

BrainWorld

Fall, 2010

This Is Your Brain on Games

By Amy Klein

POSIT SCIENCE TAKES BRAIN IMPROVEMENT TO THE LAB

■ Do you love doing crossword puzzles or playing sudoku because you think it keeps your mind sharp? Well, think again. “Most of those things don’t have a measurable impact—if it makes people happy to play them that’s good, but it doesn’t make them smarter,” says Steven Aldrich, president and CEO of Posit Science (positscience.com), a developer of brain-fitness software.

Studies show that the brains of heavy users of crossword puzzles decline at the same rate as light users of crossword puzzles. “Crossword puzzles are doing very similar things again and again—you are recalling things you already know,” says Aldrich. “It’s not a guard against healthy aging.” Neither are computer games like *Bejeweled* or Nintendo’s *Brain Age*, or even reading a book, he says. “The brain stays healthy by doing new and novel things, constantly pushed harder and harder.”



Aldrich should know. While there are many companies in the burgeoning brain-fitness industry, Posit Science is one of the few with clinical research behind its products. Founded in 2003 by Jeffrey Zimman and Michael Merzenich, a neuroscience professor at the University of California, San Francisco, the venture capital-funded private company has, together with grants from the National Institutes of Health, invested at least \$50 million in their software products, tested by tens of thousands of people and helped by a scientific advisory board of more than 40 scientists. Now, more than 100,000 people use their products, including health and car insurance companies.

Posit Science, whose tagline reads “Think faster, focus better, remember more,” is aimed at the baby boomer market—people aged 50 to 65—which, in the United States, totals some 80 million people. They offer three brain-game programs (all on the computer, since studies show that most people today have access to a computer): InSight, a program to improve visual processing and memory; DriveSharp, a product designed to improve driving safety by speeding up visual processing; and the Brain Fitness Program, exercises for auditory processing and memory.

These programs, ranging in price from \$89 to \$395, can be practiced like a regular body workout, for 20 minutes a day, three times a week for 10 weeks, in order to see results. The games seem simple—accessible for any computer novice—with basic designs, and both vocal and written instructions. For example in “Jewel Diver” in the InSight program, a number of increasing jewels are shown to you and then hidden inside fish floating in the water. You must keep track of which fish are hiding the jewels and then identify them. This measures “divided attention”—and in real life, the program explains, it might help you monitor four or five children at a time.

Another game, “Bird Safari,” flashes a bird in the center of the screen and then asks you to identify it from another group of birds flashed in a circle around the periphery, measuring visual precision as well as memory. All the games give you an initial baseline assessment and a goal. The programs also give you a program grid monitoring your total hours and progress.

If It's Not Broken...

But before investigating how brain improvement works, maybe the first question should be why we need to improve our minds. Is this another American quest to defy time, to be the best at something that might be left well-enough alone to nature? Why on earth do we need to send our brains to the gym?

“The brain is an organ that thrives on challenge,” says Aldrich. When we are younger, we go to school, learn new subjects, play new sports, develop new talents like music and dance. “But as we transition to adulthood,” he says, “for better or for worse, we start using that information we’ve accumulated over time, and we are not learning new things.”

From your late 20s to your late 50s, you lose half your ability in every cognitive function except vocabulary, unless you do something about it. After age 50, you start to see a 10% decline. With life expectancies rising and people retiring earlier than they did 20 years ago, people want to enjoy their golden years. Baby boomers—overachievers in everything—were the first generation to get college degrees, and now they want to keep vibrant as they age, Aldrich explains. “Just like we now know that we should constantly be exercising our bodies, we should also be challenging our brains,” he says, using the industry’s habit of comparing brain fitness to physical fitness. “We need brain fitness to keep the quality of life we expect, because we don’t challenge the brain enough in our daily lives.”



Most people don’t notice their brain problems at first because they usually use context to fill in what they missed, drawing on life experience to “fill in the blanks,” Posit Science experts say. But as we age, these “blanks” get too big to fill in—and you might be left with a blank look when trying to remember someone’s name, the title of a song or an event that was once on the tip of your tongue.

Posit Science games harness the brain’s inherent plasticity—its ongoing remodeling throughout life—and direct it in ways that enhance overall performance. Effective brain games, Aldrich says, focus on speed, accuracy and recording. That’s because after age 30, memory, thinking and focus tend to slow down.

1. **Speed:** Our brains slow down, but the speed of information coming in from the senses—sights and sounds happening in our lives—does not. Over time, the brain begins to miss details, making it more difficult to react to and remember what we see and hear. So the brain needs to be pushed to a point where it’s working hard. “You can miss the beginning or end of a word, and that can be debilitating,” says Aldrich. “And as we age, our vision processes at a slower rate.”
2. **Accuracy:** The brain’s neural pathways often get fuzzier, or even distorted, as we age—memories can become less clear and more difficult to process in higher cognitive functions. It doesn’t matter how fast your brain is processing if you can’t recognize what you see and hear, like the difference between the sounds bo and go, or how you recognize that that shape on the corner is a child, not a fire hydrant.
3. **Recording:** With each passing decade, our brains produce fewer neuromodulators—brain chemicals that determine what information is important to record and process. This deficit hinders the brain’s ability to record new information—its ability to learn and remember. Memory games improve the brain’s function.

I Once Was a 98-Pound Weakling...

In today's tech-savvy world, where everyone is hyper-connected through iPods, BlackBerrys, computers and video-game consoles, one might assume that kids today are getting smarter. The modern world is "a double-edged sword," Aldrich explains. On the one hand, we can find information quickly—via Google or GPS navigators, for example—but, on the other hand, "it removes the challenge of everyday life to improve brain performance."

Constant connectivity can also hurt our focus and attention. "There's a tremendous temptation to be distracted," says Aldrich. "Task-switching is very detrimental to having great thoughts or building new things." Distracted driving, for example, is bad driving. In the end, he says, brain improvement in the modern world depends on how you use technology. (That being said, Posit Science is developing an iPod app.)

All this promise of brain fitness and brain improvement are well and good, but what kind of benefits do they have in the real world? What does it mean to lose or improve your brain function?

Posit Science clinical studies have shown that after completing their Brain Fitness Program, participants show auditory-processing speeds increased by 131%, and memory improved by the equivalent of 10 years. The DriveSharp program participants have their risk of a crash cut by 50% and reduce unsafe driving maneuvers by 36%; and 87% of participants in the InSight program for visual processing and memory showed an increased rate of visual processing, reducing the risk of tripping and falling and improving the ability to maintain independence by keeping up with the demands of daily living—such as counting change or finding a phone number.

For people like 86-year-old Edward Manck from Bedford, Virginia, the Brain Fitness Program helped him relearn the saxophone—he'd stopped after he graduated high school. "When you play a song, you try to read two or three bars ahead so you can finger properly," says Manck. "After using the program, I noticed that I started to do that again." Manck isn't stopping with the sax. "I've always wanted to play the piano, so now I've picked that up, too," he says.

For others with trauma and brain injury, brain games can be a matter of survival. Steven Schultz, for example, was hit by a roadside bomb while serving in Iraq and couldn't see, hear or laugh the way he once did. After using the program, he increased his attention span, increased his vision and was able to respond to people immediately, instead of after 30 or 40 seconds.

"It was just so valuable that Steven was attending to his brain injury," says his mother, Debbie. "Pushing his attention span past that three-minute threshold was just so important."

Skier Dave Demko, a 57-year-old from Pennsylvania, learned to compete against people half his age, despite a 20-year hiatus from the sport. After training and working with Posit Science programs, he ranked in the top 15 of 16-to-25-year-olds. He realized that the younger skiers were simply not making wasted movements, and his only challenge was not physical—it was mental. "If your brain is working faster, your reactions are going to be better, and your confidence is maximized," he says. "You have to stay on the fastest line or you're going to get smoked."

Can Your Brain Lift Weights?

What will the future hold for brain fitness? Will brains go the way of the body—with a Jane Fonda-like character who leads the fitness revolution, and brain "gyms," "fitness classes" and "personal trainers" popping up around the country?

Well, that's already started to happen, with community centers offering "mind and body" classes, and places like vibrantBrains, in San Francisco. A "health club for your brain," vibrantBrains was founded in 2003 by Lisa Schoonerman and Jan Zivic. Zivic had recovered from a traumatic brain injury and her doctor told her that her rehab would not have been as successful if she hadn't been as mentally active. "Think about it—if you're physically fit and you go skiing and you break your leg, your rehab process will be more rapid than if you're not physically fit,"

Schoonerman says. “It’s important for the brain to keep active and nimble and keep the connection and neurons strong so you can be at the top of your game in the moment, and to develop cognitive reserves which are protective if something happens as we age.”

One of the only storefront “brain gyms,” vibrantBrains offers some Posit Science programs, as well as memory tests from UCLA, speaker series, and reading improvement for teens. Schoonerman estimates they have helped close to 1,000 people over the years, including a woman in her 60s who met her husband after taking a class because she felt “confident and less shy with people she thought were smart and interesting,” Schoonerman says. An amateur-ranked tennis player who went through a program said she became competitive with people 20 years her junior because she “could process the moves more quickly.” A musician in his late 20s who had suffered a brain injury used their program and recovered his ability to play music.

Although most of their clients are older, some younger people are coming in to become more mentally and athletically competitive, and others are coming in to sharpen their brains before heading back to school or into the workplace.

Staffed by three people, vibrantBrains is considering opening more branches. For Schoonerman, 42, it’s been very rewarding. “When we started doing research on this, I wasn’t 40 yet—I’m not old enough to have serious memory issues, but I felt like I slowed down.” Now, after working at vibrantBrains and doing the programs they offer, she feels much better. “I feel like I’m back,” she says. **[bw]**