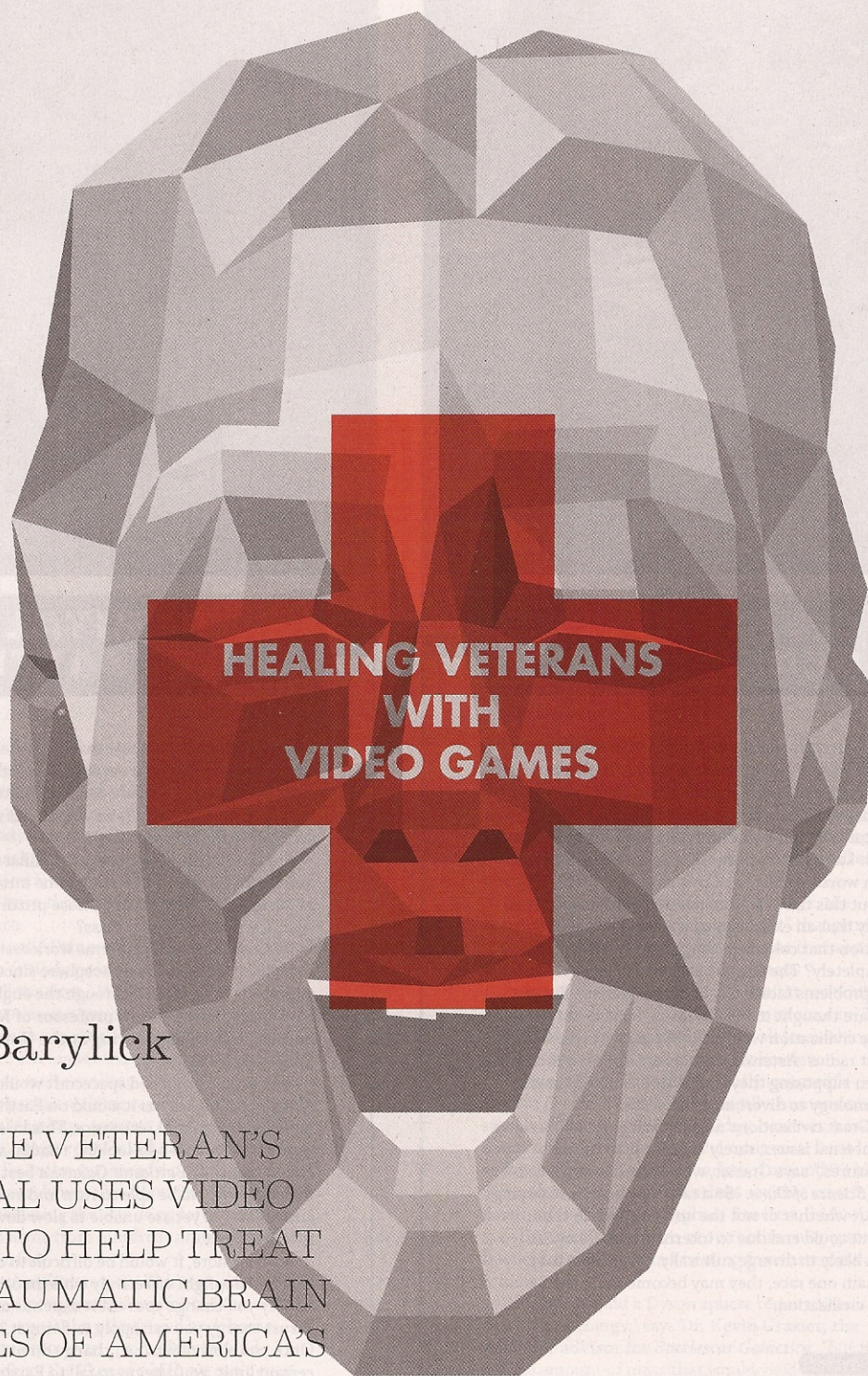




Words by

Chris Barylick

HOW ONE VETERAN'S
HOSPITAL USES VIDEO
GAMES TO HELP TREAT
THE TRAUMATIC BRAIN
INJURIES OF AMERICA'S
WOUNDED WARRIORS.



Sgt. 1st Class David Gaffney led a unit in Iraq in 2007. A 15-year veteran of the U.S. Army, Gaffney's career and life changed when he suffered a pair of bullet wounds. The first, an open wound, tore into his skull. The second, a closed wound, blasted into him from the other side shortly after the first hit.

Now deaf in his left ear and experiencing vision problems in his left eye, Gaffney's working on recovering from his war wounds. He's spent the past 30 months essentially relearning *everything* in his life.

And video games have helped put him back together.

Walk around the halls of the Walter Reed Army Medical Hospital in Washington, D.C., and you'll notice something strange; patients carrying Nintendo DS units as they travel between appointments. Donated by the Red Cross, the handheld consoles are part of an effort to help treat veterans with traumatic brain injuries from the conflicts in Iraq and Afghanistan and are loaded with copies of Brain Age and Brain Age 2.

Brain Age Rehab

In a weird cross-section between gaming and neuroscience, Brain Age turned out to be ideally qualified for cognitive rehabilitation. The game challenges players to complete assorted puzzles and then displays the "age" of your brain depending on your score, and it includes a Stroop test, a common clinical test used to gauge underlying skill sets such as reaction time and immediate memory as well as diagnose neurological disorders.

While post-traumatic stress disorder was rampant with soldiers who fought in the Vietnam War, traumatic brain injuries are likewise a big problem for soldiers leaving Iraq and Afghanistan. Brain Age proved perfectly suited for the needs of Walter Reed's Traumatic Brain Injury clinic.

"It depends on the patient, but these guys are action-oriented, and even though the symptoms will resolve with time and therapy, this program makes things more active in their own recovery," says Dr. Susan

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Schwabacher, a speech pathologist at Walter Reed. Schwabacher acknowledges that while further studies are needed to determine the software's exact usefulness, there's a "use it or lose it" approach to the games in effect that encourages patients to hone in on a personal obstacle and conquer it. Combined with the military's spirit of competition (veterans boast of improved Brain Age scores within earshot of each other), this keeps patients coming back for more.

With a broken leg, an X-ray will display the healing process and offer an accurate estimate of the patient's progress. With an injured brain, it's almost impossible to measure recovery. As a result, the staff of Walter Reed's Brain Fitness Center developed a two-pronged philosophy between constantly working the brain and the theory of neuroplasticity, which argues that the brain is incredibly elastic and that other areas of the brain can take over to compensate for a damaged area.

"The old theory is, 'Well, the damage is there—you've got to work a while to overcome it, but you can't,'" says Col. Bedford Boylston, a patient of the Brain Fitness Center. "What these games are designed to do are stimulate the brain to overcome, basically rewire your brain to bypass the damage."

And the key to bypassing this damage is through constant stimulation. "Keep working your brain. Keep stimulating it in any way that's an adjunct to traditional therapy," says Katherine Sullivan, a speech-language pathologist with the Brain Fitness Center. Founded in 2009, the Brain Fitness Center serves over 70 Walter Reed patients and incorporates various Nintendo Wii and DS titles into its treatment programs, such as Brain Age, Brain Age 2, ThinkSmart Family, Margot's Word Brain, and Big Brain Academy: Wii Degree. They also use Dakim, a Windows- and Mac OS X-based rehabilitative software package that puts patients through a 20-minute battery of randomly generated tests, with each session and web-based games available through the Lumosity website.



Rehabilitation with the Brain Fitness Center is voluntary. Patients enter, fill out quality of life, symptom, and cognitive surveys, and then come in and work with the games as frequently (or as infrequently) as they like over the course of their stay at Walter Reed.

A Need to Change

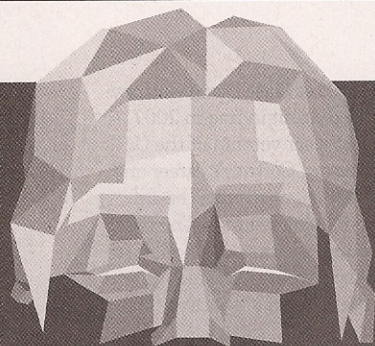
"From my experience and as a physician reviewing the literature, this is the pathway to getting better," says Boylston, who went on to cite the Army's need to change where traumatic brain injuries are concerned. "Some of these guys go on and develop significant memory loss—the Army's response is to have a notebook and write it down.

"The goals are different from a game where you're playing to win," Boylston adds. "This is because people know there's a problem and want to get better. You may play this game and do 100 modules and not feel any progress. And then something works inside, and suddenly, you go up to the next level. It's very, very unclear how this system works within a brain that's been injured, but it does work, and it's the only pathway I've seen within the Army right now that gives you that opportunity."

Boylston says that the games also helped alert him to other medical problems he was unaware of. "I was working on this for six months and was missing on the upper left quadrant [of the brain]. And only because I'm [playing] these games did I start to say, 'Hey, it appears I'm not getting it.'" Boylston then sought out various specialists to diagnose the problem and receive appropriate treatment.

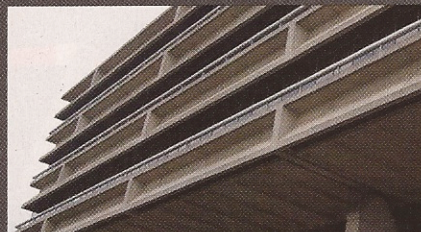
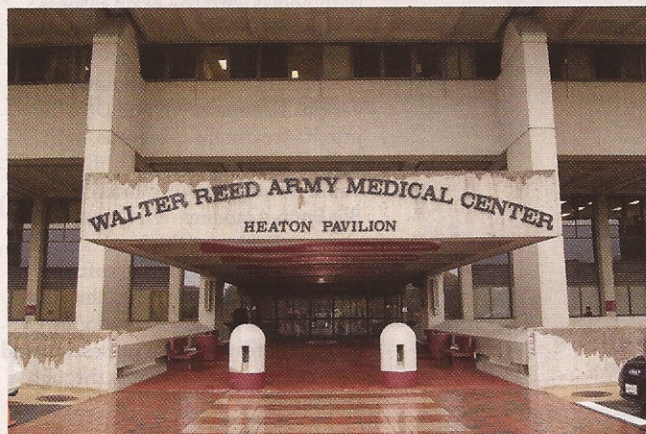
In Gaffney's case, the challenge came from having to relearn how to use his brain as well as a revised set of past memories. Sitting in the computer lab, Gaffney describes how some things, such as his enjoyment of a favorite food a family member had made for him, were now gone. "You have to remember, so you put it on a sticky note and put it in your pocket," Gaffney says. "The real problem is what you identify as a problem and how you push past it. What a lot of this has done for me, it's helped me find ways to push forward with the various disabilities that I have."

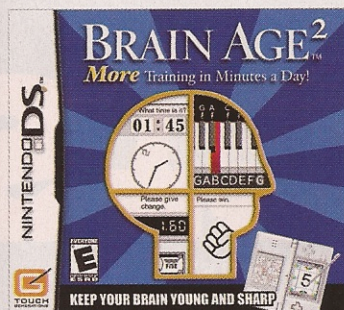
Gaffney reveals that other veterans returning from war with severe brain injuries have become frustrated when trying to return to the familiar, including video games. "They try to play first-person shooters,



Virtual Reality and Psychological Trauma

Video-game treatment programs at the Walter Reed Army Medical Hospital focus on rehabilitating veterans with brain trauma, but separate research is also underway to see if computer software can help soldiers suffering from post-traumatic stress disorder. Psychologist Loretta Malta, an instructor at the Weill Cornell Medical College in New York, is researching how virtual reality can be used to treat PTSD. The research entails having veterans with the disorder watch a realistic combat simulation called "Virtual Iraq" while monitoring their heart and breathing rates. The point of the exercise is to have patients discuss their emotional responses to the simulation afterward. Malta suggests that confronting disturbing memories through this program is a way of identifying the problem so that participants can work through the pain and move on with their lives.





forget how [complicated] something is, and that's when they'll get angry and go through controllers like wild-fire. Every weekend, somebody will play a game, and you'll hear a 'thunk!' sound and the crackle of small pieces of plastic, and you'll think, 'Someone just went through a controller...that was 50 bucks,'" he says, laughing. This frustration, Gaffney says, stems from the mindset that a soldier can move past any problem with enough effort and persistence, something Gaffney identifies with.

"I never quit. If there's a part in a game I can't beat, I'll get angry and sit there for 2 hours and try to figure out how to beat it," Gaffney says, who jokes about his own "Napoleon Complex" while gaming.

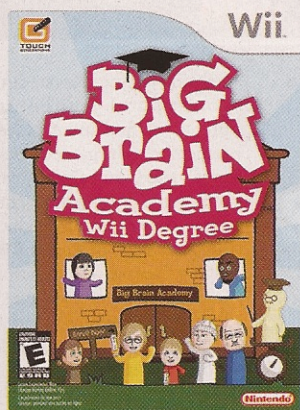
While using video games to heal brain damage is certainly forward-thinking, it's something that's also continually developing into a better form of treatment. "Using computer software for cognitive rehab isn't all that new, but it stagnated because the money isn't really there," Sullivan says. "With the brain-fitness revolu-



tion and the money from the baby boomers, this market will purchase millions of copies of Brain Age." She also notes that these sales, plus interest and capital from the neuroscience industry, could allow top researchers to gather more data about similar cognitive-rehabilitation projects, put their name on next-generation software, and finance improvements specific to their program for future users.

Among the changes Sullivan would like to see are additional group functionality and multiplayer modes. She suggests that if scores could be anonymously saved (each player could use a handle as opposed to their actual name), they could then post their results to social-media networks such as Twitter or Facebook. Such a feature, Sullivan says, could provide additional motivation for her patients: It would give them something to compete against (not to mention bragging rights).

While the discussion about the technology and research involved in using these types of games as cognitive rehabilitation is still ongoing, even the smallest improvements as a result of the treatment can have a huge impact on the veterans. "When I'd get sent to the store, I'd get there and not remember what I was supposed to get. Now I can go to the store and get what I was asked to get," Boylston recalls. "Those are small things, but they're big to a family."



We Want You

While doctors at the Walter Reed Army Medical Hospital are using games like Brain Age to treat soldiers who've suffered brain injuries, the U.S. Army uses another game to help with recruitment. America's Army is a tactical first-person video-game franchise developed by the Army as a recruitment tool intended to be both informative and entertaining. Dubbed by the media as "Militainment," the America's Army games have received some flak from critics who suggest the series is a government instrument to convince young, impressionable gamers to enlist in the armed forces. We also note that while the games feature violent and realistic depictions of combat similar to what's in Mature-rated titles like Call of Duty: Black Ops and Medal of Honor, the America's Army games bear a Teen rating.