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Abstraction and Optimization in Statistical Learning: A Randomized Controlled Trial of Implicit and Explicit Reading Intervention for Students with Dyslexia

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Abstract

Statistical learning (SL), or the ability to unintentionally extract patterns underlying sensory information, allows the human mind to acquire various regularities in written languages. However, we are unclear about its potential in learning multiple probabilistic regularities in a complex language, such as the sub-lexical mappings between orthography (form), phonology (sound), and semantics (meaning) in Chinese characters. We tested (implicit) SL and its explicit form in acquiring the Chinese sub-lexical mappings as a randomized controlled trial. Ninety-five 1st-4th graders with or at risk for dyslexia were randomly assigned to an implicit-SL group that was exposed to a set of characters with the sub-lexical form-sound-meaning mappings, an explicit-SL group that was exposed to the same set of characters with explicit instruction on the form-sound mappings, or a no-SL control group. Only the explicit-SL group showed abstraction of form-sound mappings, while only the implicit-SL group showed optimized reading processes across phonology and semantics.