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RESEARCH ARTICLE

Influence Of Dravidian Languages On Speech Perception: A Comparative Study

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Abstract

Indian languages have several psychophysical salience of contrast like variations in pronunciation, stress & rhythm and intonation pattern. With listener's experience, features enrolled in the contrast may vary the speech perception scores for native and non-native speakers. Dravidian languages spoken in Mangalore-India by native and non native speakers, also show variations in pronunciation, stress & rhythm and intonation pattern. There is dearth of information on speech perception scores over the Dravidian languages. Thus the study aimed at finding out the speech perception scores of native and non-native listeners when native and non-native stimulus is delivered. A total of 24 individuals participated. The stimulus consisted of Kannada Articulation Test and Malayalam Articulation Test recorded by native and non-native speakers each. The individual's verbal responses were judged on 3-point rating scale decided by five experienced Audiologists and Speech Language Pathologists. The results showed higher speech perception scores for Kannada Articulation Test and Malayalam Articulation Test when the stimulus was recorded by native and non-native speaker of each language and perceived by native and non-native listener. Overall, it can be concluded that native listeners of the respective language yielded better scores when the words were recorded by native and non-native speakers.

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INTRODUCTION

Verbal communication among all the society members belonging to various parts of the world is important. However, the attitude dealing with language is a key point. Spoken language is understood as a process of extracting acoustic cues from target speech signal and mapping them on to the stored linguistic representations. The system of language exploits the use of contrasting sounds positioned together to form words, which when grouped in desired order communicates a larger message. As the contrasting sounds vary from language to language, it is reasoned that the listener, a baby learning its mother tongue or a student learning a second language, must educate themselves regarding which sounds are vital to their language and how they are indicated in that language to be learnt. Both native speakers and the non-native listeners tend to have more negative attitudes towards the non native speaker. It is well-known that infants of one month of age can distinguish speech sounds that are not present in their native language (Best, Sithole, 1988). Ability to discriminate non-native speech sounds deteriorates with age and language experience. Thus, adults show difficulty in discriminating non-native speech sounds (Werker et. al., 1981). In Acoustics, the study of speech spoken by non-native speakers is a subject of research since long (Flege et. al., 1997). Today, with maturing speech technology, matter of non-native speech perception is becoming a topic of importance. The speech perception is dependent on both the language & acoustic phonetic properties of language and subjective variations. Speech perception of a native English Speaker

with variations in English i.e. English spoken by a Japanese, spoken by a French and also Jordanian concluded that native English speakers perceived speech with better intelligibility when Jordanian spoken English was presented than French and Japanese spoken English. In addition, the attitude was more positive with the Jordanian English speakers than the other groups. Difficulties could be linked to the language itself causing problems as an inexperienced listener may not know how to infer language specific cues or problems may come up from listener's long term phonological representations in second language and varying it from those of the native speaker (Jaber and Hussein, 2011). Speech perception investigation in speakers from Mandarin Chinese and native English speakers with respect to their language and developmental trend in perceiving speech concluded that the adults comparatively require increased visual information in both the language groups to obtain better scores. Similarly, considering the language as a factor, Chinese Mandarin and the English speakers used visual information to the same extent in speech processing using audiovisual mode. The non-native listeners required higher use of visual cues in perception of speech stimuli as the appearance of individuals vary subjectively and also, the acoustic phonetic properties of each language are specific to the language (Chen and Hazan, 2009). Similarly, perception of acoustic phonetic cues from phonemic contrast of native language is considered effortless. This is true when redundant speech (consisting words, sentences where multiple cues are higher meta-linguistic cues are made available. However, identification of native phonemes may be effortful due to absence of redundant cues.

India is a country with vast number of languages spoken in it. There are a larger number of dialects within a language, which has been the classic acoustic modeling challenge. Kannada language is spoken in the state of Karnataka and Malayalam language is spoken in the state of Kerala, Southern India. Both these languages fall in the Dravidian family of languages and are widely used by the native and non-native speakers of southern India. Today, in the regional areas like Mangalore – Karnataka, Audiologists frequently encounter patients belonging to various parts of India speaking different languages. Thus a non-native Audiologist may be forced to carry out testing on a native or non-native speaker. Languages like Kannada and Malayalam show variations in pronunciation, intonation pattern, stress and rhythm. These two languages being most commonly used in Mangalore – Karnataka, to evaluate the speech perception of subjects, one needs to have the knowledge of speech perception scores of native and non-native speakers from a native and non-native stimulus each. However, there is no supporting literature with the two concerned languages. There is a dearth of information on speech perception of an Indian language speaker on non-native listener. Hence the study was designed to assess the speech perception of native and non-native languages among Indians using Speech Audiometry, a critical test in commenting on one's hearing status and speech perception. The aim of the study was to improve our knowledge on speech perception of two Dravidian languages when recorded by native and non-native speaker.

Materials and Methods

Participants

A total of 24 individuals (females) in the age range of 18 years to 35 years participated in the study. The participants were further grouped into two based on their native language. Group I consisted of 12 participants belonging to native Kannada language and group II consisted of 12 participants belonging to Malayalam language. Participants selected had similar accent, dialect and had all the phonemes in their language inventory. The groups were not exposed to any (Malayalam and Kannada language respectively) other language apart from their native language. All the volunteers for the study were unpaid. Informed consent was taken from all the participants before the testing. Institutional ethical committee guidelines for human participants were followed for the entire procedure. The individuals following the inclusion criteria mentioned below were recruited for the study.

- a. Hearing sensitivity within normal limits with air conduction thresholds less than or equal to 15dB hearing level (HL) at octave frequencies between 250Hz and 8000Hz,
- b. Bilateral 'A' type tympanogram with static compliance ranging between 0.3 and 1.7cc and tympanometric peak pressure ranging between -100 daPa and +60 daPa.
- c. Present Ipsilateral and contralateral acoustic reflexes at octave frequencies from 500Hz and 4000Hz.
- d. Distortion Product Oto-Acoustic emission present in both the ears with signal to noise ratio of 6dB.

Exclusion criteria withdrew the participation of individuals complaining of any otologic and/or neurologic symptoms and also any difficulties in listening and understanding speech in quiet and noisy situations.

Stimuli

60 meaningful words from Kannada Articulation test (KAT) Babu, et. al., 1972 and Malayalam Articulation Test (MAT) Maya, and Savitri, 1989 were used as stimuli. KAT and MAT are diagnostic language specific articulation tests. All the sounds of the language appear in initial and medial position. It consists of meaningful words. These words comprise of all major phonetic sounds of the language in the form of bi-syllable and tri-syllable. The meaningful words from KAT were recorded five times in isolation by an adult female native and non-native (Malayalam) speaker. Similarly, MAT words were recorded by native and non-native (Kannada) speaker using PRAAT software (Boersma and Weenink, 2012) with sampling frequency of 44100Hz. Recorded stimuli was fed into the GSI clinical audiometer using external device (personal computer). To obtain the goodness of the recorded stimuli (native and non-native), five qualified and experienced Speech Language Pathologists listened to the stimuli auditorily. Two sets of recording (native and non-native) were selected from the two languages each. The selected sets consisted of all the 60 words identified correctly by the five speakers.

Procedure

Meaningful Kannada words and Malayalam words recorded by native and non-native speakers each were delivered to the participants through TDH 39 headphones connected to GSI 61 clinical audiometer at their speech recognition threshold level. The presentation of the stimulus was in two different protocols. Every word was less than 700ms. First, the Kannada speakers were presented with 60 Kannada words recorded by the Kannada speaker and then later with a gap of one day same words recorded by Malayalam speaker. Similarly, the Malayalam speakers were presented with 60 Malayalam words recorded by the Malayalam speaker and later same words recorded by the Kannada speaker. Secondly, the Malayalam words recorded by native Malayalam speaker were presented to the native Kannada speakers and Kannada words recorded by the native Kannada speakers was presented to native Malayalam speakers. Each participant was delivered with 180 meaningful words each. Right ear was given importance in delivering the stimuli. Order of stimulus presentation was varied to prevent subjective bias. Participants were instructed to respond in a verbal mode. Time period of 3-4 ms was given as response time to the participants. If participant failed to respond in 3-4 ms it was considered as no response. However, no response obtained in the study is less than 1%. The responses of the participants were audio recorded with a note down on a sheet. Feedback regarding the response of the participants was not provided to maintain the accuracy of the test results. A 3-point rating scale decided by five experienced Audiologists and Speech Language Pathologists was used (3-correct response, 2-partial response, 1- incorrect response) to judge the response of the participant. The collected audio response and score sheets were further analyzed to reveal the speech perception scores of two Indian Dravidian languages. For the analysis only correctly perceived words were taken and the obtained score was summed up.

Data Analysis

The collected response of the participants underwent independent sample t-test. Mean and standard deviation of each group comparison was obtained. Independent sample t-test was applied for

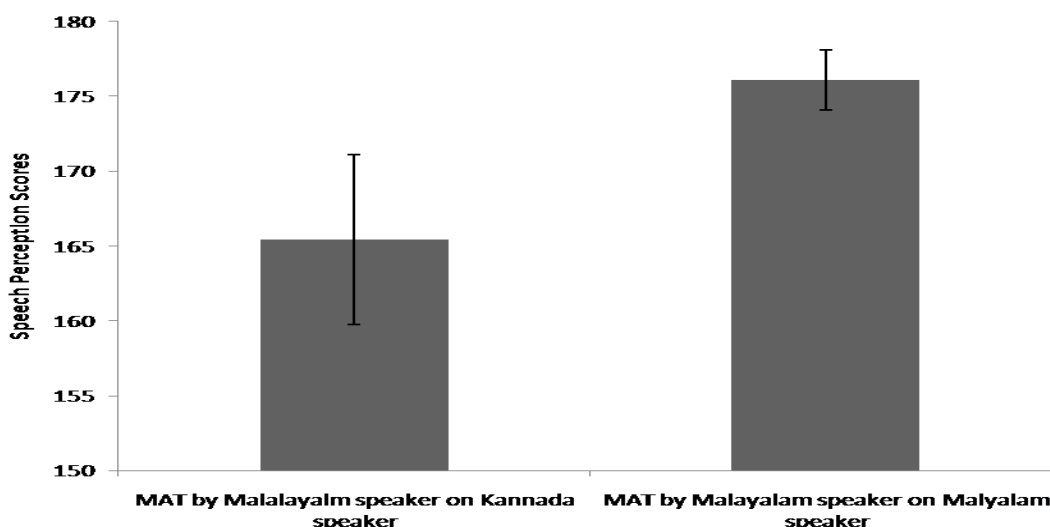
- a) The native words (Malayalam words from MAT) recorded by Malayalam speaker and perceived by a Malayalam and Kannada speaker.
- b) The native words (Kannada words from KAT) recorded by Kannada speaker and perceived by a Kannada and Malayalam speaker.
- c) The native words (Malayalam words from MAT) recorded by Kannada speaker and perceived by a Malayalam and Kannada speaker.
- d) The native words (Kannada words from KAT) recorded by Malayalam speaker and perceived by a Kannada and Malayalam speaker.

i. Results And Discussion

Significant difference ($p < 0.00$) in speech perception score was obtained when Kannada words from KAT and Malayalam words from MAT were recorded by native & non-native speakers and were perceived by native and non-native listeners. Higher speech perception scores for Kannada and Malayalam words recorded and perceived by native speakers were obtained with the mean scores of 178.91 ± 0.99 (SD) and 176.08 ± 2.02 (SD) respectively. In contrast, when Kannada and Malayalam words were recorded by non-native speakers, the native participants perceived with better mean scores of 166.91 ± 4.75 (SD) and 169.58 ± 6 (SD) respectively.

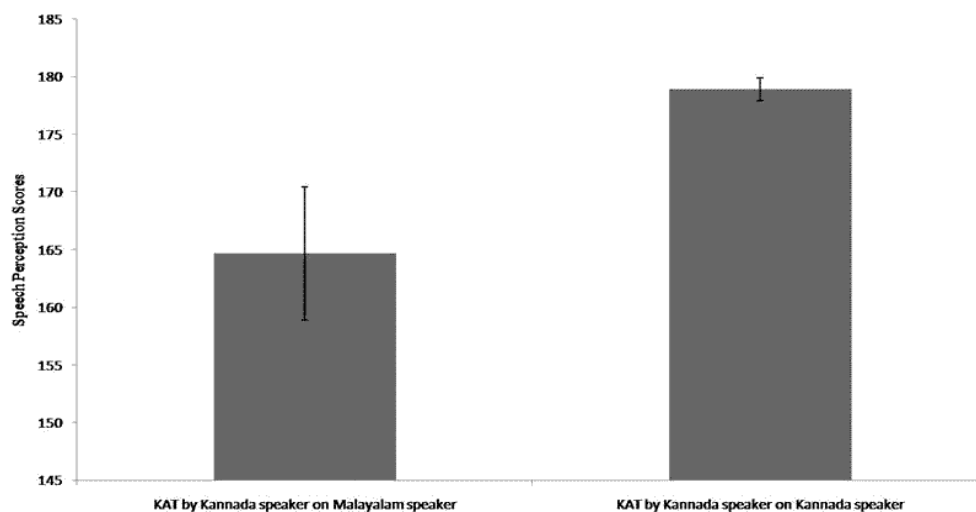
Figure 1 shows the graphical representation of the speech perception scores for native and non-native speakers when the stimulus is recorded by a native speaker. Figure 1(a) postulates the scores for Malayalam words from MAT and 1(b) postulates the scores for Kannada words from KAT.

Figure 1(a)



(a) The native words (Malayalam words from MAT) recorded by Malayalam speaker and perceived by a Malayalam and Kannada speaker.

Figure 1 (b)

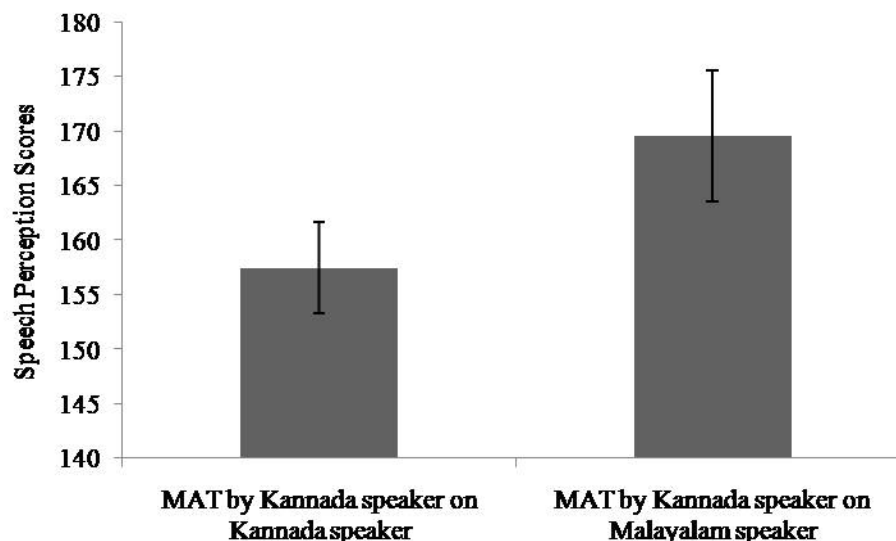


(b) The native words (Kannada words from KAT) recorded by Kannada speaker and perceived by a Kannada and Malayalam speaker.

The above figure depicts native speakers with higher scores than the non-native speakers when the words are recorded by native speakers. When Malayalam words from MAT were recorded by a Malayalam speaker and were perceived by Malayalam and Kannada speakers, there was a statistical significant difference of ($t=-6.14$, $p<0.00$) in speech perception scores. Similarly, when Kannada words from KAT were recorded by a Kannada speaker and were perceived by Kannada and Malayalam speakers, a statistically significant difference was seen ($t=-8.47$, $p<0.00$). The overall scores obtained by native speakers are relatively larger to the scores obtained by non-native speakers. Thereby, concluding that the native Malayalam and Kannada speakers can perceive the native speech in the best effortless way.

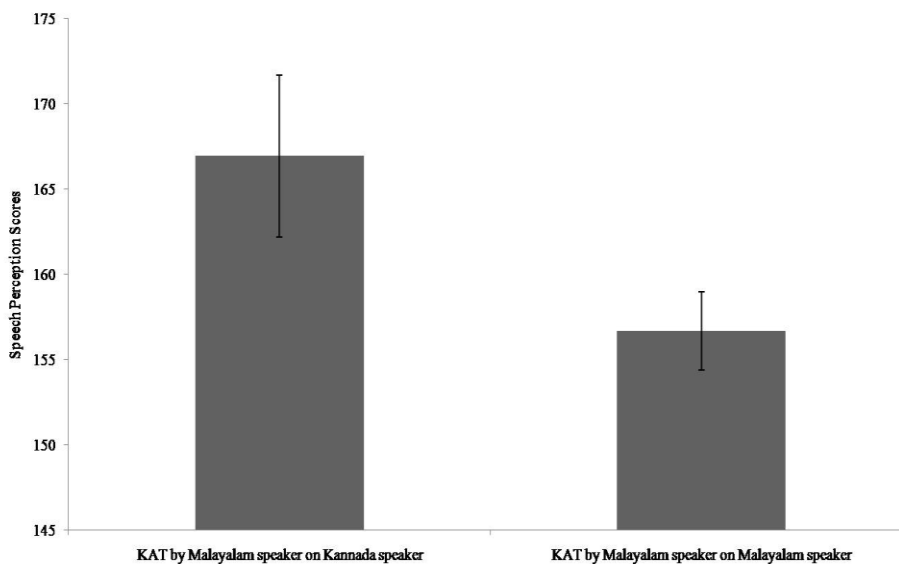
Figure 2 shows the graphical representation of the speech perception scores for native and non-native speakers when stimulus is recorded by a non-native speaker. Figure 2(a) postulates the scores for MAT and 2(b) postulates the scores for KAT.

Figure 2 (a)



(a) The native words (Malayalam words from MAT) recorded by Kannada speaker and perceived by a Malayalam and Kannada speaker.

Figure 2 (b)



(b) The native words (Kannada words from KAT) recorded by Malayalam speaker and perceived by a Kannada and Malayalam speaker.

The above figure concludes that the native speakers yielded higher scores than non-native speakers when the native words were recorded by non-native speakers. When words from MAT were recorded by a Kannada speaker and was perceived by a Malayalam and Kannada speakers there was a statistical significant difference of ($t = -5.73$, $p < 0.033$) in speech perception scores. However, when words from KAT were recorded by a Malayalam speaker and were perceived by Kannada and Malayalam speakers, there was no statistically significant difference seen ($t = 6.71$, $p < 0.18$). The overall scores obtained by the native speakers were relatively larger to the scores obtained by the non-

native speakers. Thereby, concluding that, native Malayalam and Kannada speakers can perceive the native speech in the best way even when native speech is recorded by a non-native speaker.

The possible reasons for native speakers to obtain larger scores over non-native speakers could be due to the mentioned reasons; Indian languages share common phonological structure, but with significant variations in morphological structure (Lisker and Abramson, 1970). Similarly, several psychophysical salience of the contrast like variations in pronunciation, stress & rhythm and intonation pattern (Burnha, 1986), listener's experience with features enrolled in contrast (Werker et. al., 1981), the similarity between the native and non-native sounds, allophonic variations in native language. In addition, some non-native speech contrasts present greater perceptual difficulty than others (Best et. al., 1988). Three possible factors that most commonly influence the speech perception by a non native speaker are related firstly to integrity related to generosity, good heartedness, good character, honesty and reliability. Secondly, Competence based on self confidence, prestige and wealth, leadership, ambition and intelligence and thirdly, social awareness that deals with the friendliness, sense of humor, likeability, heights and good looks, and entertainingness and cleanliness (Barona, 2008). However, lexical frequency and the phonotactics of one's language may lead to bias in ones phonetic perception of non-native language (Davis and Johnsrude, 2007).

ii. Summary And Conclusion

The study aimed at improving our knowledge on speech perception of Dravidian languages: Kannada and Malayalam words from KAT and MAT respectively recorded and perceived by native and non-native speaker. The results obtained prove significant difference in speech perception scores with larger scores for native speakers than the non-native speakers. However, further would be justified with larger sample size.

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REFERENCE

1. Best, C. T., McRoberts, G. W., Sithole, N. M. (1988). Examination of perceptual reorganization for non-native speech contrasts: Zulu click discrimination by English-speaking adults and infants. *Journal of Experimental Psychology*, 14, 345-360.
2. Werker J. F., Gilbert, J. H. V., Humphrey, K., Tees, R. (1981). Developmental aspects of cross- language speech perception. *Child Development*, 52, 339-355.
3. Flege, J., Bohn, O., Jang, S. (1997). Effects of experience of non-native speakers production and perception of English vowels. *Journal of Phonetics*, 25, 437-470.
4. Jaber, M., Hussein, R. F. (2011). Native speakers' perception of non-native english speech. *English Language Teaching*, 4(4), 77.
5. Chen, Y., Hazan, V. (2009). Developmental factors and the non-native speaker effect in auditory-visual speech perception. *Journal of the Acoustical Society of America*, 126(2), 858-865.
6. Babu, R. M., Rathna, N., Bettagiri, R. (1972). Test of Articulation in Kannada. *Journal of All India Institute of Speech and Hearing*, 3, 64-67.
7. Maya. (1989). Diagnostic test of Articulation in Malayalam," Unpublished dissertation submitted to the University of Mysore.
8. Boersma, P., Weenink, D. (2012). Praat: Doing phonetics by computer (Version 5.3.32) 2012. [computer Program
9. Lisker, L., Abramson, A. S. (1970). The voicing dimension: some experiments in comparative phonetics. *Proc. 6th Intl. Cong. Phon. Sci.*, Prague: Academia.
10. Burnham, D. K. (1986). Developmental loss of speech perception: Exposure to and experience with a first language. *Applied Psycholinguistics*, 7, 207-239.
11. Barona, D. V. (2008). Native and non-native speakers perceptions of non-native accents. *LL Journal*, 8, 3(2).
12. Davis, M. H., Johnsrude, I. S. (2007). Hearing speech sounds: top-down influences on the interface between audition and speech perception. *Hearing research*, 229(1), 132-147.