

Manual for Correction of Intonation in Kannada Speaking Children with Speech & Language Disorders

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Abstract

Speech is highly complex and variable. The variation is fundamentally due to the pattern of execution and the intention behind the speech act. The syntactic and semantic contents of an utterance are made transparent to a listener by the feature of "Prosody". Prosody refers to the melody of speech. Prosodic features of speech may signal linguistic or emotional information. The three prosodic features, that is, rhythm, stress and intonation are the result of the interaction of suprasegmental factors such as pitch, loudness, articulation time and pause time. Disruptions of the suprasegmental and prosodic features of speech may result in affected speech intelligibility and hence, prosodic features should receive equal attention in the management of any communication disorder. Amongst the prosodic features, correction of intonation, which is defined as the "perception of changes in the fundamental frequency of vocal fold vibration during speech production" is often considered to be the most challenging and evasive in nature. There are very few methods proposed for training/correction of intonation in the literature. However, these have all been proposed for the Western languages, more specifically the English language. In the absence of any single source or reference in the available literature on correction of intonation in any of the Indian languages, the present study aimed at developing a manual for correction of intonation in Kannada speaking children. The manual is targeted for children who are above three years of expressive language age, having impaired/defective intonation due to any speech and language/communication disorder. It is prepared for the Mysore and Bangalore dialect in Kannada. MCI-K is an easy to use programmed approach meant to improve the perception of pitch contours and its associated characteristics and also facilitate the production of utterances with appropriate intonation curves/contours.

Introduction

Speech production is a human activity which is highly complex and variable. The variation is fundamentally due to the pattern of execution and the intention behind the speech act. The syntactic and semantic contents of an utterance are made transparent to a listener by the feature of 'Prosody'. Prosody, otherwise termed "Suprasegmental features" is considered as one of the most important, but highly evasive properties of spoken language (Price, Ostendorf, Sharuck, Mufnager & Fong, 1991). Prosodic features extend over varying linguistic domains such as one syllable or one morpheme or one word, or may extend over relatively longer stretches of utterances like one phrase, one clause or one sentence.

Prosodic features are the results of vocal effects which cause variations in parameters of pitch, loudness and duration in connected speech. Crystal (1969) classified prosodic features into systems on the basis of shared dominant phonetic parameters, each system covering a particular kind of variability. Prosody includes Intonation, Stress, Tempo and

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Rhythm (Heuvel, Rietveld & Cranen, 1994). Among these, the phenomenon displaying maximal linguistic contrastivity within the whole range of vocal effect has been labeled as “Intonation”.

Intonation is defined as the variation of speech pitch or fundamental frequency (F0) as a function of time (Collier, 1991). Crystal (1969) views intonation not as a single system of pitch levels, pitch contours etc., but as a complex feature of different prosodic systems, the most central (of which) are tone, pitch range, and loudness, with rhythm and tempo closely related. Intonation is not only thought of as a grammatical signal of completeness and incompleteness, but also as emotional gauges of tension and relaxation (Bolinger, 1972).

According to Cruttenden (1986), languages can be divided into ‘Tone’ languages, ‘Intonation’ languages, ‘Stress accent’ languages and ‘Pitch accent’ languages. In Intonation languages, intonation involves the occurrence of recurring pitch patterns, each of which are used with a set of relatively consistent meanings, either on single words or on groups of words of varying length. Grammatical constituents of any level, up to the level of a sentence may be treated as separate intonation groups having their own meaningful tune. Intonation groups or intonational phrases generally correspond to constituents of sentences, in a somewhat loose way. Kannada language, which is one of the major Dravidian languages, is classified as an intonation language.

Features of Intonation

Variations in pitch of voice are universal to all languages. Pitch variations form a pattern in spoken language in the dimension of time. They convey information specific to human emotion/attitude. Every language has discrete and well defined pitch patterns/intonation contours and they are significant and systematic in signifying the functional (e.g., attitudinal, grammatical etc) aspect in that language. Some intonation contours are not specific in their meaning. They give the general and causal meaning and do not show the ideas/implications of speaker’s attitude/feeling. Pike (1945) calls this as ‘colourless’/neutral/normal intonation, which serves as a baseline against which all other contours are contrastable. They simply convey meaning without any implied sense of speaker. On the other hand, some intonation contours are characterized by emotion/attitude of speakers as expensed ‘by him/her’ at the moment of speech act. That is, they give the intended meaning/notion the speaker likes to convey while conversing.

Words and sentences of language have their basic and intrinsic meaning, i.e., their lexical/grammatical meanings which are well defined in nature. The intonational meanings are added to this/superimposed on this to give subjective and idiosyncratic feelings of the speaker. This change of meaning is caused by intonation/extrinsic pitch contour. The intonation contour/pitch contour is transitory in nature and they are temporary additions to basic form and meaning of the segmental units of language (Pike, 1945).

The intonational meanings are also explicit in nature, i.e., when an intonation pattern is superimposed on basic pitch sequence (in its colourless form) a more explicit implied meaning is derived, or a change in pitch patterns adds an extra information to basic meaning of that utterance, contributing to total shades of meaning of it. Thus, keeping meaning unaffected, the emotion/attitude and any other intended meaning which the speaker chooses to convey, are made explicit by intonation.

For e.g.: ||he|| (declarative – Intonation – unmarked) type

 ||he?|| (Interrogative – Intonation – unmarked) type

 ||he?!|| (Interrogative- Intonation – Surprise) type

Therefore Intonation pattern/contour is the only device to discriminate utterances having same structure but with different implied meanings.

Many studies have indicated that the intonation of the languages can be distinguished based on some typical pitch characteristics that is based on the movement of F0 such as: (a) rise or a fall in F0 (b) extent of movement (over one or more syllables) (c) relation of the intonation contours/pitch curves with the temporal factors and (d) size of excursion (Cooper & Sorenson, 1977; Currie, 1979; O' Shaughnessy, 1979; Byrd, 1992; Hermes & Rump, 1994). Cruttenden (1986) described three main constituents of intonation in English. They are – Intonation groups, Nucleus and Nuclear tone.

1. **Intonation groups** : Otherwise called sense groups, tone groups, breath groups, tone units, phonological phrases, phonological clauses or intonational phrases divides a connected speech into different intonation group boundaries. Judgment of intonation - groups will be based either on "external criteria" (pause, final syllable lengthening, anacrusis, pitch of unaccented syllable) or an "Internal criteria" (presence of at least one stressed syllable and pitch movement to or from at least one accented syllable).
2. **Nucleus**: (Alias "tonic", alias "Primary stress"), is used to describe the pitch accent, which stands out as the most prominent syllable in an intonation group.
3. **Nuclear tones**: The pitch contour, which begin on the nucleus and cover the stretch of utterances up to the end of an intonation group. A nuclear tone involves major part of the meaning contributed by the pitch pattern of intonation group.

The intonation features in Indian languages have been addressed by very few studies. Manjula (1979), Nataraja (1981) found that in Kannada language sentences are expressed with a final fall except few sentences with emotion like 'fear' and 'anger' where a final rise is noticed. Further, Nandini (1985) reported a final fall in intonation in sentences carrying neutral, jealousy, hesitation, request and answers and a rise pattern in questions, anger, frustration, accusation, a fall/rise pattern in surprise and some anger statements. In the analytical and descriptive approach, Manjula (1997) studied the features of intonation and stress in question word (WH) and Y-N interrogatives in spoken form of standard dialect of Kannada. A general rise in fundamental frequency for Y-N interrogatives and fall for WH questions was reported. Differentiated patterns of declination and inclination were observed for Y-N and WH questions.

Along with 'Intonation', 'Stress' is also considered because many studies report correlatory changes in these two prosodic elements. Identification of stress on a syllable is considered important in determining the type of changes that follow or precede the "nucleus" in the F0 or intonation contour (Chapalaz, 1964; O'Shaughnessy, 1979; Pierre Humbert, 1980; Ladd, 1983; Hermes & Rump, 1994). Some investigators are of the opinion that the intonation of a sentence is largely determined by the position of the prominently stressed syllables (nucleus/focus) in an utterance (Pike, 1945; Mc Clure, 1980; Cruttenden, 1986). Though there is an overlap and/or diffusion in the definition of the prosodic entities of "accent", "stress", "prominence" and "emphasis", they signify a very important/prominent element in an utterance. "Stressed syllable" is defined as a syllable which characterizes any one or the combination of the following:

- Rise/lowering of pitch of a syllable
- Rise in loudness of a syllable
- Increased/decreased duration of a syllable
- Pauses
- Semantic load of a syllable

- Syntactic boundary markers and/or phrase boundary
- Any other features/ combination of the above which is perceived as 'stressed' by the judge.

The length, loudness and pitch are measurable attributes and their linguistic function is often complex. These three features contribute to give prominence to some syllables when compared with other syllables. According to Cruttenden (1986) prominences are linguistically important. They may be involved in distinguishing different lexical meanings, different grammatical classes or they may be involved in making certain syllables stand out in sentences and hence make the word containing those syllables more important. Not only are the prominences produced by some combination of length, loudness and pitch themselves linguistically important, they are also important because sequences of prominent and non prominent syllables form the framework of connected speech. In many languages such patterns of prominent and non prominent syllables produce a particular rhythmic effect. Apart from that, these patterns form the backbone of intonation. "Intonation" thus can be summarized as an attribute that concerns with which syllables are prominent, how they are made prominent and to what extent they are made prominent. It also concerns how the movement from one prominent syllable to the next is accomplished.

Dysprosody or prosody incorporating deviation or complete absence in patterns of intonation is often exhibited in various communication disorders such as hearing impaired (Parkhurst & Levitt, 1978; Monsen, 1979; Sussman & Hernandez, 1979; Formby & Monsen, 1982), developmental apraxia of speech (Rosenbek & Wertz, 1972; Tallman & Crary, 1985), cerebellar dysarthrias and hypokinetic dysarthrias (Darley Aronson & Brown, 1969b; Kent & Rosenbek, 1982). Majority of the studies have found reduced prosodic values in dysarthrics and attributed it to impairment in speech production mechanism. Scott, Caird & Williams (1984) found deficits in the ability to recognize and produce anger and interrogation in parkinsonism patients. They also have difficulty in discriminating affective and grammatical function prosody and matching speech with facial expression. There are atleast 6 prosodic deficits noticed in ataxic type of dysarthria (Darley, Aronson & Brown 1969a, 1969b). Disruptions of the suprasegmental and prosodic features of speech may result in affected speech intelligibility and hence, prosodic features should receive equal attention in the management of any communication disorder. It is often the case, however, that prosodic intervention is initiated in the final stages of therapy or not at all. Amongst the prosodic features, correction of intonation, which is defined as the "perception of changes in the fundamental frequency of vocal fold vibration during speech production" is often considered to be the most challenging and evasive in nature.

Although there are extensive attempts made to describe the nature and features of intonation deficits in disordered population, there are very few treatment suggestions available for such individuals with impaired intonation. Even those that are proposed are for the Western languages and most of the treatment programs tend to adopt a problem oriented approach rather than a holistic approach and they often focus on individual cases.

Rosenbek & LaPointe (1978) suggest that "Intonation" requires a different variety of intervention strategies incorporating both direct/indirect treatment programs. These are used to correct intonation in the speech of individuals who display a variety of disorders. There are specific recommendations made for correction of different constituents of intonation in an individual.

A. Program for treatment of Pitch Height in intonation:

Individuals with hearing impairment, motor speech disorders and voice disorders benefit from the direct treatment of pitch height. Pitch height can also be corrected in normal

speakers who wish to improve their voice or overall speaking skills. Wilson (1972) described a program for teaching different pitch height in children with voice problems. According to him changes in modal pitch level can be achieved by administering a thorough program of listening training and then teaching correct pitch level and pitch variability. The listening training sharpens pitch discrimination ability and prepares the child for specific control of pitch. Awareness of differences in pitch in the speech pathologists voice and gross discrimination on two levels can be covered quickly. The speech pathologist can then concentrate on fine discrimination of three levels-high, middle and low. These three pitch levels are based upon the child's pitch range and modal pitch level. If the child's pitch is too high, the speech pathologist selects a high level near the top of the range, which often coincides with the too high modal level. The middle pitch is carefully selected as the level to be established as the new modal level. The third level is a low level only slightly above his lowest pitch. The child is told the significance of each level: the high level is the old way to be avoided, the middle is the desired new way and the low pitch is too low to use most of the time. He recommended the use of pictures for pitch practice which can be placed in the notebook. For example, the speech pathologist can use a picture of three children standing at different heights on rocks. These can be labeled "I can talk low", "I can talk in the middle" and "I can talk high". The speech pathologist demonstrates the three levels with words, phrases and sentences for discrimination training with the child pointing to the appropriate figure.

Practice by the child himself follows listening training when he has developed good pitch discrimination. The roles of the child and the speech pathologist are reversed with the child becoming the performer and the speech pathologist the listener and judge. The child knows from his listening training the significance and meaning of the three levels of pitch and can therefore strive to produce each pitch levels. Other useful devices for identifying and establishing proper use of pitch level involve simple skits in which the child is encouraged to use the three pitch levels in impersonating characters. Puppets can be used as the basis for these skits.

B. Program for treatment of direct Pitch Variation:

Pitch variations have been targeted directly in persons with dysarthria, hearing impairment and voice disorders. Boone (1971) describes 4 steps which attempts to improve the pitch inflections and these are as follows:

- i. Listen with the patient to recorded samples of the patient's voice, contrasting these perhaps with samples of a few voices with excellent pitch variation and follow this listening with direct comment on the problem. The patient must be made aware of his lack of pitch variation.
- ii. Begin working on downward and upward inflectional shifts of the same word, exaggerating in the beginning the extent of pitch change.
- iii. Using the same source material, have the patient practice introducing pitch shifts within specific words.
- iv. Record the patient's oral reading and conversation from time to time, critically analyzing these productions with regard to his pitch variability.

C. Program for treatment of Pitch direction in intonation:

Rosenbek and LaPointe (1978) listed few steps which can be used for the modification of terminal contour. Because the contour is primarily related to laryngeal activity and secondarily to subglottal breath pressure, i.e., to respiratory forces, the first

step is to get the optimum postural adjustment for the larynx and for respiration. The second is to increase the background of effort. The third step is to provide contrastive intonational drills. For e.g. “I want to go”, “I want to go”?. The stimuli should be created for each patient depending on his/her symptoms and needs.

D. Program for treatment of Nucleus in a Pitch contour:

Contrastive stress also uses prosodic cues and stress patterns as a major facilitator to improve both speech production and prosody. This method has been used for speakers with dysarthria (Rosenbek & La Pointe, 1985) and with apraxia (Wertz, LaPointe & Rosenbek 1984). This method is found to be most effective for those individuals with mild to moderate apraxia who need to improve speech naturalness through the use of stress patterning and intonational contour in sentence production or conversational speech. The method involves having the client produce an utterance with primary or emphatic stress on a particular word. Often the stressed word contains phonetic elements that are targeted for the individual. For example, if the clinician wanted to provide opportunities for an adult with acquired apraxia to produce the word “tomorrow” in a sentence context, he or she would elicit the utterance with a question such as “Are you going out today”?. The client would then respond “I am going out *tomorrow*”. A number of elicitations using different phrases may be used, focusing on the targeted phonetic string in the same and in different word contexts. This method is appropriate only after articulatory skill has been demonstrated for the targeted phonetic string. This task helps habituate and stabilize the articulatory production with appropriate stress patterning and prosody.

The method is also effective for those speakers with apraxia needing improvement in the prosodic aspects of connected speech. The clinician would choose a number of sentences, all of which change meaning when word stress is varied. For e.g., clinician would present a picture showing a boy hitting a ball. The clinician would ask the child with apraxia “Is the girl hitting the ball”? The child would then respond “No, the *boy* is hitting the ball”. The next question might be, “Is the boy throwing a ball”? The child’s response would be “No , the boy is *hitting* the ball”. Again, it is important that the speaker is able to produce each phonetic element of the sentences and that the length of the elicited sentences be appropriate for the speaker’s linguistic and motor capabilities.

E. Program for treatment of Overall Intonation Contour:

Berry (1980) designed an approach for use with groups of children with specific language impairment. The main objectives of the program are :

1. To establish rhythmic motor movements
2. To produce rhythmic speech
3. To produce acceptable prosodic patterns that serve as the “envelope” into which the other aspects of language are produced and perceived.

The other recommended techniques are use of choral speech, metalinguistics, motor movement, modeling, pantomiming, singing, self-monitoring and dramatics to achieve the objectives. The procedure is as follows:

- a. The clients practice movement patterns that involve posture, motion, balance, locomotion and action sequences (e.g. walking, jumping rope, marching, dancing to the beat of a drum, pantomiming)

- b. The clients practice directional movements, for example, “turn right, turn left, turn around”. The clinician pairs clients who are weak on this task with clients who are strong.
- c. The clients practice pantomime sequences depicting activities of daily living such as throwing a ball or pouring a drink. As the clients progress the clinician increases the affective message in the sequence.
- d. The clinician teaches clients to pair motor movements with simple finger plays, chants, and verses. As the clients progress, the complexity of the motor movements increases. Verbalization during this activity should be encouraged but not required.
- e. The clients pair the use of specified melodies (overall contours) and gestures while performing group recitations such as mini-dramas, storytelling, role-playing, puppet plays, and the production of verse.
- f. The clinician presents situations which are designed to evoke overall intonation contours associated with
 - emotional responses
 - directives
 - announcements of skills and achievements
 - social exchange or routines

The clinician and the clients discuss the appropriateness and inappropriateness of certain behaviours and generates suggestions for change.

There are several methods proposed for training/correction of intonation in the literature. However, these have all been proposed for the Western languages, more specifically the English language. But there is no treatment package which comprehensively represents the various components that individual clinician considers as factors constituting an intonation therapy program in any Indian languages. Hence an attempt is made to develop a manual for correction of intonation in Kannada speaking children with various speech language disorders, exhibiting dysprosody.

Aim

To develop a manual in Kannada language for treatment of intonation in children with speech and language disorders above three years of expressive language age, using a “contour” approach.

Purpose of the manual:

The proposed manual is applicable for those Kannada speaking children (dialect restricted to Mysore-Bangalore region) who are above three years of expressive language age and having impaired/defective intonation.

Method

Manual for Correction of Intonation in Kannada Speaking Children with speech and language disorders (MCI-K) is structured to improve the perception of pitch contours and its associated characteristics and also facilitate the production of utterances with appropriate intonation curves/contours.

The manual can be administered soon after the identification of defective/impaired intonation in children. The sections within the manual are arranged in a hierarchical manner. Training can however be commenced from any section, depending upon the baseline speech

output level of the client. Clear instructions are given for various activities in different sections and this manual can be used by speech-language pathologists (undergraduates, post graduates and practicing professionals).

Structure of the manual

The manual is developed based on the general principles of treatment for intonation, as given in the literature. There are two components of this manual:

- Text of the manual
- Pre-recorded audio cassette with target speech elements uttered with appropriate intonation as per requirement which is modeled by a female speaker.

It follows a sequential pattern through hierarchies of tasks as follows:

- Gradation of exercises from sound level to syllables, to words and then to sentences.
- Use of simple to complex sentences.
- The utterances selected for the manual have been represented using transcription method advocated by Schiffman (1979). The same system is used throughout the manual.
- The tasks and the test stimuli are recorded in audio cassettes. The audio cassettes consist of the voice/speech samples of a model speaker (female) who is selected for this task. The targeted activities/goals in each section and subsection are recorded by a model speaker. The clinician should guide the child to imitate or model the speech utterances of the model speaker with appropriate pitch control/intonation contour as required in the task.
- Activities are made as meaningful and interesting as possible.
- In order to motivate the child and to provide more realistic contexts, the activities in various sections and subsections are supplemented by appropriate pictures.
- The clinician should use intensive systematic drill as instructed under various sections and subsections.
- Repetition of each exercise/activity has been stressed.
- Use of multiple modalities during therapy has to be incorporated.

Development of the Manual

The manual is divided into five main sections and each of these sections are further divided into subsections to improve upon and train the child in detection, discrimination and identification of specific aspects of intonation that are addressed in the main sections. The five main sections include:

Section I	:	Pitch height
Section II	:	Pitch variation
Section III	:	Pitch contour/Intonation contour
Section IV	:	Nucleus in a pitch contour
Section V	:	Emotional Sentences

Goals of each section:

Section I: Pitch Height

This section is meant for those clients with impaired intonation who present difficulty in producing the three different pitch levels, namely high, low and mid pitch, which acts as a

precursor to produce appropriate variation in pitch of the voice. This in turn will help to improve the speaking skills.

Section II: Pitch Variation

This section is meant for those clients with impaired intonation who demonstrate difficulty in varying the pitch height appropriately which is very essential for excellent speaking skills.

Section III: Pitch Contour/Intonation Contour

This section is meant for those clients who demonstrate difficulty in changing the pitch contour on the terminal syllable of the utterance.

Section IV: Nucleus in Pitch Contour

This section deals with teaching appropriate placement of nucleus in a pitch contour of an utterance depending upon the intention or the attitude of the speaker.

Section V: Emotional Sentences

This section concentrates on the correction of overall intonation contour of the utterances associated with different emotions. This is considered the final stage of treatment as it incorporates all the parameters of intonation and help to develop excellent speaking skills for those individuals with impaired intonation. The general pattern of treatment as described in this manual should be followed and more number of activities depending upon the child's abilities and interests and the clinicians' imagination and creativity can be included.

Each of the sections has 2 subsections

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| Subsection I : | Perception of the selected feature of Intonation |
| Subsection II : | Production of selected feature of Intonation. |

Subsection I in each of the sections generally consists of 3 modules namely,

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| Module A : | Detection of the selected feature of Intonation |
| Module B : | Discrimination of the selected feature of Intonation |
| Module C : | Identification of the selected feature of Intonation |

Subsection II in each of the sections generally consists of only 1 module, namely

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| Module D : | Production of Intonation |
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Each of the modules within the subsection incorporates:

- Training phase: during which the child is guided to perceive and produce the specific feature of an intonation contour. The training phase is followed by a testing phase.
- Testing phase: during which the child's ability to perform the skills that are trained is tested.

Clear instructions are given for each activity in the training and testing phases. The criterion level to proceed with training to next module during training phase and the success criteria in testing phase of each module is also specified. Repeat the exercises/activities in the training phase until a set criterion of 80% accuracy is reached. In testing phase each correct response should be scored 1 and every incorrect or no response should be scored as 0.

Similar to the training phase, in the testing phase, a set criterion of 80% correct responses should be achieved, before proceeding to the next subsection or the section.

The manual consists of picture stimuli to aid in the perception and production of appropriate intonation contours during the training and testing phases within the various sections. The tasks and the test stimuli are recorded in audio cassettes. The audio cassettes consist of the voice/speech samples of a model speaker (female) who is selected for this task. The targeted activities/goals in each section and subsection are recorded by a model speaker. The clinician should guide the child to imitate or model the speech utterances of the model speaker with appropriate pitch control/intonation contour as required in the task.

Item validity

The manual was administered on three children with Delayed Speech and Language for item validation. Subsequently the instruction and the activities were modified in the manual. Hence MCI-K is an easy to use programmed approach meant for correction of intonation in Kannada speaking children with Speech and Language disorders.

An overview of the hierarchy of steps mentioned in the manual is represented in the form of a flowchart (F1).

Conclusion

Manual for the correction of Intonation in Kannada speaking children with Speech and Language disorders (MCI-K) is developed for targeting the correction of intonation in Kannada speaking children with speech and language disorders. MCI-K is developed based on literature available on the general principles of treatment for intonation and the structure of intonation in Kannada. MCI-K is devised as a simple and easy-to-use manual for the speech - language pathologists. This manual provides step-by-step activities for the speech language pathologists. It is structured to improve the perception of pitch contours and its associated characteristics and also facilitate the production of utterances with appropriate intonation curves/contours.

Limitations

- The manual should further be tested and standardized on more number of clients with Speech and Language disorders.
- The material is limited only to sentences.
- The manual has incorporated standard Mysore and Bangalore dialect.
- The manual has been proposed for the use of children and not adults

Future Recommendations

- The manual can be tested and standardized on more number of clients with Speech and Language disorders.
- Similar manual can be developed in other Indian languages.
- A manual for correction of intonation can be developed exclusively for the use of adults with Speech and Language disorders.

A manual can be developed to target the correction of intonation at the higher linguistic constituents such as paragraphs and discourses.

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Flowchart to show the recommended steps in the manual

