Improving Dorsal Stream Function and Timing By Training Figure-Ground Motion Discrimination Improves Reading Speed, Attention, Visual and Auditory Working Memory

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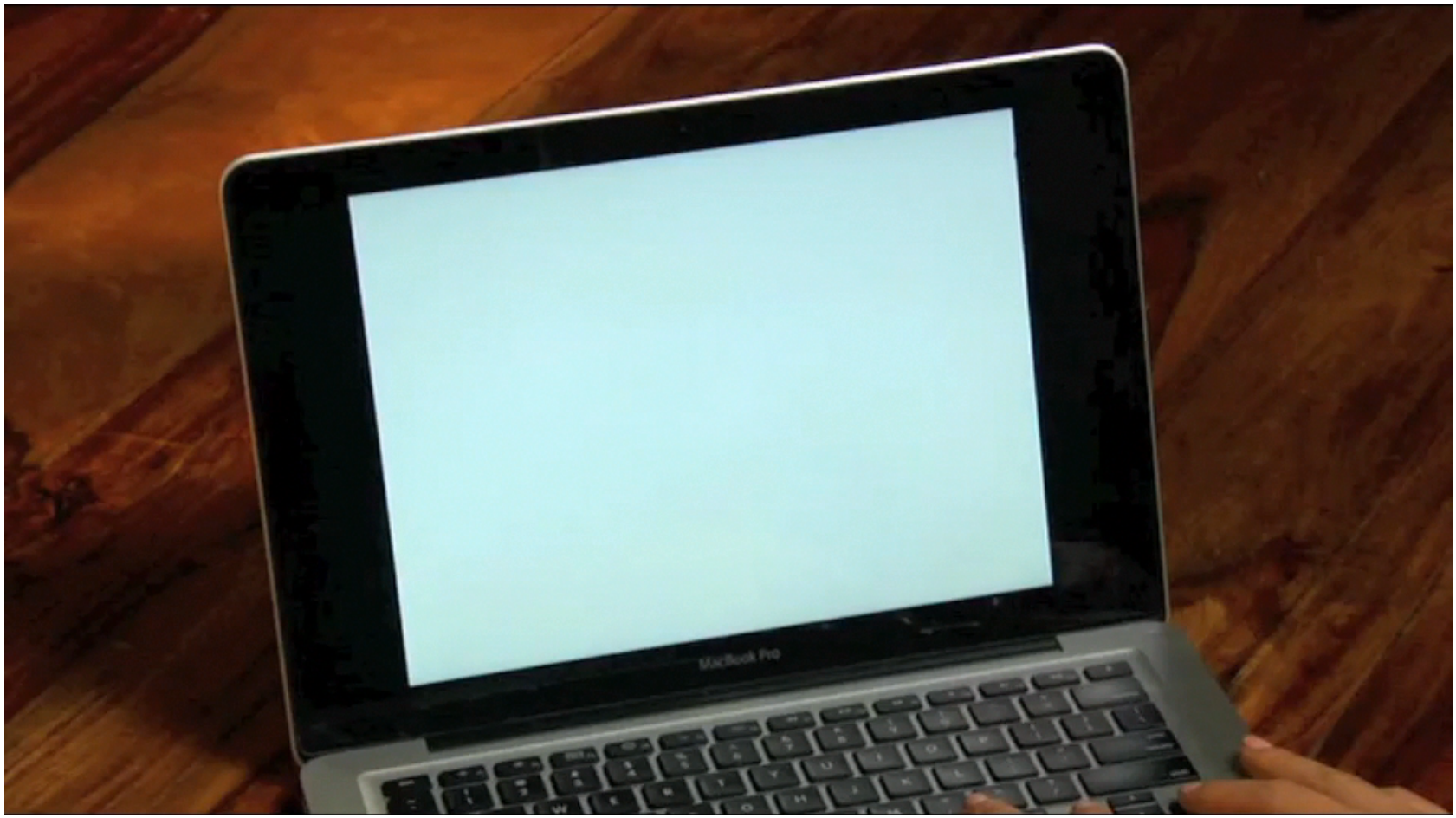
PATH to Reading

PATH to Reading Training
Remediates Visual Timing

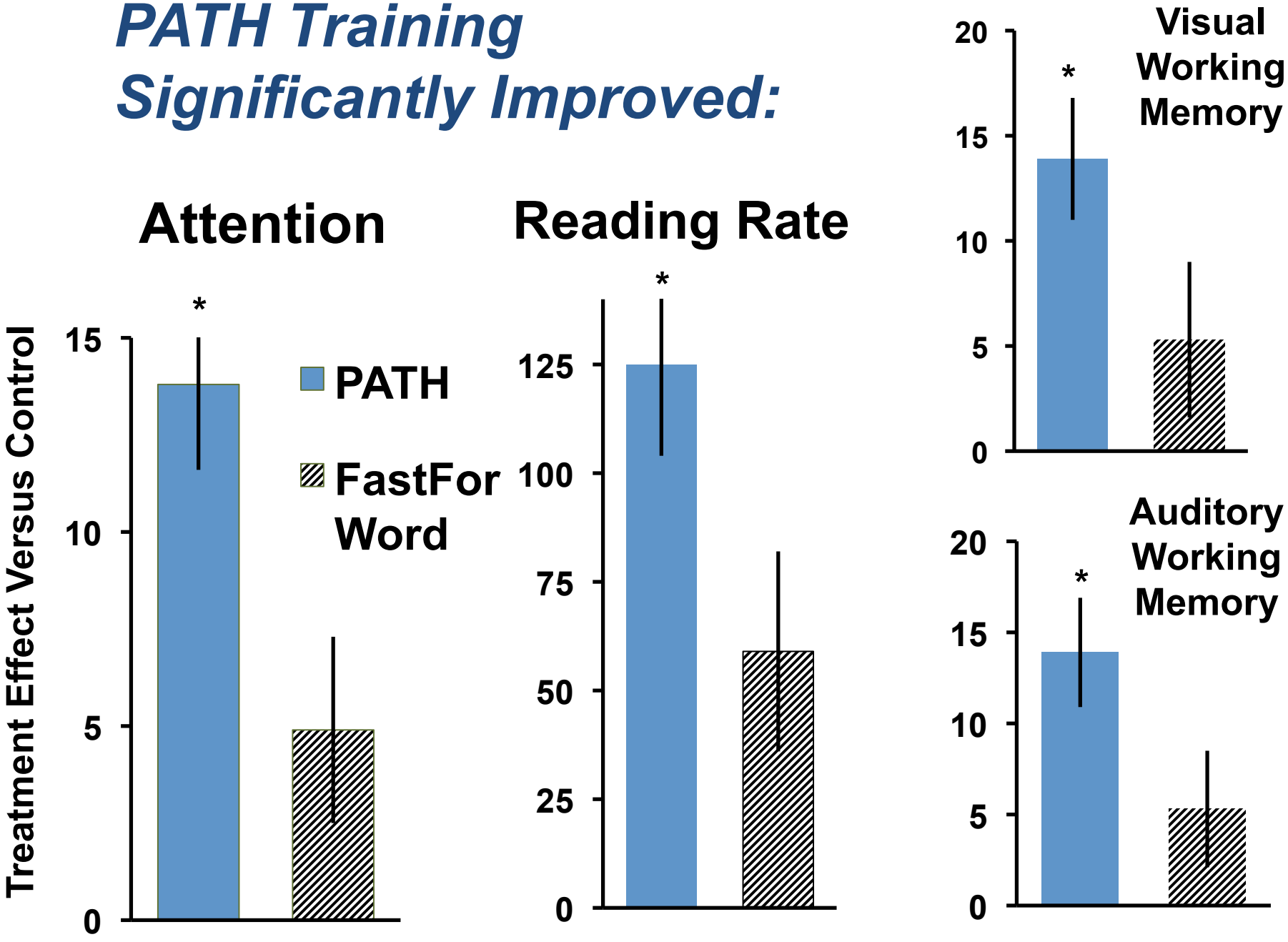
- Computer program
- Rapid and effective
- Remediates attention, reading, and memory

How *PATH* Works

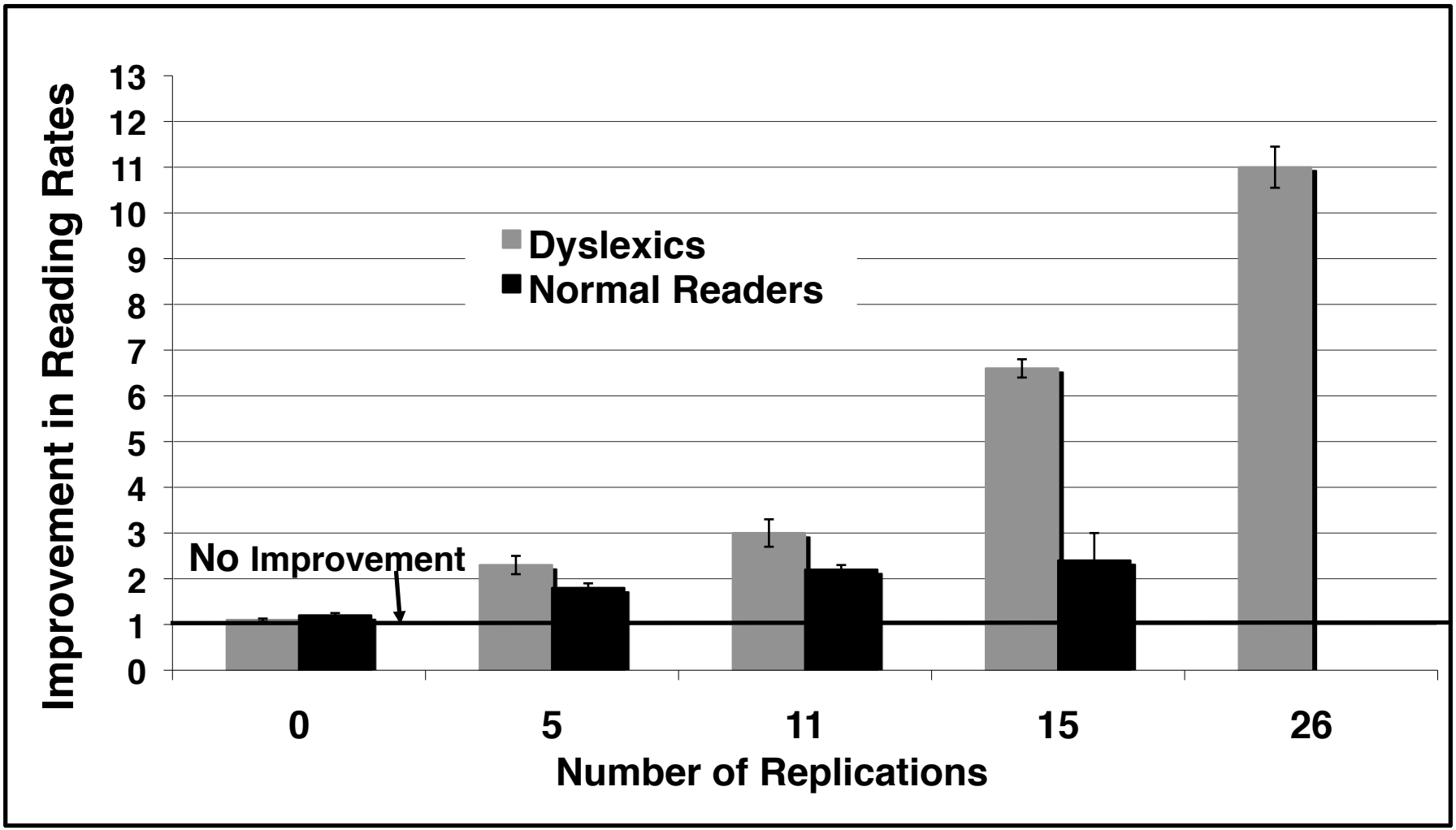


Go to www.pathtoreading.com/demo.htm to see students Motion movie

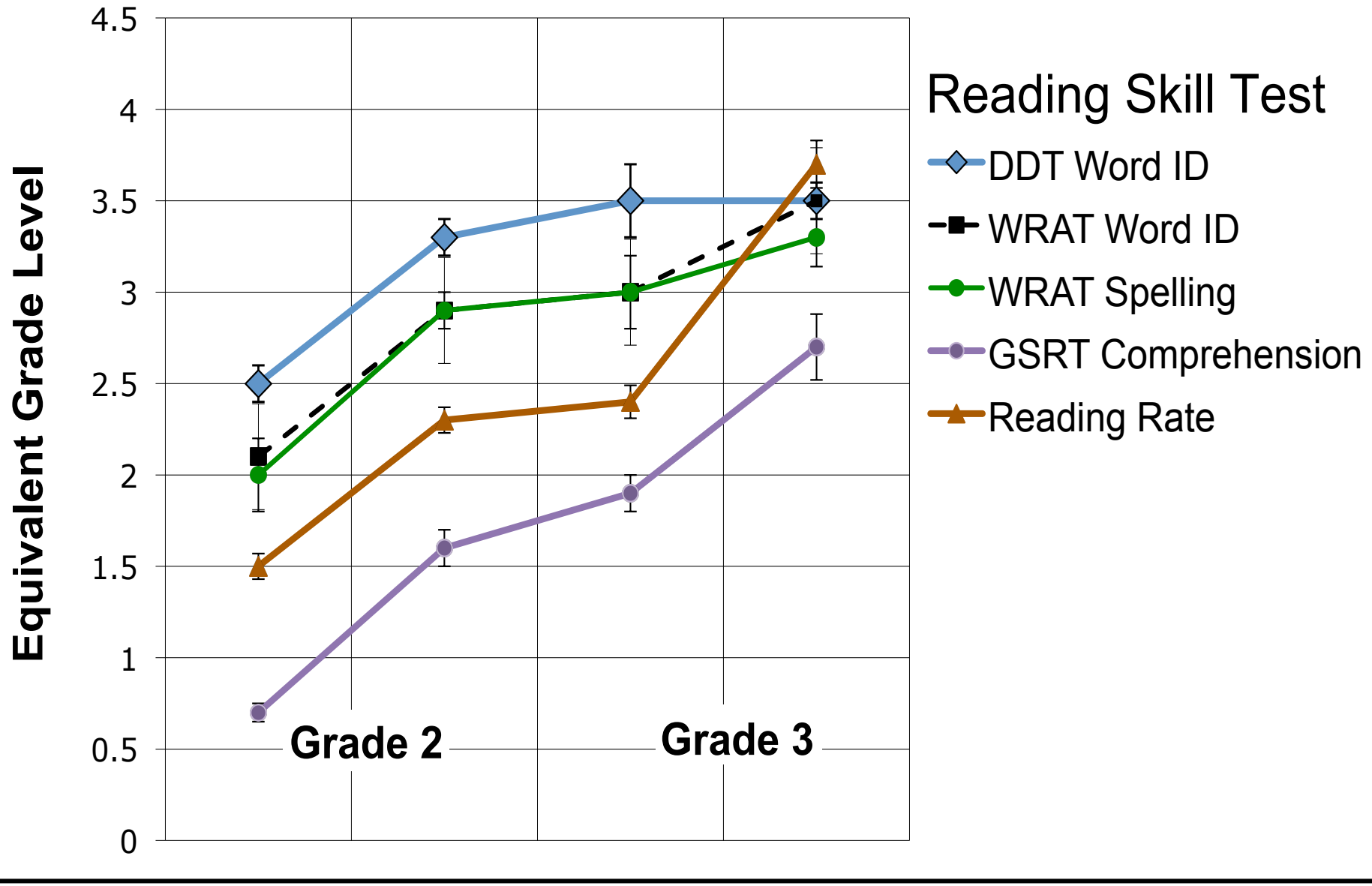
PATH Training Significantly Improved:



More PATH Is Trained
More Reading Rates Improved



Improvements Are Sustained Over Time



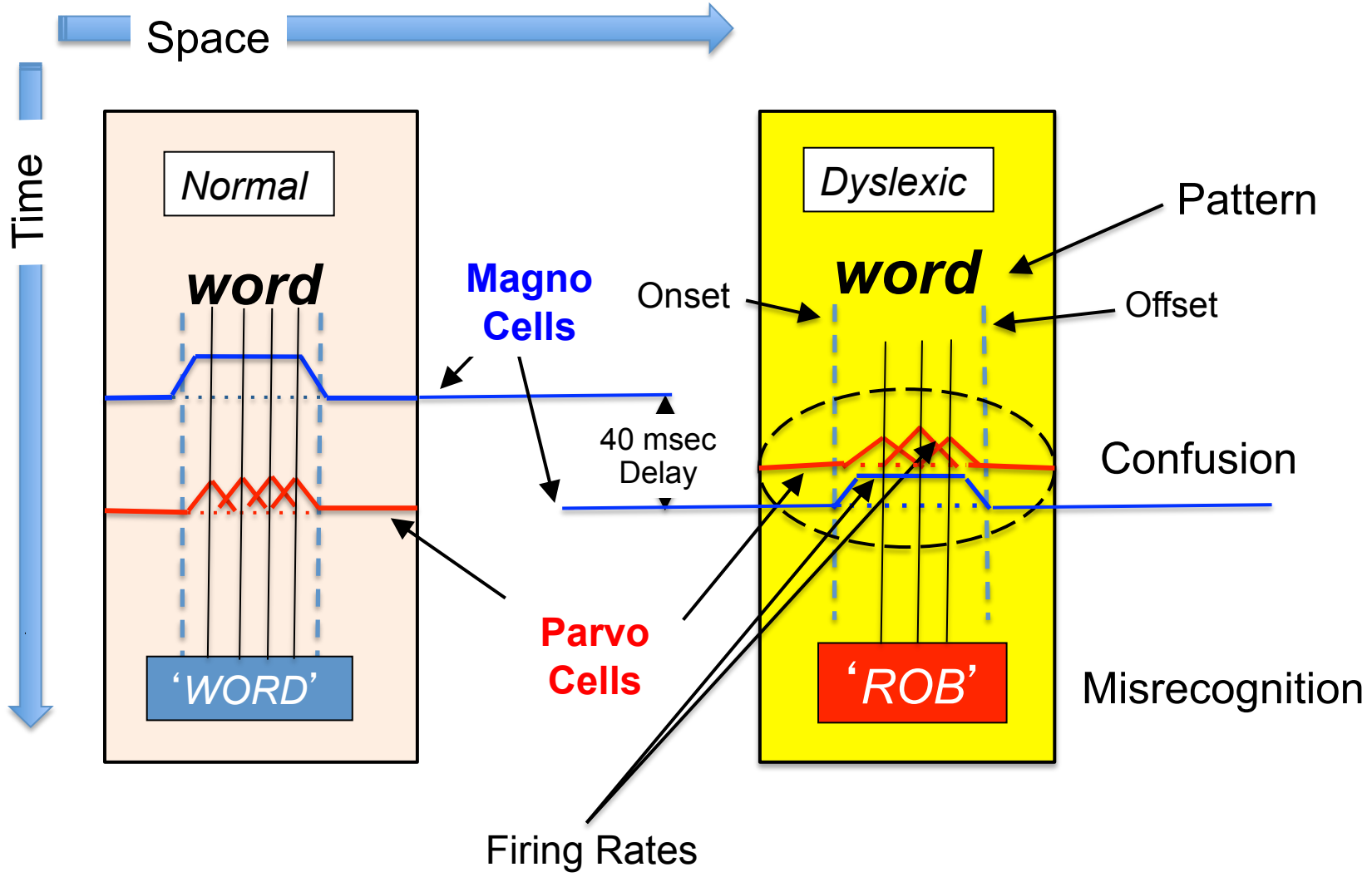
Biological Basis of PATH Training

- Dyslexics ➔
  - Sluggish magno cells (dorsal stream)
  - Normal parvo cells (ventral stream)

- *Sluggish* magno ➔ Timing deficits ***between magno (motion) & parvo (pattern) cells***

- An imbalance between magno and parvo cell functioning causes a specific deficit in reading

Word Distortions for Sluggish Magno



Low Level Deficits in Dorsal Stream Disrupt Processing at Higher Levels

Disrupted Central Executive Network (DLPFC)

Disrupted Saccade Planning (LIP, FEF)

Disrupted Motion Processing (MT, MST)

Disrupted Magno Visual Processing (V1)

MEG Brain Source Imaging Improvements

- Dr. Huang analyzed MEG source imaging evoked by 2.5% contrast 1 cyc/deg sinewave moving at10 Hz relative to 5% contrast 1 cyc/deg background.
- Substantial MEG signal increases in **Dorsal Stream** (V1, V3, MT, MST) and **Attention Networks** (ACC, DLPFC, VLPFC and precuneous/PCC areas) observed following training on ***PATH*** 2 times/week for 8 weeks.
- Left V1 and MT showed more improvements than right V1 and MT.

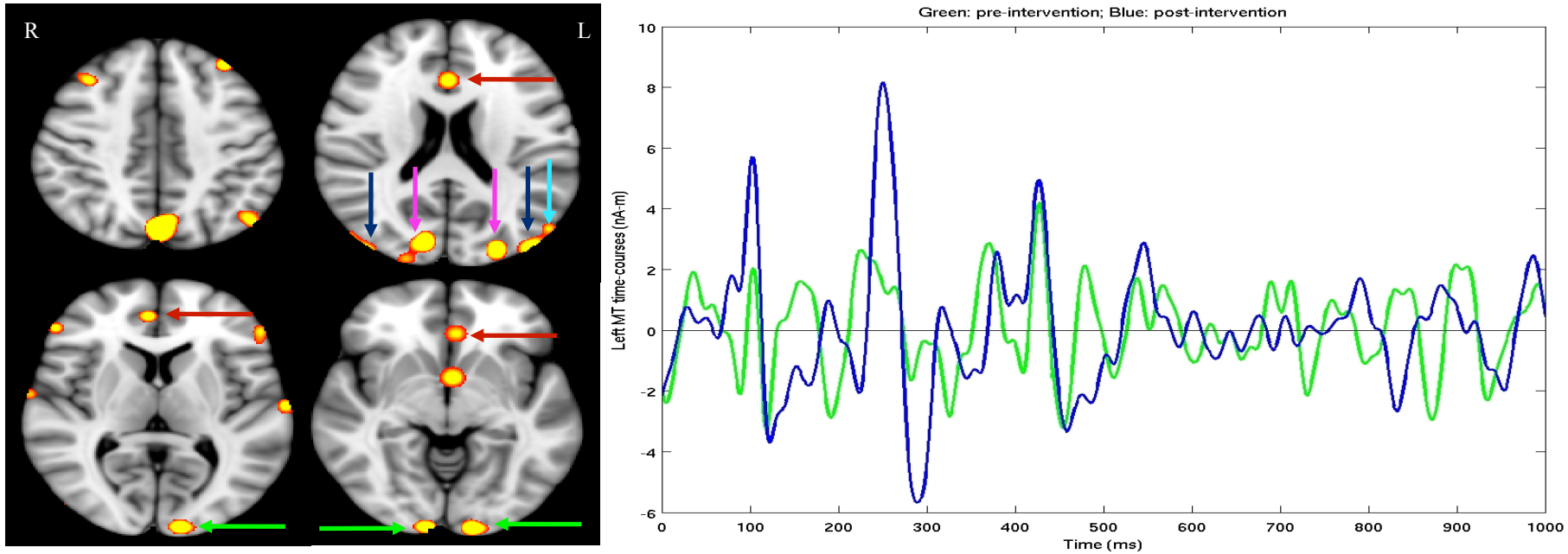


Figure 17. Left Panels: Significant MEG signal increases (color scale for t-test: 3 – 3.5) in post- versus pre-intervention exams. Green arrows : V1; Blue arrows: MT; Magenta arrows: V3; Cyan arrow: MST; Red arrows: ACC. Right Panel: MEG source time-courses from left MT area during post-intervention (Blue line) and pre-intervention (Green line) exams.

Major Behavioral Improvements Following PATH Training

- **Visual Working Memory**: 6th % to 99th %
- **Delayed Recall**: 1st % to 25th %
- **Reading Speed**: 154 wpm to 437 wpm
- **Visual Focus**: 1st % to 54th %
- Transformed his life!

Summary

PATH to Reading Intervention (www.pathtoreading.com)

- Clinically validated program based on neuroscience research
- Unveils the causal role of visual motion and attention in reading acquisition
- Improves reading fluency, attention, memory, and multitasking
- By improving visual timing, *PATH* trains brain pathways to operate together
- Simple and fast to administer