Procedural learning is impaired in dyslexia: Evidence from a meta-analysis of serial reaction time studies

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Individuals with dyslexia have difficulty reading. It has been hypothesised that the reading problems are caused by procedural learning impairments. These impairments are proposed to impact on phonological processing and the automatisation of skills necessary to support fluid reading. The procedural learning abilities of individuals with dyslexia have been repeatedly investigated using Serial Reaction Time (SRT) Tasks. On the task participants implicitly learn a visuo-spatial sequence. Overall, results from studies have been mixed. To better understand procedural learning in dyslexia, we re-examined the research on SRT Task performance in dyslexia using meta-analysis.

Following a systematic search of the literature we identified a total of 13 studies, representing data from 305 individuals with dyslexia and 305 controls. We submitted data from these studies to a meta-analysis and found that overall, individuals with dyslexia were significantly poorer on the SRT Task compared to controls. Our findings suggest procedural learning is poorer in dyslexia. Using meta-regression we also found that studies using a complicated sequence on the SRT Task and also had older participants were less likely to observe a significant difference between individuals with dyslexia and controls. Results are discussed with respect to compensatory and delayed memory systems in dyslexia.