

# ACOUSTIC CHARACTERISTICS OF VOWELS IN CLEAR AND CONVERSATIONAL SPEAKING STYLE IN MALAYALAM

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Verbal communication requires a constantly shifting balance between talker and listener-oriented forces and also the situation in which communication takes place. (Lindblom, 1990).

This intelligibility enhancing mode of speech is known as “clear speech”, whereas, everyday speaking style is referred to as “conversational speech”. In most of the perceptual studies of clear speech, where speakers are asked to speak as though he/she is talking to someone who has a hearing loss or is from a different language background, have shown significant improvement in intelligibility over ordinary conversational speech. (Bradlow & Bent, 2002; Bradlow, Kraus, & Hayes, 2003; Gagne & Masterson, 1994)

Clear speech involves wide range of acoustic adjustment. This adjustment include decreased speaking rate which comprises longer and frequent pauses as well as longer segments, greater sound pressure level, increased intensity of fricatives, increased intensity in the 1000hz to 3000hz range and an expanded vowel range (Picheny, Durlach, & Braida, 1989; Krause & Braia, 2004; Bradlow, Kraus &

Hayes, 2003; Liu, Riu, Bradlow & Zeng 2004) although acoustic difference between clear and conversation speech have been described, it is not yet clear which contributes to the superior intelligibility of clear speech.

When speakers are aware of speech perception difficulty on the part of listener they are likely adopt a distinct style aimed at improving intelligibility. This intelligibility enhancing mode of speech is known as “clear speech”. Whereas every day speaking style here in is referred as “conversational speech”.

Previous work has provided important insights into acoustic/articulatory adjustments while increasing clear speech intelligibility in western languages. The acoustic–phonetic features that characterize the conversational-to-clear speech transformation may vary across the languages and across the different contexts. However, there is a paucity of data on clear speech production and perception in any language other than English.

Because of almost exclusively western focus of previous clear speech research there is not much information available on acoustic characteristics in Indian languages. Therefore, present study investigated the acoustical characteristics of vowels in clear and conversational speaking style in Malayalam, which is one of the Indo-Aryan languages. Earlier research on Indian accented English showed in comparison with conversational speech, clear speech had more energy at high frequency region, longer vowel durations and larger spectral amplitudes for fricative and stops at local level (Ranjini, 2007).

The present study compared the acoustic characteristics of vowels produced in clear and conversational speaking style in Malayalam. Final consonant was kept same across all the contexts as this will help us see the effect of initial consonant on acoustical properties of vowels in clear and conversational speech.

The aim of the study was to analyse the Acoustic characteristics of vowels in clear and conversational speaking style in typical Malayalam speakers with the following objectives.

- a) To analyse Vowel duration of clear and conversational speech
- b) To analyse Fundamental frequency of clear and conversational speech

Ten typical Malayalam speakers (five males and five females) in the age range of 20 to 22 years (mean age 20.8 years) who had undergone education in Malayalam language from their primary school level with no history of speech, language, hearing or neurological problems participated in present study.

Stimuli consisted of vowels /a, i, u, e, o / for /sVr/, /pVr/, /bVr/ contexts. Thus in each context there were a total of ten words. 15 carrier sentences were used to elicit 15 target words in two speaking styles.

Sentences were recorded in a sound treated room. The microphone was kept at a distance of 6-8 cm from the mouth. Sentences were recorded using PRAAT voice recording and analysis software 5.2.35 version. (Boersma & weenink, 2008). Voice recording was done using an external microphone with sampling frequency of 44100Hz. For the conversational style, the speakers were instructed to speak the sentences as if they were talking to someone familiar with their voice and speech patterns. For the clear speaking style, the speakers were instructed to speak the sentences as if they were talking to a listener with a hearing loss or a non-native speaker. The order of speaking of clear or conversational speech was randomly varied between subjects.

The acoustic analyses of the target words selected from the sentence were done using PRAAT software to record voice related

parameters such as Vowel duration and fundamental frequency .the obtained data was further statically analyze for significant difference between clear and conversational speech.

The results revealed that:

### **Vowel Durations**

Vowels were significantly longer in clear speech compared to conversational speech in all the three contexts (/sVr/, /pVr/ and /bVr/). On an average, vowel in the clear speech at /sVr/, /bVr/, and /pVr/ context were 0.7, 1.33 and 1.7 times longer when compared to conversational speech respectively.

### **Fundamental frequency**

Results showed no systematic variations in fundamental frequency between two speaking styles. Some subjects showed higher fundamental frequency for clear speech while others had higher fundamental frequency for conversational speaking style.

In summary, the results of the present study indicate that vowel duration is expanded in clear speech compared to normal, conversational speech. Similar results have been shown in American accent English, Spanish, Croatian, Kannada and Konkani language too. Present study extends these results in to Malayalam a Indo- Aryan language. Furthermore, this study there is a remarkable stability in acoustic-phonetic features that characterize conversational- to-clear speech transformation across different languages.

