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Test creation for stop consonants perception in children

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Background

Learning disabled children have been shown to have difficulties with speech perception and in particular with rapid sounds such as stop consonants. Debate concerning the origin of these difficulties exists. One theory proposes that the problem is language specific (phonological) and not purely basic auditory. The other theory proposed that a group of children with learning disabilities has central auditory processing disorders, concerning in particular the temporal component. Our goal was to create a simple test to examine children with learning disabilities and investigate the incidence of occurrence of such a difficulty in Greek dyslexic children.

Materials and methods

Synthetic Stimuli of stop-vowel tokens with KLSYN88a software synthesizer were used. These stimuli were taken from a previous work of Fourakis. Sampling rate was set at 10 kHz with 12-bit precision. The overall amplitude was normalized ± 1 dB. Total duration was set at 300 ms: 40 ms transition, 260 ms steady-state. F0 contour was created with linear glide from 130 Hz to 100 Hz. The procedure consisted of six possible responses: /b/ or /p/, /d/ or /t/, /g/ or /k/. Each adult tested was given a six alternative, forced-choice identification. Following each response the subject had to rate the certainty of her/his response in a scale from 1 to 5 (were 1 was very uncertain and 5 was very certain). The stimuli were presented in a randomized order. Each test was given separately 3 times with different vowels (a, e, u) following the consonants. Stimuli were presented through an audiometer at the level of 75 dB with amplivox headphones in a quite room.

Results

The data of 25 adults with normal hearing were analyzed in order to conclude as to the most stable responses and the clearest stop consonants identification. We grouped all the responses with at least 4 rate of certainty and at least 18 of 25 adults had to agree on the stop consonant identified. We took the top 10 consonants identified for each category, according to the vowel that followed. Only the stimuli containing a and e met the criteria for stability of identification that we had set. This led us to 60 stimuli for the children's version of the test. This test was much quicker and the stimuli presented were clearly identified by an adult as being a certain stop consonant.

Discussion

Creation of a simple, quick and stable test for testing perception of stop consonants in children was our objective. Phonological deficits exist in most dyslexic children. Stop consonants are very brief sounds and elements of their frequency spectrum are incorporated in the following vowel. Being so brief children with auditory processing disorders may not always identify them correctly. This can lead to learning disabilities and studies have shown that a subgroup of dyslexic children has problems in the perception of stop consonants. Such subtle problems may become more robust in a classroom situation were noise usually exists. Our future goal is to use this test in children with learning disabilities.

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