation in the clinic.

"Our data revealed that generalization has to be learned, and we should not expect it to happen automatically," says study first author Kunlin Wei from China's Peking University. "The big question in the clinic setting is whether supervised rehabilitation can lead to functional improvement at home. Thus, the next natural step for us is to experiment on how to make this generalization from clinics to home happen more effectively."

"If we could make patients generalize perfectly from robotic training in the hospital to drinking tea at home, then training in the hospital would maximally improve everyday life," Kording adds.

More information: *Current Biology*, Wei et al.: "Computer use changes movement learning." dx.doi.org/10.1016/j.cub.2013.11.012

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