were not significantly different between subject groups. However, dyslexics were significantly impaired in their ability to discriminate small differences in frequency of tones around 1 kHz. Frequency discrimination achieved in the dyslexic group was significantly lower than in the control group. The frequency difference reflects the ability of the subject to exploit differences in interaural phase, and relies upon the analysis of phase-locked discharges. The frequency following response in a far-field evoked potential which reflects synchronous phase-locked discharges. This potential was significantly smaller in the dyslexic group, even when normalised with respect to the amplitude of the auditory brainstem response. The auditory brainstem response was not significantly different between subject groups. The far-field potential evoked by amplitude modulation stimuli was significantly smaller in the dyslexic group. The analysis of amplitude fluctuations within each of the auditory frequency channels is believed to be important in the perception of speech. The possible deficit in phase-locking at dyslexics and in impairments in their ability to track rapid amplitude changes may underlie their problems in speech perception.

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The effect of time stretch/compression on syllable perception in developmental dyslexics

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Many developmental dyslexics do not perceive consonant clusters as effectively as controls. Both single case and group studies have shown that dyslexics confuse the identity of a range of clusters in fricative-vowel syllables (Cornellsen et al., 1995). Furthermore, while dyslexics demonstrate categorical perception of synthetic CV continua containing stop consonants (palatal and labial) which differ in the frequency of the second formant transition; Mortensen et al., 1998), the slopes of labelling functions at the phoneme boundary for the syllables subjects tend to be less steep than normal. It has been proposed that the durations of consonant-vowel F2 and F3 transitions, critical to the identification-based discrimination of stop consonants, are perceived less reliably by dyslexics because of perceptual limitations of a temporal nature (Roes, 1989).

This idea suggests that dyslexics' perception of stimuli containing stop consonants might be improved by stretching them in time. Conversely, their perception of the same stimuli ought to be made even worse by compressing them in time. We tested a version of the Klatt synthesizer to generate a baseline set of consonant-vowel-consonant (CVC) stimuli. The stimuli contained all the stop consonants in either initial or final position (bok, pok, dok, lok, pok, k, kob, kob, kod and kok). We applied a time stretch/compression algorithm to the Klatt parameter which were then used to generate 11 stretched (+.5) and 11 compressed (-.5) syllables. The effect of the algorithms was to alter the rate of change of formant frequencies and not their frequencies. We tested 15 auditorically normal speech

References


Validation of high-fidelity virtual auditory space

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