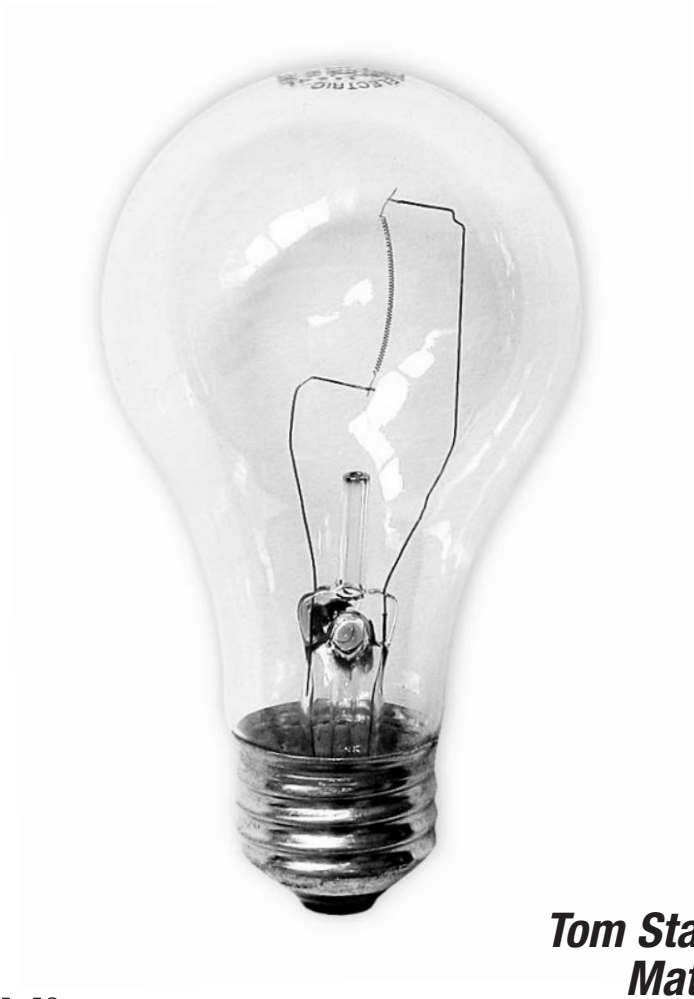
MIND HACKS™

Tips & Tools for Using Your Brain



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Foreword by Steven Johnson, author of **Mind Wide Open**

HACK #43 Improve Visual Attention Through Video Games

Some of the constraints on how fast we can task-switch or observe simultaneously aren't fixed. They can be trained by playing first-person action video games.

Our visual processing abilities are by no means hardwired and fixed from birth. There are limits, but the brain's nothing if not plastic. With practice, the attentional mechanisms that sort and edit visual information can be improved. One activity that requires you to practice lots of the skills involved in visual attention is playing video games.

So, what effect does playing lots of video games have? Shawn Green and Daphne Bavelier from the University of Rochester, New York, have researched precisely this question; their results were published in the paper "Action Video Game Modifies Visual Attention" [1], available online at *http://www.bcs.rochester.edu/people/daphne/visual.html#video*.

Two of the effects they looked at we've talked about elsewhere in this book. The attentional blink **[Hack #39]** is that half-second recovery time required to spot a second target in a rapid-fire sequence. And *subitizing* is that alternative to counting for very low numbers (4 and below), the almost instantaneous mechanism we have for telling how many items we can see **[Hack #35]**. Training can both increase the subitization limit and shorten the attentional blink, meaning we're able to simultaneously spot more of what we want to spot, and do it faster too.

Shortening the Attentional Blink

Comparing the attentional blink of people who have played video games for 4 days a week over 6 months against people who have barely played games at all finds that the games players have a shorter attentional blink.

The attentional blink comes about in trying to spot important items in a fast-changing sequence of random items. Essentially, it's a recovery time. Let's pretend there's a video game in which, when someone pops up, you have to figure out whether it's a good guy or a bad guy and respond appropriately. Most of the characters that pop up are good guys, it's happening as fast as you can manage, and you're responding almost automatically—then suddenly a bad one comes up. From working automatically, suddenly the bad guy has to be lifted to conscious awareness so you can dispatch him. What the attentional blink says is that the action of raising to awareness creates a half-second gap during which you're less likely to notice another bad guy coming along.

Now obviously the attentional blink—this recovery time—is going to have an impact on your score if the second of two bad guys in quick succession is able to slip through your defenses and get a shot in. That's a great incentive to somehow shorten your recovery time and return from "shoot bad guy" mode to "monitor for bad guys" mode as soon as possible.

Raising the Cap on Subitizing

Subitizing—the measure of how many objects you can quantify without having to count them—is a good way of gauging the capacity of visual attention. Whereas counting requires looking at each item individually and checking it off, subitizing takes in all items simultaneously. It requires being able to give a number of objects attention at the same time, and it's not easy; that's why the maximum is usually about four, although the exact cap measured in any particular experiment varies slightly depending on the setup and experimenter.

Green and Bavelier found the average maximum number of items their non-game-playing subjects could subitize before they had to start counting was 3.3. The number was significantly higher for games players: an average of 4.9—nearly 50% more.

Again, you can see the benefits of having a greater capacity for visual attention if you're playing fast-moving video games. You need to be able to keep on top of whatever's happening on the screen, even when (especially when) it's getting stretching.

How It Works

Given these differences in certain mental abilities between gamers and non-gamers, we might suspect the involvement of other factors. Perhaps gamers are just people who have naturally higher attention capacities (not attention as in concentration, remember, but the ability to keep track of a larger number of objects on the screen) and have gravitated toward video games.

No, this isn't the case. Green and Bavelier's final experiment was to take two groups of people and have them play video games for an hour each day for 10 days.

The group that played the classic puzzle game Tetris had no improvement on subitizing and no shortened attentional blink. Despite the rapid motor control required and the spatial awareness implicit in Tetris, playing the game didn't result in any improvement.

On the other hand, the group that played Medal of Honor: Allied Assault (Electronic Arts, 2002), an intense first-person shooter, could subitize to a

higher number and recovered from the attentional blink faster. They had trained and improved both their visual attention capacity and processing time in only 10 days.

Green and Bavelier's results are significant because processes like subitizing [Hack #35] are used continuously in the way we perceive the world. Even before perception reaches conscious attention, our attention is flickering about the world around us, assimilating information. It's mundane, but when you look to see how many potatoes are in the cupboard, you'll "just know" if the quantity fits under your subitization limit and have to count them—using conscious awareness—if not.

Consider the attentional blink, which is usually half a second (for the elderly, this can double). A lot can happen in that time, especially in this information-dense world: are we missing a friend walking by on the street or cars on the road? These are the continuous perceptions we have of the world, perceptions that guide our actions. And the limits on these widely used abilities aren't locked but are trainable by doing tasks that stretch those abilities: fast-paced computer games.

I'm reminded of Douglas Engelbart's classic paper "Augmenting Human Intellect" [2] on his belief in the power of computers. He wrote this in 1962, way before the PC, and argued that it's better to improve and facilitate the tiny things we do every day rather than attempt to replace entire human jobs with monolithic machines. A novel-writing machine, if one were invented, just automates the process of writing novels, and it's limited to novels. But making a small improvement to a pencil, for example, has a broad impact: any task that involves pencils is improved, whether it's writing novels, newspapers, or sticky notes. The broad improvement brought about by this hypothetical better pencil is in our basic capabilities, not just in writing novels. Engelbart's efforts were true to this: the computer mouse (his invention) heightened our capability to work with computers in a small, but pervasive, fashion.

Subitizing is a like a pencil of conscious experience. Subitizing isn't just responsible for our ability at a single task (like novel writing), it's involved in our capabilities across the board, whenever we have to apply visual attention to more than a single item simultaneously. That we can improve such a fundamental capability, even just a little, is significant, especially since the way we make that improvement is by playing first-person shooter video games. Building a better pencil is a big deal.

See Also

1. Green, C. S., & Bavelier, D. (2003). Action video game modifies visual attention. *Nature, 423*, 534–537.
2. Engelbart, D. (1962). Augmenting human intellect: a conceptual framework located at *http://www.bootstrap.org/augdocs/friedewald030402/augmentinghumanintellect/ahi62index.html*.