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Adult Dyslexics' Visuo-Spatial Serial Memory: Evidence of Intact Non-Verbal Encoding?

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Introduction

Whilst research consistently shows that dyslexic participants show performance deficits on a number of serial recall (SR) tasks there has been conflicting evidence about dyslexics' ability to perform visuo-spatial tasks; an inconsistency often attributed to differential task demands (Smith-Spark & Fisk 2007). Also, on different visuo-spatial tasks it is possible that participants use verbal encoding strategies to facilitate recall, which then compromises comparisons of dyslexic and non-dyslexic performance.

We employed a visuo-spatial task that has been shown to minimise reliance on verbal-labeling of stimuli, and can therefore be considered a pure test of visuo-spatial SR memory. This task involves the sequential presentation of seven dots in quasi-random locations on a blank screen. The difficulty of the task can be varied by increasing the joint action of length of the path described by the sequence of dots and number of path crossings in the to-be-remembered sequence (Jones, Farrand, Stuart & Morris, 1995; Parmentier and Andres 2006). In the current study, dyslexic and non-dyslexic visuo-spatial SR was compared across 4 levels of task difficulty.

Method

Participants

Two Groups of Cardiff University students participated. The Control group consisted of 20 self report non-dyslexic', and the Dyslexic group consisted of 20 participants with a pre-existing diagnosis by an educational psychologist.

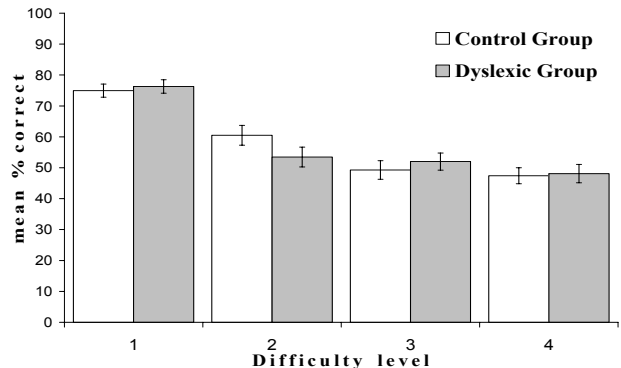
Design

There were 84 trials (21 per condition). There were 4 difficulty conditions with in the experiment crossings (no crossings, 1, 2, and 3 crossings) and increased length of path (significant increase in each condition $p > .00$).

Procedure

Each trial consisted of 7 dots appearing one at a time in different locations on screen for 700ms (300ms off). During the recall phase the 7 original dots re-appeared simultaneously on screen in their original positions accompanied by 2 dummy dots and the mouse pointer. In the recall phase participants used the mouse pointer to click on the dots in the order they were presented.

Results & Discussion



An ANOVA showed no significant group differences in performance $p = .872$ and post hoc comparisons showed no differences between groups at each level of difficulty ($p > .133$).

Increasing difficulty level significantly decreased SR ability in both groups $p < .001$. Post hoc comparisons showed that in both groups each level of difficulty was different from another ($p > .05$) with the exception of level 2-3 in the dyslexic group and 3-4 in the control group. This suggests that in a task independent of verbal encoding, dyslexics perform comparably to controls.

Parmentier and Andres (2006) have demonstrated that path length and path crossing have their effect on encoding of the visuo-spatial sequence, but not during the rehearsal phase. The results thus suggest that dyslexics are not subject to manipulations of encoding difficulty in the current non-verbal task.

The results also suggest that previous studies (e.g. Winner et al 2001) that have found that dyslexics show a deficit on spatial tasks may have been compromised due to an element of verbal encoding of the visuo-spatial stimuli.

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