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Backward-masking effects in the perception of stop sequences in dyslexic children

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The deficit in the perception of speech shown by dyslexic children, compared to control children, has been sometimes accounted for by assuming that acoustic information is integrated over a longer time window in dyslexics. Short and fast-varying acoustic cues would therefore be more difficult to detect, and this process would be more likely to be disrupted by a following sound, in dyslexics than in control children. This theory leads to the prediction that dyslexic children should be more sensitive than controls to backward auditory masking (BM). Investigations on this issue were recently conducted by Bishop *et al.* (1999), Rosen & Manganari (2001), and Wright *et al.* (1997). In this study, we examined whether a VC transition is masked by a following CV sequence to a greater extent in dyslexic children compared to control children.

The experiment was divided into two parts. In the VCCV condition, subjects were presented with three pairs of synthetic stimuli, /ɛd^ˈgɛ-ɛg^ˈgɛ/, /ɛg^ˈgɛ-ɛg^ˈgɛ/ and /ɛd^ˈgɛ-ɛd^ˈgɛ/, in an AX discrimination task. The duration of the interval between V1 and V2 ranged on a five-step continuum between 50 and 210 ms. We expected the difference between /ɛd^ˈgɛ/ and /ɛg^ˈgɛ/ to be more difficult to perceive when the CV sequence exerts a greater BM effect on the VC transition. In the VC condition, the subjects performed an AX discrimination task on three VC pairs, /ɛd^ˈ-/ɛg^ˈ/, /ɛd^ˈ-ɛd^ˈ/ and /ɛg^ˈ-ɛg^ˈ/ . The extent of BM effects was determined by comparing the subjects' responses to the VCCV condition with their responses to the VC condition, taken as baseline. There were five groups of subjects: (1) 16 children with a phonological developmental dyslexia, mean age 8;9. (2) Nine children with a severe phonological developmental dyslexia, mean age 11;2. (3) Nine 7-year-old control children. (4) Ten 10-year-old control children. (5) Ten control adults, mean age 25;1.

A signal-detection analysis showed that the dyslexics did worse than the control groups in the VC condition, their performance being lower than that of the younger control children ($F(1,23) = 18.665, p < .001$). Poorer discrimination for dyslexics than for controls was also observed in the VCCV condition. Among the controls, discrimination improved as the interval between V1 and V2 was longer. Backward-masking effects of the CV sequence on the VC transition were found in all groups for relatively short V1-V2 intervals. The results suggest that dyslexic children are severely impaired on the discrimination of VC transitions, regardless of whether or not these transitions are followed by a CV sequence. [Supported by the French Ministry of Research (ACI COG 148b) and Ministry of Health (PHRC UF 1639).]

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