# EMOTIONS AND PROSODIC FEATURES

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The term language is restricted to refer to a vocal system of human communication. Crystal (1971:239) says that "language is the most frequently used and most highly developed form of human communication we possess". He further clarifies (ibid) that, "an act of communication is basically the transmission of information of some kind, a message from source to receiver". Gimson (1962:3) also views that, "a language is a system of conventional signals used for communication by a whole community". So language can be characterized as a system of human vocal noises used as a conventional signals by a community for purposes of communication. The patterns of communicational convention cover a linguistic system, a system of significant sound units (phonemes), the inflexion and the arrangement of words (ibid.,4). But not all the sounds produced by the human vocal system are linguistic in nature.

Since language is purely a human act, this system carries person's emotions and attitudes also. Hence Sapir (1921:8) regards language as, "purely a human and non-instinctive method of communication, ideas, emotions as desired by means of a system of voluntarily produced symbols".

There exists a medium enabling a language to its communicative functions. Abercrombie (1967:3) calls this medium as 'aural' medium. This medium is created by the movement of tips, tongue, larynx and lungs. All these collectively constitute the vocal apparatus, the function of thewhich results in the speech sounds. These speech sounds are arranged in such a way that they form patterns in time. These patterns are relevant for linguistic communication. They function as sequence of sounds in a language. These sound sequences are realized as sentences or utterances. So language is nothing but a system of structures built by the sequence of human vocal sound patterns used for linguistic communication.

Speech sounds are constituted by segmental and non-segmental features. The segmental sounds, with different qualities, are produced by the vocal apparatus by the various articulatory postures at oral, pharyngeal and laryngeal cavities. The extra ordinary activity of the articulators in the above cavities with respect to the articulatory postures, produces the

quantitative variations over the already produced qualitatively different segmental sounds (Ravisankar, 1980:3). 'The quantitative characteristics of the segmental sounds are known as non -segmental features.

Segmental sounds of a language are broadly classified as vowels and consonants. They are basic to the formation of sound sequence structures. The conventional combinations of these sounds give meaningful words and sentences. The meaning they give are based on their lexical and grammatical relations to the sound sequences.

Non-segmental features (D. Crystal and R. Quirk, 1964: 10 and D. Crystal, 1969:98) prevail over the segmental sounds. They are essential to a language to make the communication complete, fulfilling the various aspects of human activity by intoning his emotions, attitudes and personal traits. Even a few lexical and grammatical differences are also made explicit by these features. They establish an indirect link with the words and stretch of utterances to convey not only the semantic variations of lexical items, but also the intended and implied meanings of the utterances. So the non-segmental features along with segmental sounds make the language a humane activity, a social act.

There are two aspects of the non-segmental features which are called as 'paralinguistic and prosodic features'. Crystal (1969:12) says that, "the phrase 'prosodic and paralinguistic features' is really a comprehensive label functionally as well as phonetically by definition, referring to all non-segmental vocal effects which have a conventional and systemic role…". These non-segmental vocal effects cause variations along the parameters of:

pitch (The number of vibrations of the vocal cords per second or the number of repetitions of the complex wave per second),

loudness (the intensity of force of the air-flow causing the production of a sound or a sequence of sounds),

duration (the time taken for the production of a sound sequence),

silence (the time-lag or the imposed intervals in a sound sequence).

Though the prosodic and paralinguistic features differ from each other in many respects, it is very difficult to make a sharp distinction between them.

Paralinguistic features are the vocal effects which mainly express the idiosyncratic features like the speaker's personal moods ad traits. Crystal (1969:6) says that, "other vocal effects, similar in their relation to the segmental side of language and in their semantic role,

but distinct in their physiological articulatory basic and distribution…are paralinguistic features". They too have some degree of pitch, loudness, duration and even silence. But, these features are phonetically less discrete and discontinuous in the connected speech than the prosodic features.

Prosodic features are also the results of vocal effects which cause variations along the parameters of pitch, loudness, duration and silence in connected speech. Crystal (1969:5) says that. "prosodic features are set of mutually defining phonological features which have an essentially variable relationship to those features (phonemes, lexical meaning) which have direct and identifying relationship to such words". He (ibid.:140) groups prosodic features into systems on the basis of shared dominant phonetic parameters, each system covering a particular kind of variability that can be discussed independently of variations taking place elsewhere. The systems distinguished are: tone(pitch) , pitch-range, tempo, loudness, rhythmicality and pause.

Ravisankar (1980:2) defines prosodic features as the musical characteristics of speech and they are rhythmical by recurring in equal intervals of time. Unlike the paralinguistic features, these futures are present at all times in all persons' speech in some degree or other. They are integrated with the linguistic aspects to express the emotion/ attitude of the speaker.

The prosodic features form prosodic patterns in time dimensions. The prosodic patterns establish a direct link with the segmental sound sequences and add different senses to the basic meaning of the sound sequences (word or sentence) constituted by segmental units (phonemes) by their distinctive behaviours. These sense variations may be related to semantic and grammatical variations of lexical items; emotional and attitudinal feelings of the speaker and emphatic and contrastive functions of the meanings. These extraordinary senses are the results of the overlaid supra segmental features of the segmental units which otherwise will only give the lexical meanings.

The system of segmental sounds and non-segmental features together play a significant role in making the communication strong and effective in a language. Mostly, the lexical and grammatical meanings are expressed by the structural patterns of the segmental sound sequences the connotative aspects of the same as implied by the speaker are carried by the prosodic features.

The prosodic system is organized on some primary parameters which are the psychological attributes of sound, viz., pitch, loudness, duration and silence with

rhythmicality (the isochronous recurrence of syllables), tempo (the speed of the utterance) and pitch range (the width of the pitch-glide). These parameters in various fixed combinations are used to express different marked meanings of the sentences.

A stretch of utterance is formed by the sound sequence structures referred to as utterances. Each such utterance is overland with an intonation unit which is formed by the co-ordinate function of different prosodic features referred to above. Among these parameters of intonation Pitch is the most significant one which because of its musical quality, is highly sensitive to human ear. It makes tremendous effect as a perceptual factor. The fluctuations of pitch while contributing a smoothening effect to the utterance cause linguistically significant sound components. This musical effect, considered to be pleasing to the ear, is termed as 'speech melody' (D. Abercrombic 1967:104). Abercrombie (ibid.) says, "When this speech melody is part of the structure of words (syllables) it is called as 'tone' and 'intonation' when it is part of the structure of sentence".

Abercrombie (ibid) defines intonation as "the speech melody brought out by the pitch fluctuation" and proceeds to say. "pitch fluctuation in its linguistic function may conveniently be called as speech melody". Bollinger (1972:3) puts at length that "all languages, including tone languages, use the fundamental for mood and punctuating effects over longer stretch of speech. These are called as - intonation speech melody as distinct from the tones of non-tonal languages". He further says (ibid.) "in every non-total language the pitches of utterances tend to be frozen into formalized patterns or intonations. These patterns constitute phrase melodies which are characteristics of the particular language and which differ from language to language". Chang (1972:401) simply defines intonation as "the sentence melody superimposed on the sentence as a whole". He (ibid) agrees with Abercrombie in the contention that "intonation is the fluctuation of the voice pitch as applied to the whole sentence". Denes et. al.1962:2) give a different view describing it as "… a linguistic form in which information about the speaker's emotional attitude towards his subject matter (agreement, doubt, questioning) is encoded…."

Intonation can be defined on the whole as the pitch patterns formed on the sequence of speech sounds where the pitch patterns are characterized by different parameters from the prosodic system, viz., pitch, loudness, duration, silence etc.

The intonational meanings are explicit in nature. That is, when an intonation pattern is superimposed on the basic pitch sequence (in its colourless form) a more explicit, implied

meaning is got. In other words, a change in the pitch pattern adds an extra information to the basic meaning of that utterance, contributing to the total shades of meaning of it. Thus, keeping the meaning unaffected, the emotion/ attitude and any intended meaning, the speaker choose to convey, are made explicit by intonation. Consider the following examples."

1. //avan// 'he' (declarative - unmarked)

1a. // avan?// 'he?' (interrogative - intonation type - unmarked)

1b. //avan//'he?!' (interrogative - intonation type - surprise)

The word *avan*when normally said gives a declarative meaning 'he' (1) without any added implication. The same word if given a rise-fall intonation will change into a question form meaning, 'is that he?' (1a.) In the same way, it can be said along with questioning, expressing the exclamatory mood or astonishment of the speaker. Here, it gives the sense, 'is that *he* who did it?' (1b). The questioning and exclamation are the added meaning to the basic meaning *avan.* The basic meaning, however, is retained. The different pitch sequences probably imply the characteristic relation of the speaker to the environment concerned. The superimposed meanings, i.e., the extra information are carried by the extrinsic pitch patterns.

Intonation pattern is the only device to discriminate utterances having same structure but with different implied meanings (cf: Crystal, 1975:29). For example, a slow rising pitch may be a declaration or a question. The degree or the level of the rising of the pitch helps to discriminate the meaning of utterances which are structurally similar. The following illustration may be considered.

2. // na:nvi:ttukkupo:kanum…// 'I have to go home' (declarative - hesitation)

This sentence has the pitch pattern '**gradual rise - gradual fall - gradual slow rise'.** The meaning conveyed by this sentence is that the speaker intends to go home, but could not do so due to some reason.

Intonation has often been used to express affective meaning. It serves as a device to convey different types of emotion / attitude, the speaker likes to convey. For example, a **low fall** type intonation will indicate the emotion 'pity' whereas the **high fall** will indicate the emotion 'happiness'. Likewise, a **rising** type intonation will express the 'questioning attitude', i.e., an enquiry of the speaker. Similarly, **rise-fall** will express 'insult', to the hearer. So it can be said that intonation carries the subjective feelings of the speaker in any speech act. The emotion/ attitude signalling function of intonation is an integral part in any language function.

Intonation is the overb ferm which refers to the organized prosodic system of the said features. It means that intonation is not a single system of contours, levels etc., but is a complex of features from different prosodic systems like pitch, loudness, tempo etc. The system of intonation is not restricted to pitch and pitch movement, but can be farced to the factors other than pitch which are responsible for semantic effect (cf; K.L.Pike, 1945:25). Crystal (1969) explains that "intonation has a very clear centre of pitch contrast and periphery of reinforcing contrast of a different order". Here the usage periphery indicates the significance of prosodio features other than pitch. Pattern of intonation are invariably complicated because of the minor variations they show yet, they can be limited to specific number on the basis of th semantic contrasts expounded by them. This leads to the understanding that intonation is a "system of systems" and it functions itself as an institution with a set of well defined, structured departments.

From an application perspective it would be appropriate to look at intonation patterns formed on two structures, one formed by the pitch factor i.e., pitch level of pitch movement and the other formed by pitch-range, loudness, tempo. Duration, as suprasegmental feature, co-exists with these two levels of structures. In an utterance, pitch movement and pitch levels form a pitch pattern which exists in time domain, and the combined function of pitch range, loudness, and tempo forms specific rhythm (rhythmicality) which also exists in time domain. A pitch pattern fcombines with a rhythmic structure, we get a rhythmic-melodic structure which is super imposed on a stretch of sound sequence to form a meaningful utterance.

I have proposed in this article that the features that form the rhythmic structure. Have the cue to emotional / attitudinal expressions of utterances and even a accented sentences. In a normal utterance, with a specific pitch pattern, these features behave in a 'normal' manner. In other words, the acoustic value of each of them in kept optional and hence we get 'normal'/colourless utterance. On the contrary any significant variations in the acoustic values of each of these feature, will result into expressing specific emotion/ attitude, depending on which feature gets altered and to what extent. This aspect, may be illustrated with the help of the following table;

## Acoustic Data

| Sl. No | Sentence | Nature of | Pitch range | Loudness | Tempo | Rhythm |
|---|---|---|---|---|---|---|

| | type | sentence | (in Hz) | (in dB) | (in ms) | pattern |
|---|---|---|---|---|---|---|
| 1. | Declarative | Colourless | 20 | 66 | 12.7 | $Pr_2L_2T_2$ |
| 2. | | Happiness | 40 | 66 | 11.2 | $Pr_3L_2T_2$ |
| 3. | | Surprise | 40 | 57 | 10.5 | $Pr_3L_2T_3$ |
| 4. | | Anger | 15 | 71 | 11.0 | $Pr_3L_2T_3$ |
| 5. | | Pity | 10 | 48 | 12.0 | $Pr_1L_1T_3$ |
| 6. | | Sorrow | 15 | 48 | 12. | $Pr_1L_1T_2$ |
| 7. | | Disgust | 10 | 51 | 9.5 | $Pr_1L_1T_3$ |
| 8. | | Fear | 10 | 51 | 9.7 | $Pr_1L_1T_3$ |
| 9. | | Hesitation | 12.5 | 43 | 15.2 | $Pr_1L_1T_1$ |
| 10. | | Request | 10 | 42 | 11.0 | $Pr_1L_1T_2$ |
| 11. | | sarcasm | 10 | 60 | 18.0 | $Pr_1L_2T_1$ |

## Parameters

**Pitch range**

| | | |
|---|---|---|
| Narrow | <20Hz | $Pr_1$ |
| Normal | 20 - 30 Hz | $Pr_2$ |
| Wide | > 20 Hz | $Pr_3$ |

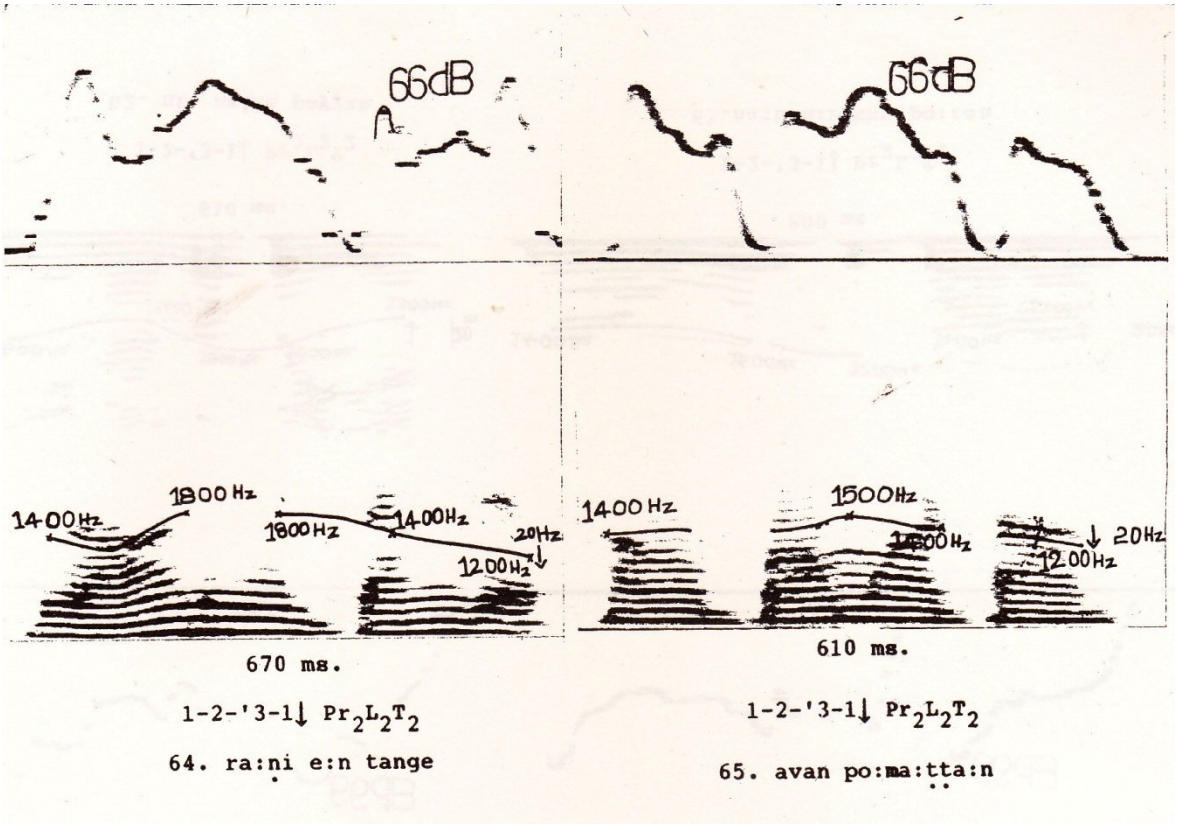
**Loudness**

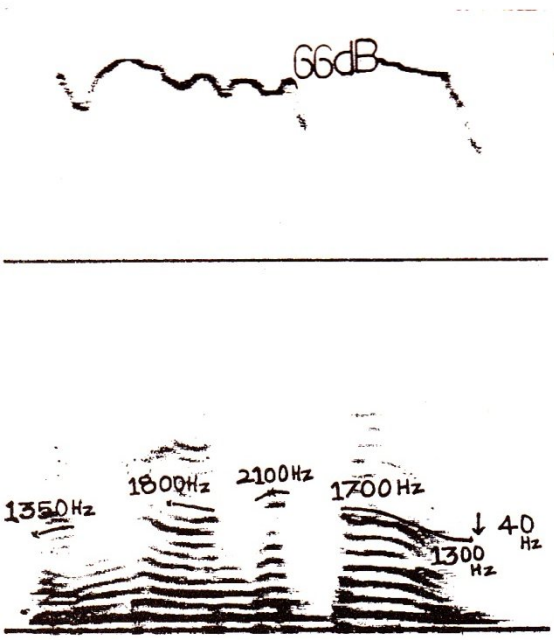
| | | |
|---|---|---|
| Soft | < 55dB | $L_1$ |
| Normal | 55 - 80 dB | $L_2$ |
| Loud | > 80 dB | $L_3$ |

**Tempo**

| | | |
|---|---|---|
| Slow | >13.0 ms | $T_1$ |
| Normal | 11.0 - 13.0 ms | $T_2$ |
| Fast | < 11.0 | $T_3$ |

The introduction to intonation given in a simple but concrete manner above is expected to be understood by the speech scientists / technologists. The sound understanding of intonation organization in a language will help formulate the ways and means of inputting intonational cues for speech synthesis and subsequently speech recognition. The validity and effectiveness of the proposition given in this article / need to be discussed by the technologists involved in the discipline concerned.

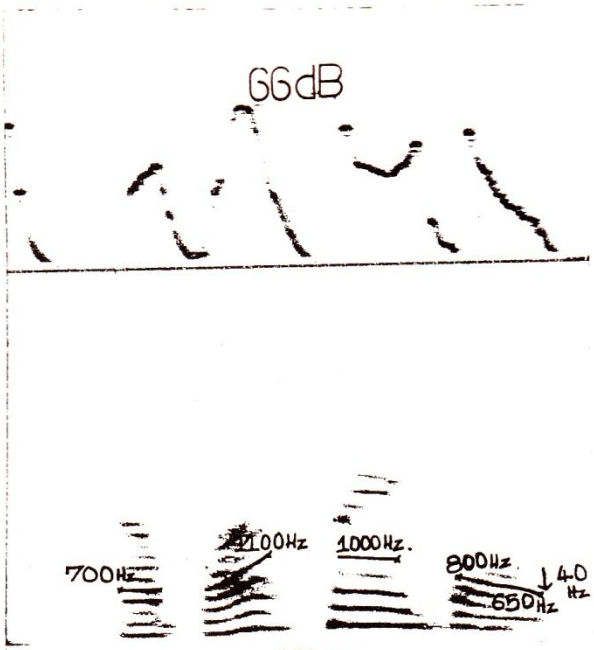





570 ms.

1-3-'5-3-1 ↓ $Pr_3L_2T_2$

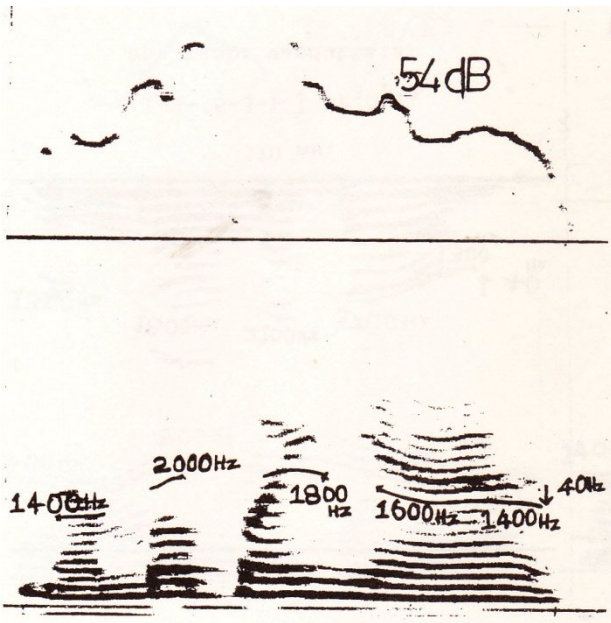
66. tambi vandutta:n!




570 ms.

1-3-'5-3-1↓ $Pr_3L_2T_2$

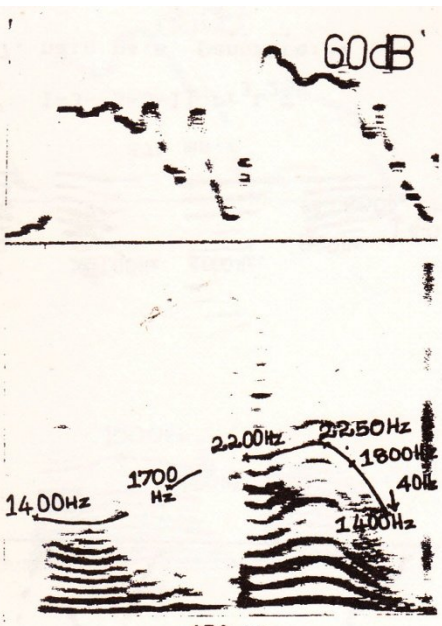
67. na:n pa:s pannitte:n!




460 ms.

3-4-'5-2↓ $Pr_3L_2T_3$

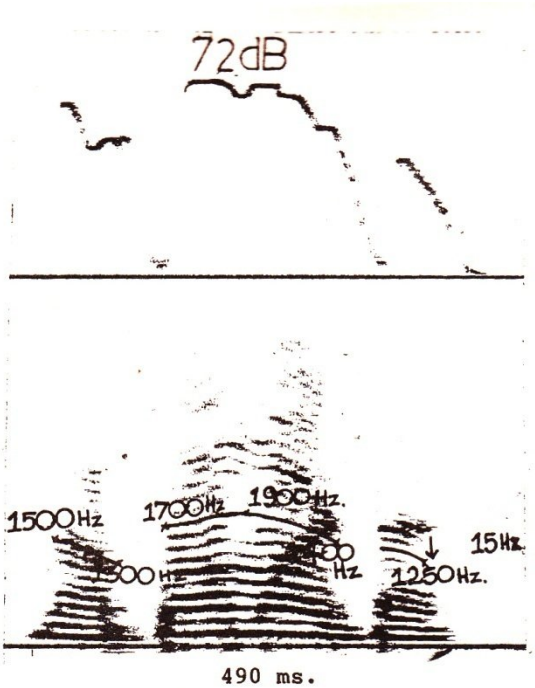
68. namba payyan!




470 ms.

3-4-'5-2↓ $Pr_3L_2T_3$

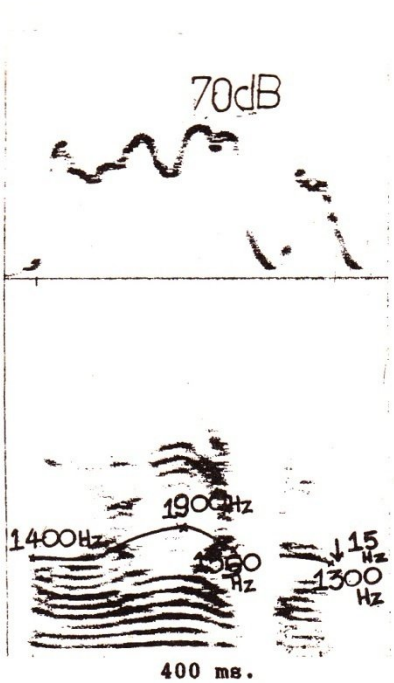
69. avan vandutta:n!




490 ms.

2-'3-2-1↓ $Pr_1L_2T_3$

70. na:n po:ma:tte:n

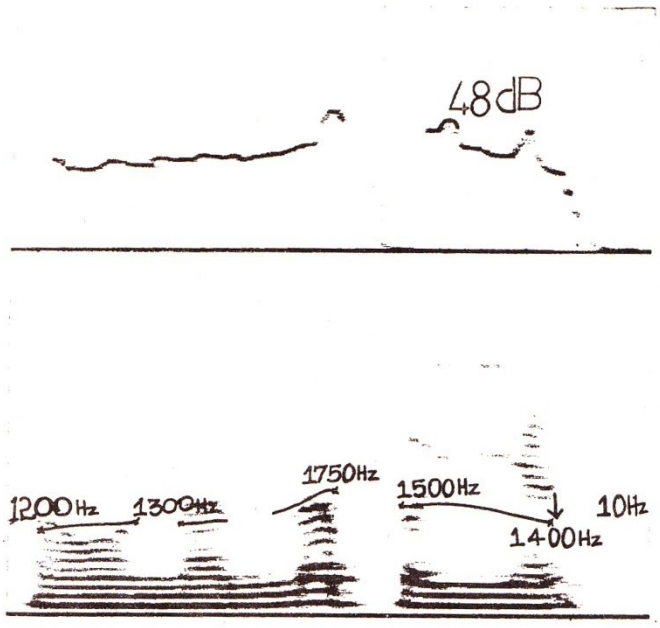



400 ms.

2-'3-2-1↓ $Pr_1L_2T_3$

71. varama:tta:n

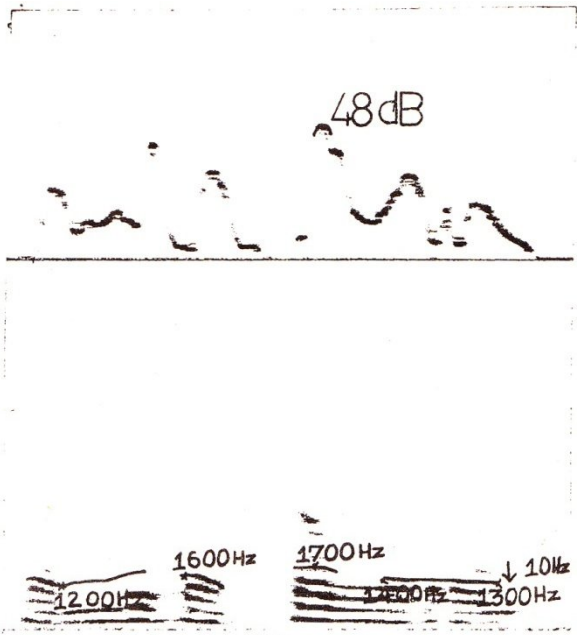
287




750 ms.

1-2-'2-1↓ $Pr_1L_1T_2$

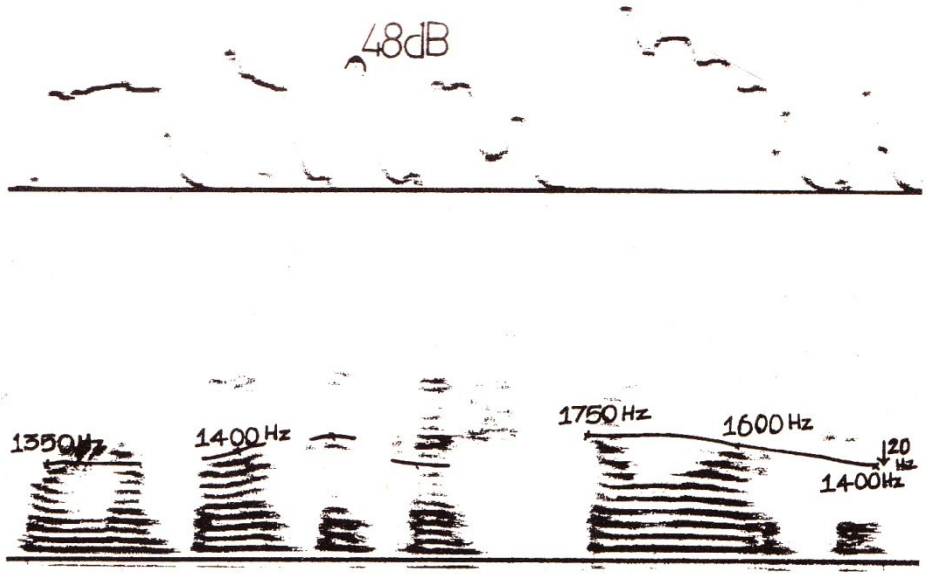
72. avan nalla payyan




690 ms.

1-2-'2-1↓ $Pr_1L_1T_2$

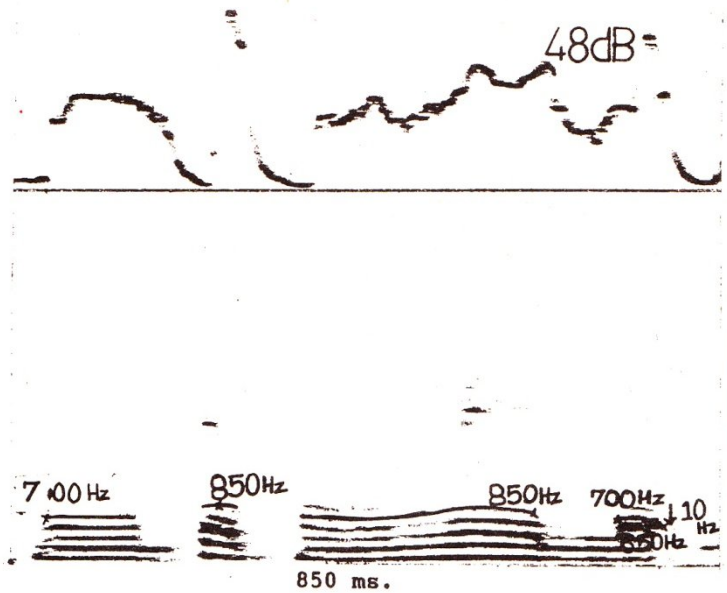
73. tambi kaṣṭapaṭra:n!




1170 ms.

1-'3-2-1↓ $Pr_1L_1T_2$

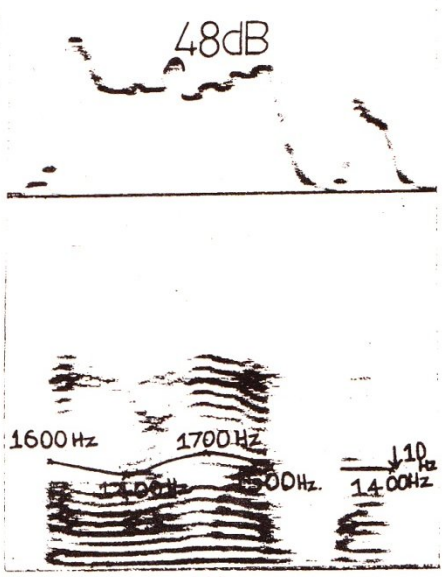
74. onne pa:kke kastama:rukku!




850 ms.

1-'3-2-1↓ $Pr_1L_1T_2$

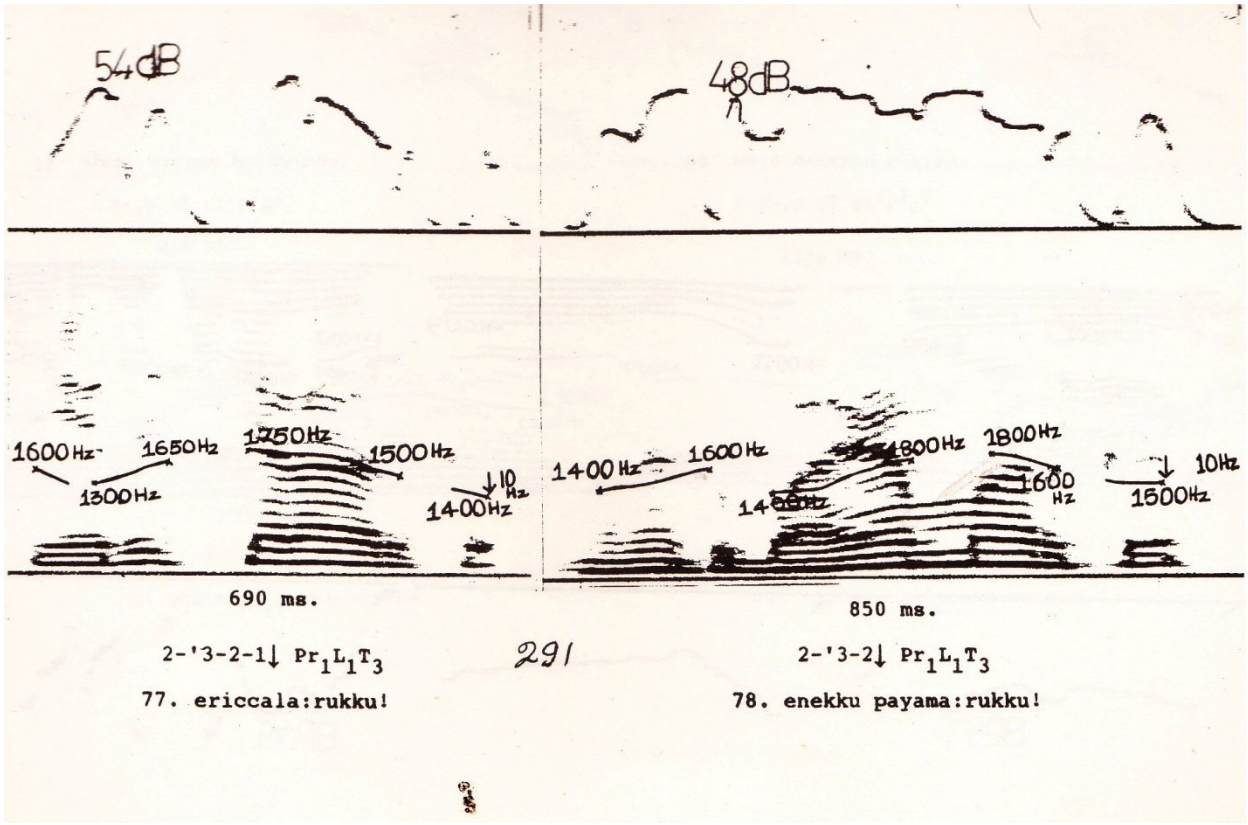
75. engitte paname ille!




460 ms.

2-'3-2-1↓ $Pr_1L_1T_3$

76. avan varama:tta:n!

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