Do Dyslexics Have Difficulty Accessing Articulatory Information?

D. Montgomery

Division of Education Studies, Gipsy Hill Centre, Kingston Polytechnic, Kingston Hill, Kingston upon Thames, KT2 7LB, Surrey, England

Summary. Dyslexic and normal readers of the same reading age of around eight years, but of different chronological age (ten and eight years) were given an articulation accessing and a phoneme segmentation task. For the former task they had to indicate which of several schematic drawings corresponded to the position of their tongue, teeth, and lips for a given phoneme. The dyslexic children experienced great difficulty with this task while they were equal to the normal children on a simple phoneme segmentation task. These results were replicated with two further samples of dyslexic and normal children. It is hypothesized that awareness of articulation processes is an important factor in explanations of dyslexia.

Introduction

A close association has been found between the ability to blend and manipulate phonemes and reading achievement (Chall et al. 1963; Liberman 1973; Calfee et al. 1973; Roberts 1975). Many investigators, reviewed by Naidoo (1972), have found that dyslexics are significantly poorer than controls at this. Although it is difficult to know if this is a cause or an effect of reading problems, tests of phoneme blending and segmentation are often used as exploratory screening devices, and have been targets for training (Rosner 1974; Williams 1980). Young children have little difficulty in intentionally segmenting speech sounds into words and words into syllables, but have great difficulty segmenting syllables into phonemes (Savin and Bever 1970; Savin 1972). A reason for this is suggested in the research of Liberman et al. (1967). They pointed out that there is no indication of separate phonemes in the acoustic bundle representing a syllable. The phonemes are shingled on each other and there is little direct acoustic correspondence for 'cat' in the separate phonemes 'c — a — t'. It was for this reason that Gleitman and Rozin (1977) called the phoneme an 'abstract perceptual unit'.

What is puzzling is how, in the early stages of learning to read in the alphabetic system, these abstract units are acquired. Golinkoff (1978) reviewed research on the relationship between awareness of phonemes and reading development. Ehri (1979) called this awareness 'linguistic insight'. However, it is difficult to imagine how, without explicit cues, so
many children learn the associations between sounds and letters as quickly as they do. Children learning to read and spell may be seen mouthing and heard sounding out the separate phonemes of a syllable. This would suggest the presence of some useful cues. It may be the process of sounding out, i.e., articulating, rather than the sound that results in the end, that is crucial. Articulatory deficits in dyslexic children have been reported and are considered significant in relation to their usually late speech development (Mason 1967; Rutter and Yule 1973; Ingram 1969). Since such deficits have often been found to disappear by the time the child reaches school age, they have been somewhat neglected in theories of dyslexia. However they may be a symptom of one and the same problem that dyslexics experience. It is conceivable that children who have greater difficulties in learning to speak and later on, in learning sound-letter associations, also have greater difficulty in accessing articulatory cues. Clearly the problem need not reside in the articulatory process itself but rather in the use the child can make of it.

Marcel (1980) studying phonological deficits in abnormal spellers pointed out that their impairment may be essentially one of linguistic awareness. Similarly, one might argue that in dyslexic children there might be a deficit specifically in the awareness of articulatory cues. The speech process itself provides proprioceptive information. Thus the exact places of contact of the more sensitive parts of the articulators, particularly the tip of the tongue on the alveolar ridge, the teeth, and the lips are normally detectable (O'Connor 1974). The extent to which this information is accessible to a child may vary. If a pupil is unable to access this articulatory cueing system, the ability to read and spell could be impaired. For such a pupil the assignment of a grapheme to a sound, which he can produce but cannot consciously 'feel', would appear to be arbitrary and only learned with considerable difficulty. Thus some dyslexics would be expected to show deficits in comparison with normals in this skill.

Since linguistic awareness of sound constituents may well be an outcome of reading experience as suggested by Morais et al. (1979) and Marcel (1980), it is necessary to compare children of the same reading age, not the same chronological age. If the dyslexic groups still show poorer performance in such a comparison then linguistic awareness is more likely to be a cause than an effect.

A preliminary report will be given of some data that contribute to these questions. Two tasks are used, one phoneme segmentation task similar to the one used by Bruce (1964) and one novel articulation accessing task. The findings have been replicated on two pairs of independently drawn samples of normal and retarded readers. This replicability at least justifies presenting a report of this study even though it constitutes only part of a bigger investigation into the role of phoneme segmentation and articulation difficulties in dyslexia.

**Method**

**Subjects**

For two separate studies samples of subjects were drawn from a population of 'dyslexics' referred to a Reading Centre for special remedial tuition and two samples from a population of eight-year-olds attending a Primary School. They were matched for intelligence as well as for reading age as shown in Table 1. Sample 1 was used for the first study. Sample 2 with completely different children was used for the replication study.