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SPORTS

Getting Your Head In the Game

From the World Cup to youth tennis, a training fad emerges; the science of finding the zone

By RUSSELL ADAMS

MEMBERS OF ITALY'S World Cup-winning soccer team have done it. A starting quarterback in the NFL has tried it. And so has Jordan Kreuter, an 18-year-old golfer in North Carolina.

The thing they have in common: They've all turned to neurofeedback, a technique that promises to help athletes reprogram their brains so they can reach a zone of relaxed concentration during clutch situations.

Long used to treat medical conditions such as attention deficit hyperactivity disorder, epilepsy and dementia, it is beginning to emerge as a tool for pro and amateur athletes alike with neurofeedback machines even starting to show

up at some local public golf courses.

This technique is bringing some science to the mental side of athletics, a field also known as sports psychology, which has often been derided by many players and trainers as hokum. In neurofeedback, athletes strap on electrodes that measure brainwaves. They then try to learn how to control spikes in those brainwaves, which may signify distractions going on inside their heads, such as obsessing about a past performance. Critics say it's one thing to be able to manipulate a bunch of lines moving across a screen, but it's another to remain perfectly calm as a fastball zooms toward you at 100 miles per hour or network cameras hover over your par putt.

As a veteran sports reporter who has seen many training fads come and go, I was curious to try it out. Wiring myself up to a neurofeed-

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back machine, I spent two hours working my way through everything from complicated math computations to techniques for slowing my heart rate. It was far more grueling than I had envisioned. But it gave me some appreciation for what it feels to be more focused—and for how stress and pressure can hijack your brain.

In one exercise, the goal was to use the power of concentration to move two mice forward across a computer screen. Just when I was starting to have some success, I was interrupted by a phone call from my editor, who was calling to burden me with more work. For the next five minutes, I couldn't even keep the mice from back-pedaling. (See story below for more details on my neurofeedback experience.)

Neurofeedback's big claim to fame so far is its little-publicized connection to this year's World Cup. In February, months before the tournament started, some of Italy's best soccer players, including a handful who would later play in the Cup, began spending much of their practice time in a small room in Milan furnished with six luxury leather recliners facing a glass wall.

On the other side of the glass Bruno De Michelis, head of the sports science lab for AC Milan, one of the country's top professional teams, monitored a bank of six computer screens wired to a system made by Thought Technology Ltd., a Canadian company. The screens showing how each player's brain responded to stressful situations. Some players, the data showed, were nervous about doing mental exercises in front of their teammates, while others either had trouble winding down after a match or winding up before one. In the following weeks, the players spent hours working on these issues through a series of exercises that resembled computer games, with the brain as the joystick.

Mr. De Michelis says a tremendous amount of energy in soccer games goes to waste because players lose concentration during key moments, like penalty kicks. "I call this useless suffering," he says. "We can't do magic here, but it can be of some help."

Having the ability to tune out distractions during competition—known as having a "quiet mind"—is one of the holy grails of sports. Jocks believe that the capacity to have extreme concentration during stressful moments gives you a big edge, whether it's a basketball player

staying focused on the hoop while thousands of fans are waving their arms in the background, or a tennis player learning not to berate himself for a bad shot.

To help Tiger Woods learn to block out distractions during critical moments, his late father, Earl, used to jingle change in his pocket, drop golf bags and roll balls across his son's line of vision. Golfer Se Ri Pak's father used a different approach to make her mentally tougher. When she was a child, he took her to pit-bull fights and Korean cemeteries at night.

Until now, neurofeedback has mostly been confined to medical environments. Sufferers of attention deficit disorder, for example, have been found to have reduced activity in parts of the brain. Neurofeedback teaches them how to produce brainwave patterns that speed up those slow brainwaves. But brain-training has rarely been tried on healthy people, mainly because of doubts about its utility and its high cost, which can be as much as \$200 an hour.

Over the last decade, university researchers and some of the companies that make neurofeedback devices have begun to dabble in the sports world, including helping Olympians like Austrian skier Hermann Maier.

Many of these same athletes have already had experience with a technique called biofeedback. Biofeedback differs from neurofeedback in that it focuses on controlling physiological responses to stress (like a fast heart rate and extreme muscle tension) as opposed to neurological responses. (To confuse matters, neurofeedback is sometimes referred to as EEG biofeedback.)

Proponents of neurofeedback say retraining your brain, as futuristic as it sounds, is now possible because scientists know precisely which brainwave frequencies correspond with optimal levels of focus. All a person has to do is learn how to achieve those same frequencies by practicing, they say.



Mind Games: Several members of Italy's World Cup-winning team, including Andrea Pirlo, second from lower left, did extensive neurofeedback in the runup to the tournament.

Getty Images

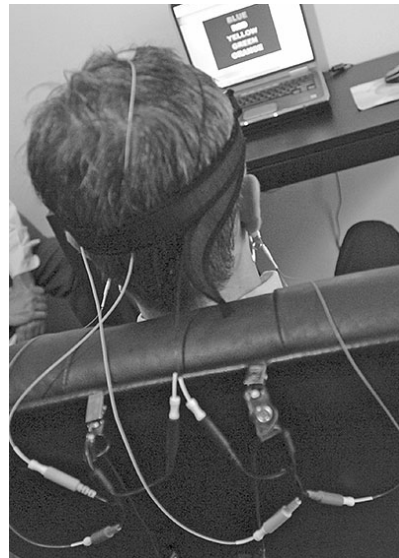
A Reporter Donates His Brain to Science

T BOILS DOWN to this: Can I make two animated mice march across a computer screen using only my powers of concentration?

Four electrodes are stuck to various spots on my head to monitor brainwave activity. One sensor is attached to my shoulder to pick up muscle tension, while another is wrapped around the fingers on my left hand to monitor skin temperature, heart rate and sweat response. A belt covers my waist to keep tabs on my breathing. On a computer screen, moving graphs offer a real-time view of what's happening inside my body and brain.

The goal: learn how to manipulate those graphs through a series of exercises. In one, a soccer ball periodically moves side to side on the screen, and I have to use the cursor to keep it as close to the center as possible. (The cursor has to be moved in the opposite direction from where the ball is going.) Within a couple of minutes, I'm able to bump my score up from a lowly 40 to above 170. But when it's time to move on to the next drill, which involves focusing intently on a single spot on the screen, the active brainwave graphs show that I'm still thinking about the previous exercise. My heart rate and muscle tension show the same thing.

Later comes the mice exercise. The two mice, one on top of the other, will only walk across the screen when I'm absolutely focused on that task. In sports, that state of relaxed focus is often called "the zone." After several minutes, I have moderate suc-



David M. Russell

A Frankenstein Moment: *The author undergoes neurofeedback in New York.*

cess making the mice walk, but that all ends when I get a cellphone call from my editor. After hanging up and getting back to the exercise, I let thoughts about my conversation interfere with my quiet focus, and it shows—not only are the mice not moving forward, they're back-pedaling. Fast.

After my two-hour session at the office of a New York psychiatrist, I receive a detailed email from Vietta Wilson, who has analyzed the results. My big problem is that I do too much "replaying" of past events at the wrong times, and my mind is cluttered with "negative self-talk." In short, she says, I have a "busy brain."

But there's some good news. My tendency to push too hard during tasks is common among executives and "elite performers."

—Russell Adams

But not all the kinks have been worked out yet, according to some people who have used the neurofeedback devices. Vietta Wilson, who has trained some Canadian track-and-field Olympians, says some of the devices she has tried pick up radio stations instead of brain waves. Another potential problem, according to some researchers: Some of the same devices track brainwaves in a particular part of the brain called the executive center—but altering brainwaves there can trigger depression in certain people. Several device manufacturers say neither of those problems has been an issue with their products.

In the last five years, neurofeedback has become the focus of studies in some top medical and psychology journals. In general, they bolster the case that it's possible to retrain the brain.

Last fall, Canada's governing body of tennis put some of its top 20 youth players through neurofeedback. And McGill University in Montreal and the National Coaching Institute of Montreal have committed to a five-year study to test neurofeedback on the region's top 80 athletes in sports ranging from hockey to racquetball.

For high-school football player Michael Dell'Aquila, neurofeedback was part of a plan to gain an edge with college scouts. At the time, Mr. Dell'Aquila, a skilled defensive back, had already received letters of interest from dozens of colleges. But he

was concerned about his ability to perform in front of recruiters day after day. Specifically, he wanted to learn how to clear his mind of the previous day's performance. So last spring, while he was finishing his junior year at Avon Old Farms prep school in Avon, Conn., he signed up with a nearby practitioner.

Over the course of about 10 sessions, he worked on boosting his concentration by trying to propel a rocket forward with his mind. If his focus drifted and he either began daydreaming or listening to his inner-critic, different-colored rockets associated with those brain states would creep forward on-screen and begin to overtake his rocket. The sessions also showed that Mr. Dell'Aquila wasn't getting enough connectivity between the two hemispheres of his brain. So every night during the summer he listened to 30 minutes of specially engineered music. Mr. Dell'Aquila will play football for Boston College beginning this fall.

Gio Valiante, a sports psychologist to a number of top golfers including Justin Leonard and Chris DiMarco, says neurofeedback will one day be the norm for PGA Tour pros. But he says he's not about to strap anything onto his clients until these devices are rigorously tested on amateur players.

BrainTrain UK is now offering Neurofeedback-based training for sports professionals and serious amateurs.

Call for details of how we can help your golf game with this exciting technology, now available here in the UK.

BrainTrainUK.com 0330 111 3299