

A Synthetic Test of Rhythm

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Suprasegmentals are properties of speech that have a domain larger than a single element. For being analogous to, superficial decoration, suprasegmentals or prosody consisting of stress, rhythm, intonation & juncture, functions as the foundation or structural support for the organisation of speech communication. Of these, rhythm is intrinsic & critical in both production & perception of speech. Several studies have been conducted in the past to gain a knowledge of the development of speech rhythm in children. However, this topic is not yet understood & there is a pressing need to conduct research in this area, in order to use it clinically. In this context the present study was aimed to highlight the developmental trend of rhythm in children & develop a synthetic test of rhythm.

A total of seventeen rhythm patterns were synthesized based on three parameters:- change of intensity, change of fundamental frequency & change of both fundamental frequency & intensity, /ba/ syllable was synthesized for 500 msec, using the acoustic parameters, viz formant frequency, fundamental frequency, formant bandwidth, intensity & duration. The sampling frequency was 8000Hz with a resolution of 10 msec. The stimuli were synthesized, based on the software developed by Voice & Speech Systems, Bangalore. Rhythmic patterns, starting from one foot to six feet were generated, following the method of reiteration where stressed & unstressed syllables were concatenated. The original /ba/ syllable had a fundamental frequency of 140Hz. Intensity was reduced in 100RdB steps & Fo was reduced in 5Hz steps for the weak syllables.

Two experiments were carried out. Experiment -I dealt with the identification of rhythm patterns by adults. A total of seventeen stimuli were audiopresented to twenty normal adults, who were instructed to imitate the same. Their imitations were recorded and analyzed. A score of '1' was assigned, when the imitation resembled the original for rhythm & '0' was assigned when the imitation was inappropriate for rhythm. The percent response was calculated & a test of significance was carried out. The results indicated that the adults could imitate upto four feet & had difficulty in imitating five feet & six feet. Thus, in the second experiment, five feet & six feet were deleted. The second experiment consisted of the perception of rhythm patterns by children. Stimuli till four feet were audio-presented, one at a time. Forty Kannada speaking normal children in the age range of 2.6 - 6.6 years, were the subjects for the study. The children were instructed to imitate the patterns for rhythm. These imitations were audio-recorded & judged for imitation. Using the similar scoring system, performances were scored in percent & interjudge correlation was found out.

The results indicated that as the age level increased, performance scores also increased linearly, depicting the developmental trend, for rhythm in children. Regarding the patterns of stimuli, four feet stimuli were relatively difficult than three feet, & three feet relatively difficult than two feet & so on. The task - 3, which consisted of duplex cues, i.e. change in both intensity & fundamental frequency, was better than task -1 & task - 2 in terms of performance. This was true for adults too. The sex difference in the limitation task couldnot be established, since a mixed variety of superiority of sex was found in the tasks, amongst the different age groups.

Considering the results, this test could be used as a clinical diagnostic tools in order to explore the suprasegmental functioning in patients, having dysprosodia. It may also be used as a therapeutic tool for facilitating rhythmic speech & hence enhancing speech intelligibility in those, who have arhythmia (disorder of rhythm).