INTONATION IN FOUR INDIAN LANGUAGES UNDER FIVE EMOTIONAL CONDITIONS

N. P. NATARAJA*

' The changes in pitch which occur within a sentence are not hapazard variation. The pattern of variation, the rules of changes, are highly organised. Their intricacy is so great that, although one speaks his language with little effort, their analysis is extremely difficult and may induce one to conclude that no actual organization or rules are present, but that people use pitches by whim and fancy. In each language, however, the use of pitch fluctuation tends to become semi-standardized, or formalized, so that all speakers of the language use basic pitch sequences in similar ways under similar circumstances. These abstracted characteristic sentence melodies may be called " Intonation contours ",' (Pike, 1945).

' Intonation is the linguistic form in which the speaker organises certain kinds of information' (Dewes, 1959). Intonation can be used to convey linguistic and/or extra linguistic aspects in speech. An utterance may convey different meanings due to the changes in intonation, even though the utterance contains the same segmental phonemes.

The meaning intonation of in a language are superimposed upon lexical meaning. That is the intonation meaning temporarily added. It does not contribute to the intrinsic meaning of a word but merely gives a shade of meaning added to or superimposed upon the intrinsic lexical meaning, according to the attitude of the speaker. The listeners often react more to the intonational meanings than the lexical ones (Pike, 1945).

The intonation contours, though fluctuating like the speaker's attitude, are as strong as in their implications as the attitudes which they represent; in actual speech usually there will be a balance between intonation and the words chosen. But some times, a lack of balance between intonation and word content may be brought in deliberately for special speech effects (Pike, 1945). Pike (1945) divides the intonation characteristic roughly into two types—

(i) Those contours which are completely colourless in meaning. This is known as intonational minimum of speech which serves as a mould into which all sentences may be poured so that they achieve utterance.

• Mr N. P. Nataraja, M.Sc, Lecturer in Speech Pathology, A.I.I.S.H., Mysore-6.

(ii) The other intonation characteristics are affected or caused by the individual's physiological state like anger, happiness, excitement, age, sex etc. These are the ones which help one to identify people and to ascertain how they are feeling. Whenever a certain sequence of relative pitch is heard, one may conclude that the speaker means certain things. One sentence may have several contours and a single contour may have several meaningful parts.

' The general characteristics of the intonation seem to be shared more broadly than those of any of the other phenomenon commonly gathered under the label of language.' (Bolinger, 1972).

Some of the intonation characteristics are shared by most of the language in the world. This is called as the ' Universality' of intonation. Attempts have been made by several investigators to compare different languages of the world. However, no definite and conclusive results have been derived regarding this aspect as some are arguing for it and some against it (Larson and Pike, 1949; Pence, 1964; Abe, 1955; Hadding and Kennedy, 1964).

Bolinger (1972) considers that the causes of these universal features, as not linguistic inheritance, but as the intonation is gestural, which is also connected with physiology of speech and with the nervous system. Thus some consider that there is universality in intonation across the languages.

Attempts have been made to study the acoustic correlates of intonation. Pike (1945) and Labo (1961) believed that variations in fundamental frequency of voice is the basis for intonation contours. Denes (1959) disagrees with this view, as he has experimentally found that it is not always the variations in fundamental frequency that contributes for intonation contour. But he believes that the other acoustic correlates like intensity, duration or the spectrum may also serve as cues for the recognition of intonation. However, the intonation is considered to be mainly determined by the variations in fundamental frequency.

Several methods of analysis and methods of describing intonation have been attempted. According to Pike (1945) it is not just enough if an intonation contour is described in terms of raising or falling or falling-rising pattern therefore all the characteristics need to be described for the complete understanding of any contour.

Pike (1945) considers that the four relative pitch levels [i.e., (1) extra high, (2) high, (3) mid and (4) low] represented by numerals from 1 to 4 are sufficient for writing and distinguishing all the contours in English. However, additional symbols have been used to represent aspects of stress, quality, pause, general height of the voice, etc.

Several languages of the world have been analysed by various investigators. Study of intonation in Indian languages have been very rare. However, even

in the ancient Sanskrit literature intonation has been discussed, and Deva (1957 and 1960) has attempted an analysis of intonation in Telugu under certain emotional conditions.

Rathna *et al.* (1976) conducted an experiment to study the identification of intonation with reference to context. They have concluded that the listeners were not able to identify the correct pair of intonation sentence and context sentence. It was also concluded that it is possible to use a similar kind of intonation pattern in different contexts in the Kannada language. Thus the reference context may become important in identifying the intonation.

Manjula (1979) studied intonation in Kannada under 9 emotional conditions using 36 sentences. She has concluded that—

The sentences in Kannada with emotion are expressed with a final fall in the intonation pattern;

A sentence with a specific emotion can be expressed with more than one type of intonation pattern, and a single intonation pattern may be used to express sentence with different emotions.

The present study is an attempt to compare the intonation contours in four Indian languages (Kannada, Tamil, Gujarathi and Hindi) under five emotional conditions, using objective and subjective analysis of variations in fundamental frequency. The five emotional conditions are:

(a) Anger
(b) Joy
(c) Jealousy
(d) Neutral
(e) Mercy

Pike's (1945) four levels of pitch will be used to mark the intonation contours.

Methodology

The four Indian languages chosen for the purpose were: (1) Kannada (2) Tamil (3) Hindi and (4) Gujarathi. Sentences expressing five emotions: *(a)* Joy *(b)* Jealousy (c) Neutral *(d)* Anger and *(e)* Mercy were prepared in all the four languages. All the sentences had a common part sentence.

Four female subjects whose mother-tongue was Kannada, Tamil, Hindi and Gujarathi were selected. They were given the five sentences written in their mother-tongue and they were asked to ' speak' these sentences expressing the emotions indicated along with the sentences. These sentences were recorded and played back to the subject using a tape recorder. Each subject was given

as many trials as they wanted, i.e., recordings were repeated until the subject was satisfied that she had expressed the required emotion. A minimum of three trials and a maximum of five trials were required to obtain required speech samples consisting of 20 sentences.

Then for the purpose of analysis, from this master tape, only the *common part sentence* (CPS) from each of the 20 sentences were transferred to another tape.

Analysis

1. *Instrumental Analysis*—Using a pitch computer and a level recorder the 20 CPS were analysed to get fundamental frequency curve for each of the CPS.

2. *Analysis by judges:* Two judges, one the experimenter and a teacher of English with training in experimental phonetics analysed the sentences using 4 levels of pitch marking as used by Pike, i.e., (1) Extra high (2) High (3) Mid and (4) Low were used to mark the pitch on each of the sentences. There were some differences between the judgements made by two judges. However, when both listened to tapes and discussed, some changes in the judgements were made and thus there was inter and intra-judge reliability.

Table showing the result of Analysis (Both objective and subjective)

Language	Kannada	Gujarathi	Tamil	Hindi
Emotion	avan bandidane	e avyo	avan vande	vo agaye
Anger	3-2-4	3-4-2-4	3-4-3-4	3-4-3
Joy	2-3-2	3-4-3-4	2-3-2-4	2-3-2-3
Jealousy	3-4-3-4	3-4	3-2-4	3-4
Neutral	2-3-4	3-4-3	3-2	3-4-4
Mercy	3-4-3-2	3-4	3-4-3-4	3-4-3

(1) Extra high (2) High (3) Mid (4) Low

Sentences

1. *He has come,* you go, I won't come (Anger)
2. *He has come,* we can go to film (Joy)
3. *He has come,* I won't get the job (Jealousy)
4. *He has come,* nobody else has come (Neutral)
5. *He has come,* from such a long distance (Mercy)

Results

(a) A comparison of the analysis by judges and instrumental analysis showed no difference between the two analysis i.e., the patterns of intonation curves as noted by judges and the curves obtained by instrumental analysis were almost same. Thus it can be stated that either analysis well do to obtain information regarding the intonation curves when well trained judges are used. Variations were only within 80 Hzs. Only 3 levels (low, mid and high) were used by the subjects.

(b) Comparison of intonation contours on different emotions within each language.

1. A comparison of analysis of intonation contours of Kannada language shows that 5 different contours have been used by the subject. However, 3 of the sentences with anger, jealousy and neutral showed lowering of fundamental frequency at the end whereas 2 other conditions, mercy and joy showed an increase in fundamental frequency at the end of the sentences. These results are in agreement with conclusions drawn by Manjula (1979).

2. A study of intonation contours of sentences spoken in Gujarathi showed a general lowering of fundamental frequency by the end of the sentences. The subject had used almost same intonation pattern/contour to express different emotional conditions. It may be possible to express different emotions using the same intonation contours as in Kannada, as reported by Manjula (1979).

3. In Tamil sentences, the same intonation contour has been used to express Anger and Mercy, whereas different contours have been in other 3 sentences. However, there was a general lowering of fundamental frequency towards the end of the sentences.

4. To express anger, neutral and mercy in Hindi, the same intonation pattern has been used. Two different patterns have been used to express jealousy and neutral. However, there was increase in fundamental frequency towards the end of the sentences.

(c) A comparison of intonation contours across the languages under different emotional conditions.

This comparison showed lowering of fundamental frequency at the end of the sentences under anger in all the languages except in Hindi where there was a rise from low to mid. Under joy condition all the subjects showed a lowering of fundamental frequency except for the subject speaking Kannada, who had shown an increase from mid to high.

In all the four languages there was a lowering of fundamental frequency at the end of the sentence under the conditions of jealousy.

In Kannada and Hindi, under neutral condition there was a lowering of fundamental frequency whereas there was a rise in two other languages.

The expression of mercy had shared almost the same contour whereas only a slight rise from mid to high was seen in Kannada and low to mid in Hindi.

It may also be noted from the examination of the table that all the subjects have generally started at the mid level and none of them have used level, i.e., extra high in expressing any of these emotional conditions.

In conclusion it may be said that the same intonation contour may be used to express different emotional conditions, and further, the same patterns/contours are seen across the languages used. However, the results of this study must be viewed with the limitation that only one subject in each language have been used. The results may be further confirmed using greater variety of subjects and emotions. However, there seems to be common or ' universal' intonation contours across the languages studied in this study.

Further it is recommended that the analysis of texts in various languages to study the ' universality of intonation contours' may be used to confirm the findings of the present study.

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