

## BRIEF REPORT

# Effecting Peak Athletic Performance with Neurofeedback, Interactive Metronome<sup>®</sup>, and EMDR: A Case Study

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Keywords: peak performance, neurofeedback, EMDR, Interactive Metronome<sup>®</sup>, brain map

*This case study chronicles the application and effects of a customized combination of therapies, including neurofeedback, Interactive Metronome<sup>®</sup> (IM), and Eye Movement Desensitization and Reprocessing (EMDR) created to help a professional athlete improve his brain function and performance. Brian, a 28-year-old professional baseball player, sought help for difficulty maintaining focus and concentration while playing baseball. He felt his challenges impeded his athletic performance, and he wanted to perform at the highest possible level during the upcoming spring training season. Brian's history combined with the results of a QEEG brain map led to a diagnosis of Attention Deficit Disorder–Inattentive Type. The individualized treatment program for Brian included neurofeedback to lower theta activity and increase beta, IM to improve coordination and timing, and EMDR to address his feelings of anger and lack of self-confidence. At the conclusion of his training, Brian described feeling “clear-headed” and was able to focus his mind when needed. His timing and coordination improved, and he showed a positive attitude about playing baseball and felt confident that he would perform well at spring training.*

### Case History

#### Background Information

Brian is a 28-year-old male professional baseball player in good health. Brian sought my help to overcome challenges with his ability to focus in preparation for spring training. Brian felt that his inconsistent athletic performance, particularly batting, could be attributed to his struggles to maintain focus during games. The season before Brian sought my help, he had played a backup role on a major league team for the first half of the year. Inconsistent performance led to his transfer to the minors to work on his hitting.

#### Description of the Presenting Problem

When Brian first spoke with me, I observed a person who appeared demoralized and exhibited poor self-esteem and anger when he described his current situation. He said he was thinking of quitting baseball and taking a job as a high school coach. He expressed frustration over not earning a starting position on a major league team and felt it was unfair to be expected, as a backup utility infielder, to sit on the bench for most of a game and then suddenly perform at his highest potential. He felt this scenario set him up to fail. He also revealed that one of his coaches had told him he was not a team player and tended to think only of himself.

Brian described lifelong challenges with retaining information and felt he had a “busy mind” that often wandered. Brian stated that he often has to reread paragraphs or sentences to process and comprehend what he is reading. During a typical baseball game, Brian's efforts to remain focused on the field left him exhausted. Brian also reported that during his lifetime he had suffered one concussion that resulted in unconsciousness.

To assess his current brain function and activity, I obtained a Quantitative Electroencephalogram (QEEG) brain map using the NxLink database from the NYU Medical Center Brain Research Lab (see Figure 1). Brian's map showed discriminant functions that did not indicate the existence of postconcussive syndrome ( $p \leq .05$ ). However, the discriminant scores fell outside ( $p < .1$ ) the normal limits expected for an individual of his age.

An analysis of Brian's QEEG protocol revealed significant elevations across theta, alpha, and beta frequencies, with greatest elevations in the theta range throughout all measured sites according to the International 10–20 system of electrode placement. Mean frequency theta z scores were significantly elevated, whereas beta mean frequency z scores were significantly lower than expected for Brian's age, particularly at prefrontal, frontal, and central sites. Hypercoherence was evident at homologous prefrontal and frontal sites.

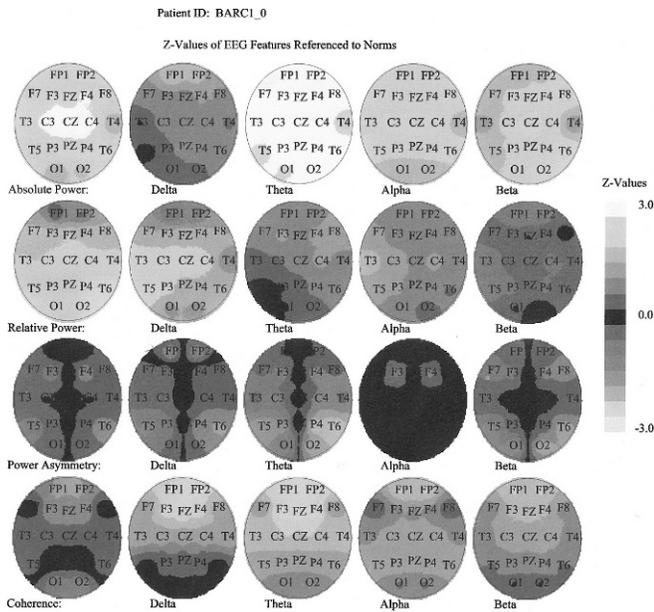


Figure 1. QEEG map that depicts z values of EEG features referenced to norms.

### Diagnosis

Based on Brian’s history of focus-related issues and the findings from his QEEG, I diagnosed him with Attention Deficit Disorder–Inattentive Type.

### Treatment

Because Brian lived 2 hours away and was to participate in spring training for an out-of-state major league team in 3 weeks’ time, I had to customize the timeline of my treatment program. Rather than a typical program consisting of 20 or more 45-minute sessions, we agreed on six 2-hour sessions. These sessions would include the following therapies:

1. Neurofeedback to normalize Brian’s theta and beta activity
2. Interactive Metronome® (IM), a patented technology designed to enhance focus, concentration, coordination, and timing through a series of synchronized hand and foot exercises (see Figure 2)
3. Eye Movement Desensitization and Reprocessing (EMDR), an information-processing therapy that contains elements of several psychotherapies, including cognitive, behavioral, interpersonal, experimental, and body-centered approaches

Throughout Brian’s treatment, I sought to gain his trust by demonstrating my enthusiasm for working with him and my confidence that I would be able to help him improve his mental and athletic performance and emotional well-being.

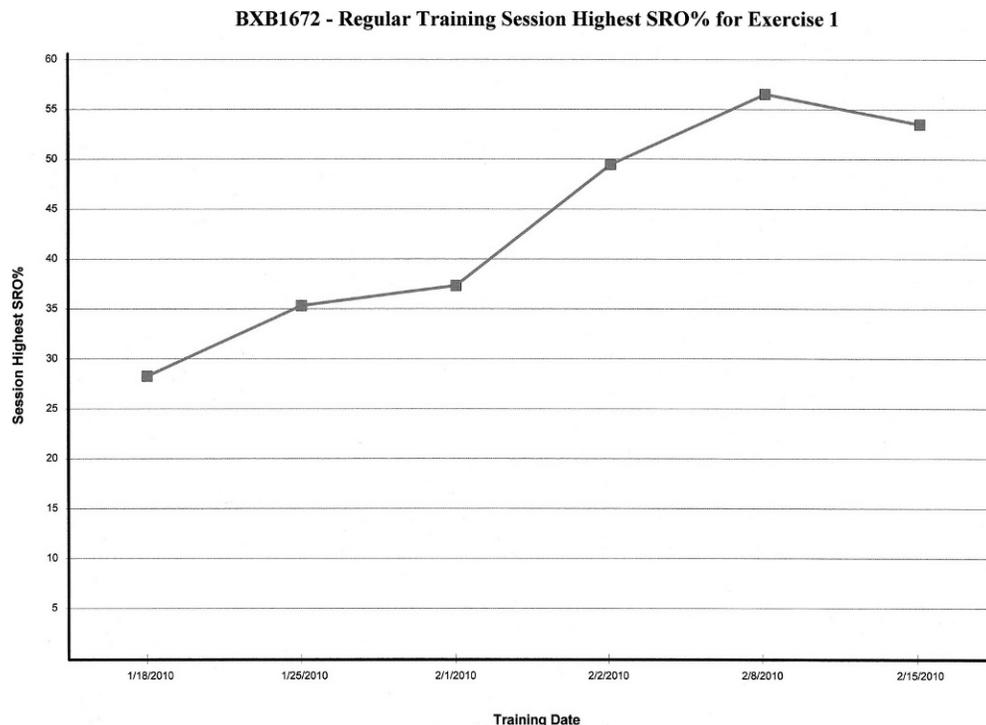


Figure 2. Illustration of Brian’s improvement in coordination and timing during his IM training.

The first session began with neurofeedback using Neurocybernetics™ equipment. I initiated frontal training (Fz) to lower theta activity while increasing beta. Inhibits were set at 3–6 Hz (theta) and 22–36 Hz (high beta). Reward was set at 12–15 Hz (beta) and later in the session 15–18 Hz (beta). Following neurofeedback, Brian participated in IM training, completing 908 repetitions.

Session 2 took place 7 days later. Brian's neurofeedback training focused on Fz to lower theta activity and increase beta, with inhibits set at 3–6 Hz (theta) and 22–36 Hz (high beta) and the reward set at 15–18 Hz (beta). Brian completed 800 repetitions during IM training.

Session 3 began 7 days later with neurofeedback training at the previous settings. I then moved the electrodes to left-sided training (F3) to treat suspected mood issues and to keep up Brian's interest through varied training. In this session I introduced SMART Brain Technology on the Sony PLAYSTATION® platform, increasing the beta reward to 12–20 Hz while simultaneously decreasing theta. Brian completed 972 repetitions during IM training.

Session 4 took place the next day. Brian continued left-side neurofeedback training using Neurocybernetics and SMART Brain Technology at the same frequencies. Brian completed 1,790 repetitions during IM training.

Session 5 began 5 days later. At this point in his therapy, Brian was describing an improved ability to focus and concentrate, and his coordination had improved with the IM training. However, I did not see a significant shift in his emotional state and mindset, and he still didn't exhibit a positive outlook regarding his future. Thus, I introduced EMDR to help Brian overcome his negative emotions and increase excitement about playing. We worked on his disappointment about being a backup utility player rather than a starter as well as being traded. After the first session of EMDR, Brian exhibited more confidence and enthusiasm for playing. Brian continued neurofeedback training on the left side using SMART technology and completed 1,491 repetitions using IM.

Session 6 was Brian's last training session. We continued with EMDR, and by the end of the session Brian's negativity had been replaced with a renewed confidence and zeal for playing baseball. Brian concluded

IM training with 1,528 repetitions. Throughout his training program he showed consistent improvement in his timing and coordination.

We completed his left-side neurofeedback training using Neurocybernetics technology. I taught him to take micro-breaks to prevent mental exhaustion during a game and to learn to direct his mental focus as needed. By the end of this session, I saw a marked change in his emotional state. I observed Brian's renewed passion for playing baseball and heightened confidence in his ability to play well and prove himself in spring training. He described himself as excited to be part of a team once more. He now found himself able to shift his focus and attention as needed and felt confident he could continue to do so in a high-pressure baseball game.

### Discussion

Brian's challenges required a combination of therapies, which appeared to work synergistically. Using a variety of methods, along with supportive counseling, Brian was able to effect change in various aspects of his life. Throughout Brian's program, it was necessary to assess and adjust the protocols based on his response. Any one approach by itself would not have been sufficient to address the emotional, cognitive, and biochemical/neurological components that were preventing Brian from performing at his highest level.



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