



## Video Games Can Improve Memory



Playing 3D video games can enhance the formation of memories, according to a new study from University of California, Irvine. This finding published in *The Journal of Neuroscience* shows the potential for novel virtual approaches to helping people whose memory wanes as they grow older.

For this study, Craig Stark and Dane Clemenson of UCI's Center for the Neurobiology of Learning & Memory recruited non-gamer college students to play either a video game with a passive, two-dimensional environment ("Angry Birds") or one with an intricate, 3D setting ("Super Mario 3D World") for 30 minutes per day over two weeks.

Before and after the two-week period, the students took memory tests that engaged the brain's hippocampus, the region associated with complex learning and memory. They were given a series of pictures of everyday objects to study. Then they were shown images of the same objects, new ones and others that differed slightly from the original items and asked to categorise them.

Results showed that students playing the 3D video game improved their scores on the memory test, while the 2D gamers did not. Overall, memory performance increased by about 12 percent, the same amount it normally decreases between the ages of 45 and 70.

Recognition of the slightly altered images requires the hippocampus, Stark explained, and his earlier research had demonstrated that the ability to do this clearly declines with age. This is a large part of why it's so difficult to learn new names or remember where you put your keys as you get older.

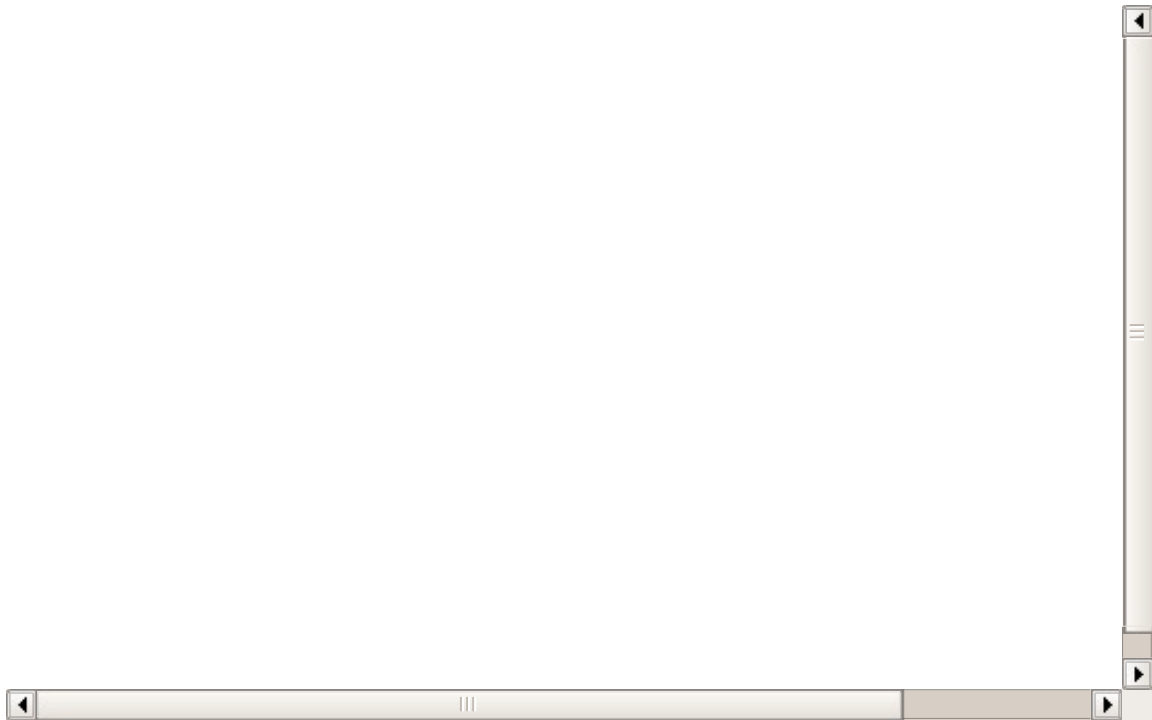
In previous studies on rodents, postdoctoral scholar Clemenson and others showed that exploring the environment resulted in the growth of new neurons that became entrenched in the hippocampus' memory circuit and increased neuronal signalling networks. Stark noted some commonalities between the 3D game the humans played and the environment the rodents explored – qualities lacking in the 2D game.

3D games generally have a lot more spatial information for players to explore. They are much more complex compared to 2D ones, with a lot more information to learn. This kind of learning and memory not only stimulates but requires the hippocampus, Stark emphasised. However, it's unclear whether the overall amount of information and complexity in the 3D game or the spatial relationships and exploration is stimulating the hippocampus. "This is one question we're following up on," he added.

Stark and his colleagues will conduct further research to determine if environmental enrichment – either through 3D video games or real-world exploration experiences – can reverse the hippocampal-dependent cognitive

deficits present in older populations. This effort is funded by a \$300,000 Dana Foundation grant.

“It’s often suggested that an active, engaged lifestyle can be a real factor in stemming cognitive ageing,” Stark said. “While we can’t all travel the world on vacation, we can do many other things to keep us cognitively engaged and active. Video games may be a nice, viable route.”



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