

Action video games make players better learners of visual and memory tasks

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Playing video games that are heavy on action can make you better at some new tasks. New research reveals that these games are helping by teaching players to be quicker learners.

"Imagine taking an American and putting them through physical training to boost their athleticism," says C. Shawn Green, a psychology professor at the University of Wisconsin-Madison who studies how people learn. "If you then have them try to play rugby for the first time ever, they might not look that good. After all, even a good athlete who is stepping into a rugby match for the first time will have to learn a lot of new rules. However, their increased athleticism will mean that they'll tend to be in slightly better positions initially than people with lesser athleticism, and thus will learn to play rugby more quickly."

That idea is similar for action video games—typically those in a genre called first-person shooters—in which players are rewarded for swiftly and accurately tracking and reacting to features of the game that appear and move quickly.

"If you're increasing the equivalent of athleticism for perceptual [cognitive abilities](#)—like visual attention or speed of processing—that should allow you to learn faster when you've got a new [task](#) that calls on those abilities," Green says.

The results will help researchers understand how gaming—which is used to train laparoscopic surgeons and drone pilots, and to help people with amblyopia (sometimes called "lazy eye") and attention deficit disorders—creates some of its well-documented positive effects.

"Games are really powerful, complex experiences," says Green, whose work is supported by the Office of Naval Research. "We know they produce interesting changes in behavior, but their level of complexity makes them hard to study."

The study also shows that not all training activities are equal. Some types of practice can make you perfect, but only at one thing. Types of training that make trainees better at quickly learning to perform a broad

range of tasks—or at least more than one—have obvious advantages.

"If you have people who are new to a basketball court shoot nothing but free throws over and over and over, they'll probably get much better at shooting straight on from 15 feet," Green says. "But then if you have them shoot from somewhere else on the court, they're probably going to go right back to where they started. We call that a failure of transfer or a failure of generalization."

In a pair of experiments described recently in the journal *Communications Biology*, 25 participants at the University of Rochester in New York and then 52 participants at the University of Geneva in Switzerland were separated into roughly equal groups assigned to play 45 hours of either action video games (such as those from the Call of Duty series) or other popular video games that unfold at a different pace without relying so much on visual attention and reaction speed (games such as Sims and Zoo Tycoon).

Before the players began their gaming assignments, they were tested with tasks that measured their visual perception and working [memory skills](#). The [visual perception](#) tasks required participants to use a brief glance to pick out the direction of movement of an object or orientation of stripes running across a shape. The working memory tests were more challenging, asking players to listen and watch for pairs of letters read aloud and shapes appearing in different locations on a screen, and report when one matched a sound or placement from a certain number of turns back.

Both groups came out relatively even in the initial tests. But after their contrasting gaming experiences, the action game players were different.

"They had a slight advantage right away, after playing the action games. But the bigger effect was that they improved faster at these orientation

and memory tasks than the people who played other games," says Green, who collaborated on the study with researchers from Rochester, Geneva, New York University and the University of California, Irvine.

The tests were chosen because the simple movements and orientation of basic shapes engage parts of the brain involved in very rudimentary visual processing and working memory. "Constantly having to manage new stuff versus old stuff as information comes in" is a common factor in tackling new tasks, Green says.

Teasing the significant aspects out of the complexity will help future [game](#) designers who are focused on training as much as—or more than—entertainment.

"There are issues with action games—they tend to be violent, for example, and it's unlikely that is necessary to cause the effects we want to see in players," Green says. "Before you can start designing games with the goal of maximizing the benefits, you need to know what's helping and what's not.

More information: Ru-Yuan Zhang et al, Action video game play facilitates "learning to learn", *Communications Biology* (2021). [DOI: 10.1038/s42003-021-02652-7](https://doi.org/10.1038/s42003-021-02652-7)

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