

Play Attention!

Can custom-made video games help kids with attention deficit disorder?

By Gordon Kwan

For children with Attention Deficit Hyperactivity Disorder (ADHD), life can feel like a never-ending video game. They are wired--restless, impulsive, and easily distracted. Their minds are constantly bombarded with different elements of reality that compete for their attention.

So far, the most popular treatment for ADHD has been Ritalin, a rapid-acting stimulant for adults that has the opposite effect in children, calming the jitters associated with the disorder. According to the National Institute of Mental Health, about three percent of American school children take stimulants like Ritalin regularly. However current research suggests a surprising new strategy for treating this disorder: video games linked to brain-wave biofeedback that can help kids with ADHD train their minds to tune in and settle down.

It is difficult for a child with ADHD to learn how to self-regulate and know what it feels like to concentrate. Biofeedback teaches patients to control normally involuntary body functions such as heart rate by providing real-time monitoring of such responses. More than 15 years of studies show that with the aid of a computer display and an EEG sensor attached to the scalp, ADHD patients can learn to modulate brain waves associated with focusing. Increasing the strength of high-frequency beta waves and decreasing the strength of low-frequency theta waves, for example, creates a more attentive state of mind. With enough training, changes become automatic and lead to improvements in grades, sociability, and organizational skills.

Despite its proven success, the technique has not become a mainstream treatment for several good reasons. First, unlike drug therapy, which can have immediate results, a typical course of biofeedback treatment takes a series of about 40 one-hour sessions over a span of several months before benefits become apparent. Second, it is more expensive than drugs. Costs range from \$3,000 to \$4,000 for these treatments, so insurance companies tend to pick the less expensive option. Finally, biofeedback training requires the very kind of prolonged concentration that patients with ADHD struggle to attain.

Alan Pope, a behavioral scientist at NASA Langley Research Center in Hampton, Virginia, came up with a more engaging approach through work with NASA flight simulators. He was determining the degree of interaction with cockpit controls necessary to help pilots stay attentive during routine flights. In an experiment, he linked the level of automation in the cockpit to the pilots' brain-wave signals, so that some controls switched from autopilot to manual when the pilot started to lose focus. He found that with practice the pilots could begin to adjust the controls to the level of automation that felt most comfortable by regulating their own brain waves.

Pope applied his findings to help ADHD patients stay focused by rewarding an attentive state of mind. He realized, however, that the simple displays that were already part of biofeedback treatment may not be enough to hold the interest of restless youngsters. He then chose several common video games and linked the biofeedback signal from the player's brain waves to the handheld controller that guides the games' actions. "In one auto-racing game, a car's maximum speed increases if the player's ratio of beta to theta waves improves. The same sort of feedback also controls the steering," Pope says.

In the test, six Sony PlayStation games were used with 22 boys and girls between the ages of nine and thirteen who had ADHD. Half the group received traditional biofeedback training; the other half played the modified video games. After 40 one-hour sessions, both groups showed substantial improvements in everyday brain-wave patterns as well as in tests of measuring attention span, impulsiveness, and hyperactivity. Parents in both groups also reported that their children were doing better in school.

The difference between the two groups was motivation. "In the video-game group, there were fewer no-shows and no dropouts," according to Pope. The parents were more satisfied with the results of the training, and the kids seemed to have more fun.

Since children are more motivated toward video-game biofeedback and may already be familiar with video games, they will not need one-on-one coaching to master the technique. As a result, the cost of the treatment should be reduced and maybe even permit "do-it-yourself" biofeedback. One North Carolina company markets their system as a fun bike helmet and game-like video exercises that work on almost any computer. The helmet is lined with sensors that monitor the child's brain waves, and the child actually controls the computer video exercises by mind alone. Parents should not expect regular video games to help their children. The wrong kinds of video games might actually hurt children with attention disorders.

Parents, however, may be hesitant to switch from traditional treatment programs. One parent whose child currently takes drugs to control ADHD says, "Our son is using drugs to control his attention problems and although we don't like giving him the pills, he is no longer causing problems at school. We try to keep our son away from things that might make him hyperactive. Unless our doctor tells us to do this brain wave training in a hospital, we are not going to buy a machine to do our own treatment at home."

Brain-wave biofeedback alone may not be a substitute for drug therapy. Professor Stephen Hinshaw, an expert in the field of child clinical psychology at UC Berkeley, gives a reserved opinion about biofeedback treatment. "Biofeedback is a promising potential alternative, but unfortunately the kinds of really well-controlled studies that might support its clinical benefits have yet to be performed." The two treatments have complementary aspects that make them effective as adjuncts. A single dose of Ritalin, for example, acts quickly but only for a few hours, and most patients take it only on school days. Brain-wave regulation takes a long time to learn but has the potential for longer-lasting effects.

Researchers and clinicians are realizing that ADHD is not easily outgrown. Most doctors support an approach that combines good nutrition, sleep, exercise, and learning strategies as well as biofeedback and drug therapy. The possibilities for brain-wave biofeedback are very promising since its benefits could last a lifetime. Video game biofeedback therapy may provide a more tolerable and long-lasting form of treatment for children through a medium they are more likely to enjoy.

Gordon Kwan is a fourth year MCB major with a desire to pursue medicine, research, and eternal bliss.