



A Neuroscience Rhythm-Based Study Implementing the Musical Metronome to Affect Reading Fluency

Sylvia B. Driggins, Ed. D., CCC-SLP

Tennessee State University Department of Speech Pathology and Audiology

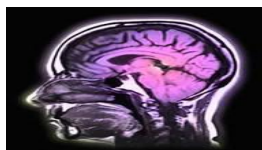


ABSTRACT

The National Reading Dilemma

Each year, the U.S. Department of Education issues the National Reading Report Card for students across the nation. In 2020, the NAEP report for the 2019 school year disclosed an achievement of 36% in proficient reading skills, and 6% in advanced reading skills for students in the twelve grade.

Reading fluency and proficiency at the collegiate level is critical for student success and retention. Reading readiness standards listed by the College Readiness Standards EPAS System (2008) require students to apply higher-order, critical thinking skills in their reading/class assignments. (http://nationsreportcard.gov/reading_2019); NAEP, Nations Report Card, 2019.)



Cognitive Neuroscience and Reading

Studies in cognitive neuroscience have been gaining and attracting more attention in recent years. Neuroscience examines the “processes by which the brain learns and remembers” (Goswami, 2004). Much of the research in neuroscience involves neuroimaging using Functional Magnetic Resonance Imaging (fMRI). fMRI measures brain activity while the individual is performing a task..

Results of these studies have given educators a greater insight into understanding the “reading process at the neural level” (Taub, et al 2007) and has led to the exploration of various neuroscience-based techniques that can potentiate the benefits of reading support/ intervention programs..

Synchronize metronome (timed) tapping (SMT) is a neuroscience based intervention that targets an individual’s timing, rhythmicity, attention and motor planning. During SMT, the individual taps in synchronicity to the rhythm of the metronome while reading. The basis of SMT is “consistent with neuropsychological functioning and cortical (cerebral) organization” (Gorman, 2008) which lends to its’ evidence-based criteria and efficacy in intervention strategies that target compromised neuro-cognitive processing

For more than a decade, the effect of SMT in the reading process has been the focus of cognitive neuroscience research, disclosing statistically significant results in improving reading fluency, and comprehension. The results of studies implementing SMT suggest a positive relationship between neuroscience rhythm-based interventions and the reading process. (Goswami, 2004;Taub, 2007; Gorman, 2008; Ritter, et al, 2012)

Driggins, 2020

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Cognitive neuroscience-based case study

- Quantitative 8-week study
- College Freshmen enrolled in a reading support class

Synchronized Metronome Training (SMT)

- explore effect on Reading Fluency
- target practice - morphology (prefixes & suffixes)
 - in isolation with meaning
 - word context
 - Sentences
 - passages



Results

Non-parametric comparative analysis

- Reading accuracy, i.e. word accuracy, found to be the strongest gains in grade equivalency (G.E.) and percentage gains.
- Reading fluency followed word accuracy with the second highest gains.

Grade Equivalency (G> E>) Pre-and-Post Intervention Scored Data

Word Accuracy	G. E	G. E	G. E	G. E
Pretest	4.7	6.4	8.4	11.7
Posttest	13	10.2	13	13
Percentage Gain	+176%	+54%	+59%	+11%
Fluency				
Pretest	4	4	6	7.2
Posttest	8.2	6.2	10.4	7.4
Percentage Gain	+105	+73%	+55%	+2.8%



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