

# INTERACTIVE METRONOME®

## MAKES RICK'S FORGETFULNESS A DISTANT MEMORY

Presented by **Tony Jackson, PhD, Skyline College - Department of Psychology & Kinesiology** and **Raymond Jones, PhD, Morrissey-Compton Educational Center**

**R**ick is a 47 year old male, a college student and a former emergency medical technician (EMT) who volunteered for the Brain Training project study. He is a veteran who had recently suffered a left hemispheric stroke due to the growth of a large arachnoid cyst. Rick has acknowledged cognitive deficits and slowed motor functioning, and looked into Interactive Metronome® (IM) out of curiosity about a noninvasive therapy. He chose to participate in the IM study with the hoping to improve his recall, minimize dysnomia and improve his math efficiency.

Interactive Metronome® (IM) is the only training program that improves timing in the brain in an organized, systematic, flexible and engaging format. Research shows that engaging whole body movements in combination with cognitive tasks leads to overall better outcomes. IM is a patented and unique training tool that challenges thinking and movement simultaneously, providing real-time millisecond feedback to help synchronize the body's "internal clock."

Rick initially completed a Pre-IM survey and pre-rating scale, in addition to a pre-short form assessment (SFA) and a pre-long form assessment (LFA). He had a difficult time understanding the concept of the timing based exercises but earnestly wanted to perform well. Rick approached the IM tasks seriously, with openness to session tasks and with a focused effort. He initially required some level of structural support for the latter LFA tasks utilizing a table to maintain his balance.

He experienced difficulty in maintaining synchronicity with the guide sounds and would experience frustration particularly when he would miss the tap mat while working the heel exercises. At times Rick could not find the mat, his timing was significantly off and he would occasionally stomp out of frustration. Rick preferred to hold onto a chair in order to maintain his balance while performing Balance Left/Right Foot exercises.

A number of best practices were used to assist Rick in improving his level of focus. We customized his program on weekly performance analysis and comparison reports

He remained consistent, even through several location changes due to the need to negotiate institutional space. We would make changes in the session attributes based around a Plan B template and divided the plan into 5 phases, for a total of 25 sessions (including pre-interim-post LFA). We met on the average of 2 sessions per/week. with his previous sessions, first LFA and with his best scores.

The focus was always on maintaining a balance between challenging Rick and allowing for a sense of success. This balance became very important in maintaining his engagement in the intervention. For example, we began using a Plan B template but increased the tempo to 60bpm (beats-per-minute) from 54bpm given Rick's 84% early hit rate on the LFA pre-test. He experienced early success at this tempo, which became very important in managing his level of frustration with his performance early in the intervention. We maintained the tempo at 60bpm until the 5th session where we decreased it to 50bpm. This proved challenging for Rick; however, over the next few sessions he adjusted to the new tempo. On the 7th session we increased the difficulty level 150 to 100 while maintaining the tempo at 50bpm and by the 9th and 10th sessions we began to introduce lower extremity tasks with the difficulty level at 100 while increasing the difficulty level to auto difficulty for hand-related tasks. At the 10th session Rick attained a new record SRO% (super right on) score and continued to show improvement.

Rick continued to make slow but steady adjustments as we moved him through the protocol increasing the level of challenge. At the 12th session, although he found it difficult to switch between feet, he noticed that he no longer required the use of a chair as support to perform the foot exercise.



During the 13th session he attained a new record for SRO% and bursts for both hands. Rick showed significant improvements by the interim LFA (15th session) and at his 21st session he attained his very first burst with the Both Heels tasks.

### Evaluation

After IM, Rick reported improvement in memory recall, organizational skills, and in coping skills. Further, Rick reported a marked increase in concentration/focus. He also reported significant improvement in his retention and recall after lectures and reading, an increase in fluency and in speed when reading during exams and when answering questions. Rick has seen a reduction in the time required to complete tests and that his mind flowed smoother and felt sharper in social settings.

According to IM rating scales, Rick indicated 40% gains in frustration tolerance, initiation of reading and reading comprehension, diminished sensitivity to touch and to particular foods and in overall organization.

As we translate the above self-report to actual IM performance measures we see that Rick's initial LFA revealed several noteworthy scores. Performance on numerous tasks scored in the below average range, while two tasks revealed performances in the severe to extreme deficiency range. The significant early hit rate was consistent with impairment in impulse control. Rick's pattern of deficiency at right hand/toe related tasks were indicative of residual hemiparesis from his left hemispheric stroke. This along with Rick's abnormal gait would also explain his loss of balance as well as his extreme deficiency score in the Both Heels task. His unadjusted score was 110.9 MS (millisecond), with 84.4% of hits being early and 15.6% being late. Rick demonstrated

a fairly significant right/left side difference and experienced some difficulty with tasks requiring movement of the lower extremities. At interim LFA, his total unadjusted score improved to 53.6 MS.

By the end of the intervention Rick posted moderate gains. His post LFA performance revealed a total unadjusted score of 47.9 MS with 70.3% early hit rate and 29.7% late hit rate. The right/left side difference was negligible at 40.7 MS and 39.7 MS respectively.

His "percentage within 15 MS" scores improved from 6.7% (pre) to 20.7% (interim) to 23.3% (post). Rick's total number of IAR (in a row) bursts improved from 0 (pre) to 2 (interim) to 4 (post). In addition, Rick produced a consistent increase in short form SRO% and a lowered task average. Indications are that with increased sessions Rick would continue to improve.

At three-week follow up Rick reported that the areas he considered problem areas were not as prominent. He was experiencing improved recall and was better at remembering his driving routes when returning home. This makes sense given his pre to post improvement in SRO%. He also felt that his gait and balance had improved although at times he still experiences dizzy spells (at 1 per/week to one every other day). He experienced significant improvement in dysnomia reporting that his ability to "get his words out" and to create sentences that make sense had improved. Finally he felt his processing was faster which enabled him to pass his compressed summer algebra course.

To the question of "What specific improvements have you noticed in your note taking and study habits", Rick's response was:

***"I don't have to re-read basic information. I can read and pay attention amongst distraction better than before".***

When asked to describe how IM has affected other areas of your life such as sports, music, driving, or any aspect of daily living, Rick responded:

***"I remember return routes better. I can remember where I parked the car after class".***



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