Speech intelligibility in continuous and intermittent noise for dyslexic and normal-reading listeners

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It has been suggested that perception of sequential sounds is impaired in people with dyslexia. The experiments designed to assess these impairments have typically used detection or discrimination tasks and relatively simple non-speech stimuli. In the experiments reported here we explored whether impairments in dyslexic listeners’ performance could be demonstrated when the task was the more complex one of speech identification, and the stimuli were sentence-length utterances in which the availability of information in the speech stream could be sequentially constrained.

The experiments involved measurement of speech reception thresholds (SRTs) for sentences presented in either continuous or intermittent noise. The extent to which listeners could use speech information in the brief temporal windows in intermittent noise was quantified by comparing SRTs in continuous and intermittent noise.

We measured SRTs using sentence lists for 12 adult dyslexic listeners and 12 normal-reading control listeners in each of four conditions: sentences were presented in quiet, in continuous noise and in two types of intermittent noise with on/off cycles of 50ms/50ms and 75ms/25ms. SRTs corresponding to 50% correct were estimated adaptively using 15-sentence lists and loose scoring of keywords, and the SRT for each condition was taken as the mean of SRTs for three lists. For both groups of listeners SRTs were lower for intermittent noise than continuous noise, but there were no differences between SRTs for dyslexic and control listeners in any condition.

In a second experiment we used different types of speech material and a stricter scoring criterion. The stimuli were lists of meaningful sentences, nonsense sentences, and sentence-length strings of words. SRTs were measured in continuous and in 50ms/50ms intermittent noise for 10 dyslexic and 14 control listeners, using a scoring criterion that required all words in a sentence to be reported correctly. For all three types of speech material, dyslexic and control listeners had similar SRTs in continuous noise, but in intermittent noise SRTs for dyslexics were reliably higher than those of controls, suggesting that dyslexic listeners were limited in their use of the extra information available in intermittent noise.

A further experiment currently in progress should help to clarify (i) whether, as we suspect, the scoring criterion is the key procedural difference between our first two experiments that underlies the difference in outcome, and (ii) the extent to which linguistic as distinct from auditory processes contribute to the difference in performance between dyslexic and control listeners. [Supported by the Wellcome Trust.]