Visual, as opposed to auditory, timing interventions targeting magnocellular functioning in children with dyslexia significantly improved reading, attention, and working memory skills.

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Reading difficulties permeate the schools. Data suggest that reading deficits result from immature magnocellular pathways in the dorsal stream. We hypothesize that a temporal processing deficit in both the visual and auditory pathways may be a key factor limiting reading performance. To investigate the efficacy of reading interventions designed to improve temporal processing speed, we compared two timing interventions, Fast For Word (FFW) targeting the temporal dynamics of the auditory pathway, and PATH to Reading (PATH) targeting the temporal dynamics of the visual pathway. This study examined whether FFW or PATH improved reading skills more than found for controls, and whether these two interventions can be combined into an intervention that results in a superadditive effect. We ran a randomized trial on 33 dyslexic second graders in 4 public elementary schools in San Diego that includes a wide ethnic distribution of predominantly low socioeconomic students, comparing the school’s regular reading program (control group), FFW, PATH, and FFW + PATH combined. FFW was done for 30 minutes, 5 days a week for 20 weeks. PATH was done for 30 minutes, 3 days a week for 20 weeks. When FFW was combined with PATH, each intervention was trained for 10 weeks, half doing PATH first and half doing FFW first. Standardized tests of reading fluency, attention, and working memory were the measures used to evaluate improvements in reading skills. ANCOVAs were used to compare the treatment response across groups. Students trained on PATH increased their reading speeds, up to 200 words/min, significantly more than found for controls, p < 0.006. Only after training on PATH did attention improve significantly more than found for controls, p < 0.004. Both visual and auditory working memory increased significantly after training on PATH, p < 0.02, for visual sequential working memory, p < 0.04 for auditory nonsequential working memory. The only other intervention to improve working memory was FFW+PATH, only significantly improving sequential, p<0.02 and nonsequential, p < 0.03, visual working memory. Whereas training on FFW alone did not significantly improve reading speed, attention or working memory, training on PATH improved a variety of reading, attention and memory skills. These results show that visual temporal processing is fundamental for learning to read, paying attention, and remembering, contrary to claims that reading is only phonologically-based. We did not find a superadditive effect of PATH combined with FFW. Our results support the hypothesis that improving visual magnocellular functioning in the dorsal stream is essential for improving reading skills, as well as attention and working memory.

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