

# Timing in the Brain

Temporal processing is the rate at which one processes auditory information. Most of the actions the brain performs on a daily basis, such as perceiving, speaking, motor movement, and driving a car, require timing on the scale of tens to hundreds of milliseconds. Understanding the timing of events, such as a motor act followed by a sensory consequence, is critical for moving, speaking, determining causality, and processing our senses. Certain disorders, such as aphasia and dyslexia are recently being researched as being disorders of timing rather than disorders of language (Efron, 1963; Merzenich et al., 1996). Other deficits in time perception are found in a variety of disorders such as Parkinson's disease (Riesen and Schnider, 2001), attention-deficit/hyperactivity disorder (ADHD) (Kerns et al., 2001), and schizophrenia (Davalos et al., 2003).

Interventions that focus on improving timing can ultimately help improve such disorders as mentioned above. Interactive Metronome (IM) is such a modality of intervention. IM engages the patient and provides constant feedback at the millisecond level to promote synchronized timing in the brain. Exercises can be customized and involve precisely timed motor movements intertwined with cognitive processing, attention and decision-making. The child wears specialized headphones and performs different motor movements in response to the metronome beat. The goal is to respond as close to the beat as possible and as the child progresses, the tasks advance.

Interactive Metronome is used by many physical, occupational, and speech therapists. By promoting and restoring synchronous neural communication through repetitive, timed, and rhythmical full-body movement, balance, symmetrical gait, precision of movements improve. IM addresses the neurological foundation of sensory integration and cognitive abilities, such as reciprocal social engagement, eye-contact, self-regulation, focus/concentration, handwriting, and academic achievement. Timing in the brain or temporal processing is critical to speech, language, and cognitive functioning. It is the basis for attention, working memory, and processing speed, all of which are critical for auditory processing, linguistic development, and reading achievement in children. By integrating IM with PT, OT, or ST to address the core deficit of timing and functional therapeutic activities, better treatment outcomes will be achieved.

[www.interactivemetronome.com](http://www.interactivemetronome.com)

Interactive Metronome can be used as a treatment modality integrated into a therapy session or can be used as an isolated modality as an intensive treatment over the course of a number of weeks. IM can be beneficial to anyone with motor planning and sequencing problems, speech and language delays, motor and sensory disorders, or

learning difficulties. (Athletes have been using IM as well to improve their timing and precision professionally.)

The therapist will decide the best course of treatment for each child depending on the needs of each individual child. If you think your child might benefit from IM or have questions regarding the benefits of IM, contact The Therapy Gym at 201-357-0417.



*Elisheva Fuchs has a doctorate in physical therapy and is the owner of The Therapy Gym in Teaneck. She can be reached at 201-357-0417 or [ellie@thetherapygym.com](mailto:ellie@thetherapygym.com). For more information on The Therapy Gym, please visit [www.thetherapygym.com](http://www.thetherapygym.com).*