

VOICE ONSET TIME FOR VOICELESS STOP CONSONANTS IN TYPICAL MALAYALAM SPEAKERS.

Ms. Jiya Jinson, Ms. Anna Maria Manoj, Ms. Teena Thomas

(Students, Dr.M.V. Shetty college of speech and Hearing).

Nithin. K. Alex ((Asst.Professor, Dr.M.V. Shetty college of speech and Hearing)

Email; annamanoj678@gmail.com

VOT is defined as the length of time that passes between the release of a stop consonant and the onset of voicing or the vibration of the vocal fold. VOT is an important acoustic feature and temporal cue for discriminating voiced and unvoiced phonemes and also a feature of the production of stop consonants in various languages. It reflects subtle motor coordination skills. Studies have been conducted on changes in several acoustic parameters of voice with respect to age and gender about studies' concerning voice onset time and gender has been very less documented.

VOT can vary with the rate of speech, especially for voiceless aspirated (long-lag) stops. As would be expected, VOT decreases as rate of speech increases, and VOT increases as rate decreases (Baum & Ryan, 1993).

Voice onset time (VOT) is measured as the time interval between the release burst and the first quasi periodicity in the acoustic signal (Lisker & Abramson, 1964; Klatt, 1975).

TYPES OF VOICE ONSET TIME (VOT).

- 1) Negative VOT: where the onset of vocal fold vibration precedes the plosive release. If the voicing starts before the release (i.e during the closure phase) of the stop, then the result is described as 'voice lead' (or 'prevoiced') and is given a negative VOT value. This is the case of voiced plosives.

- 2) Zero VOT: where the onset of vocal fold vibration coincides (approximately) with the plosive release. Voiceless un-aspirated plosives have zero voice-onset time.
- 3) Positive VOT: where there is a delay in the onset of vocal fold vibration after the plosive release. If the voicing starts after the release of the stop, then the result is 'voice lag' and is described with a positive VOT value. All voiceless aspirated plosives have positive value of voice-onset time. The amount of lag is important to separate voiceless un-aspirated ('short lag') from voiceless aspirated ('long lag').

Investigators have examined several acoustic and perceptual aspects of speech which are affected by age and gender related changes. These areas include pitch, intensity, quality and selected measurement of rate and duration. With respect to measurements of rate and duration, investigators have examined age-related changes in rate of speech, maximum vowel duration, pause time, and voice onset time.

Titze (1994) shows that the average vocal fold membrane length is 6mm shorter in female adults compared to male adults. The shorter membrane length in turn increases the possibility of a more rapid closure gesture, which is shown by the higher average f_0 value in female speech compared to male speech. If VOT influenced by the abduction speed of the vocal fold (Port and Preston, 1974) then, male and female plosives would be unequally affected by this factor, creating a gender bias.

The aim of this study was to investigate the effects of age and gender on voice onsettime with respect to voiceless stop consonants in typical Malayalam speakers.

For this study 80 subjects were grouped into two age group (adult and geriatrics). The three voiceless stop consonants /p/, /t/, /k/ were stimulus for the study. The participants were seated comfortably in front of a computer connected to a microphone kept at a constant distance of approximately 5cm from the mouth of the speaker. The utterances were recorded and acoustically analyzed via PRAAT. During the formal recording, they were required to read the words in a normal speed. All productions were recorded with a sampling rate of 44.1 kHz. The VOT values of the target stops were obtained from the wave form and verified with the spectrogram. As

for the spectrographic readings VOT intervals from the beginning of the release burst to the onset of voicing were analyzed. The obtained data statistically analyzed.

The result of the present study revealed that adult performance was better when compare to geriatrics for all the voiceless stop consonants /p/, /t/, /k/. Across genders females are having high VOT when compare to males. Voice onset time for velar has larger when compare to alveolar and bilabial.

In summary we can conclude that there is significant difference in VOT across genders as well as age. So these findings can be later used in the assessment and diagnosis procedures. Moreover these finding can be later used as reference for further studied to be done in different populations as well as other age groups.

The present study is in accordance with Kaur (2015) where he reports that voice onset time for voiceless consonants is larger than the voiced consonants and velar has largest VOT following in descending order by alveolar and labial

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