

T. A. T. A TEST OF ARTICULATION IN TAMIL

Register No. 8411

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*A dissertation submitted as part fulfilment for
Final year M.Sc. (Speech and Hearing)
to the University of Mysore.*

**All India Institute of Speech & Hearing
MYSORE-570 006.**

MAY—1986

Dedicated to
my
Family and Friends

C E R T I F I C A T E

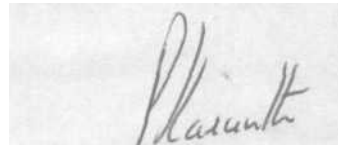
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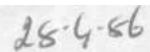
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This is to certify that this dissertation
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has been prepared under my supervision and guidance.



Guide



DECLARATION

This dissertation is the result of my own study undertaken under the guidance of Dr. Prathibha Karanth, Head of the Dept. of Speech Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree.

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Chapter-1

INTRODUCTION

It has been said, "Every time you say a word you perform a miracle". Yet those of us who use words so freely and so easily come to take them for granted forgetting that oral communication probably is the most important and most complex of human behaviours.

Oral communication is important because it is the primary means for interacting with others, for expressing feelings and ideas, for venting anxieties and frustrations, for effecting change, and for enabling one person to find out what another person is perceiving and thinking. Oral communication is complex because it involves understanding and using abstract, arbitrary symbols; it utilizes many different combinations of phonemes, morphemes, words and inflections; it integrates millions of nervous, nerve fibres, and multiple synaptic connections of the neurologic system; and it simultaneously encompasses virtually all of the bodily systems in its feedback functions.

Not only is oral communication an invaluable asset for those persons who have mastered it, but an enormous liability for those who have not. It offers freedom for great achievement but also a heavy responsibility for personal and social conduct, and it can mean success or failure to the individual.

The principal vehicle for conveying meanings, thoughts, ideas, concepts and attitudes through sounds words, phrases, and sentences is articulation. An over simplified definition of articulation 1st the adjustments and movements of speech structures and vocal tract necessary for modifying the breath stream for producing the phonemes of speech.

Impairment in oral communication due to articulation depends on a number of variables, including the person who has the impairment. No two persons with a similar articulation disorder may experience the same degree of handicap. Likewise one listener may be unaware of the presence of an articulation disorder, whereas another may be quite aware of the disorder and may be highly distracted by it. Such different attitudes may also exist among those persons having defective articulation. However, clinical experience shows that most adolescents and adults with articulation disorders are acutely aware of and bothered by their deviant articulation.

The effects of an articulation disorder may not be readily apparent to the listener but they could have far-reaching repercussions on the person's social-emotional well being, occupation, and of course, interpersonal relations. Almost 75% of all communicative disorders are articulatory disorders and makes it the cause of more human distress and suffering than any other communicative disorder, because articulation is so visible and audible, it invites judgements and penalties by listeners far out of proportion to the severity of the actual

deviation.

Articulation disorders have been defined by Powers (1971) as the "faulty placement, timing, direction, speed or integration of articulation movements resulting in absent or incorrect speech sounds", or what some would consider phonetic errors. Using a somewhat different viewpoint winitz (1969) described defective articulation as the incorrect learning of the phoneme system of the language, which is also referred to as phonemic errors. Misarticulations occur normally during the early stages of speech development. Thus, when some articulation errors occur at certain age levels, the child is not considered to have an articulation disorder. Rather use of such articulation patterns is characteristic of normal phonologic acquisition.

Roe and Milisen (1942) found that articulation continues to develop until the fourth grade. Nevertheless, it is generally agreed that by the second grade or by 7 years of age most children have acquired normal articulation as judged by adult standards. If misarticulations are regularly present after this age or if sound development is behind the expected norms, articulation is considered to be deviant.

Probably the most traditional system for classifying articulation errors describes the the nature of mis-articulations, that is, how particular phonemes are misarticulated. The types of errors include (1) substitution (2) omission (3) distortion and (4) addition. An individual with articu-

deviancies may have one or a combination of these types of errors.

A substitution is a misarticulation in which a standard or non-standard phoneme replaces the correct phoneme, for example 9 /tæt/ for /kæt/ and /θit/ for /sit/. Substitutions are relatively common and normal in speech of small children and are the most frequent type of articulation error. They are often inconsistent (Johnson et al. 1967). They occur least often in the initial position on words and most frequently in the medial and final positions.

An omission is an articulation error in which a phoneme is not produced at a place where one should occur, for eg. /kæ/ for /kæt/. Omissions are most common in the final position of words and occur less frequently in the medial position for most sounds.

A distortion is an articulation error in which the standard phoneme is modified so that it is approximated, although incorrect; the approximation is also not acceptable as a different standard sound as in substitution errors and may be considered a malphone. These occur more often than omissions in older children and adults and tend to be more consistent in usage than omissions and substitutions (Johnson et al. 1967)

An addition, is a misarticulation in which a phoneme is added, for eg. /b lu/ for /blu/. This type of error occurs quite infrequently and is not always considered an articulation error.

Assessment of Articulation:

Disturbances of speech-sound production - misarticulations- as mentioned above are probably the most common type of speech disorder. The clinician, therefore, should have a thorough understanding of articulation, and the disorders of articulation.

Here diagnosis plays a crucial role in the Management of communication. It is a difficult task for the clinician. The demand for clinical skill is as great as in any other undertaking. The concept of normality is a necessary backdrop for arriving at a diagnosis of the disorder.

The speech and language specialist should be in a position to differentiate the normal population from the abnormal group. This can be achieved through administration of tests. There are batteries of tests which can be used for detection, assessment, prediction, analysis and interpretation and research. The selection of particular tests should depend on the purpose or reason for testing a specific client.

1. Detection testing is done to find out which persons are behind developmental norms or have articulation deviations.

2. The assessment process typically proceeds with administration of an articulation test battery to determine misarticulations, missing rules and features, phonologic processes, levels, trends or patterns and inconsistencies.

3. Another possible assessment, procedure involves predic-

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tion which may help in selecting the caseload. This test tends to predict which children might outgrow their misarticulations.

4. Some articulation tests like Templin Darley Tests of Articulation, Weiss tests appear to be especially appropriate for analysis and interpretation. They provide a different but appropriate method for analysing and interpreting the obtained articulation information.

6. The final assessment procedure relates to research. These tests provide the most in-depth information regarding phonemic context from which base rate can be determined and progress measured such as in clinical research.

Purpose of Articulation Testing:

1. Screening and management.
2. Predict and make prognostic statements
3. It describes phonetic proficiency of an individual. Here the phonemes that are actually used by the individual are compared with the phonemic structure of his language group.
4. Determines if his or her speech sound system is sufficiently deviant from the norm to merit intervention.
5. Determines the direction, form and frequency of a remediation programme.
6. Observe changes due to instruction or to maturation in an individuals phonetic proficiency.

Need for the Study:

There are hardly any articulation tests in Indian languages. The present study attempts to design an articu

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lation test and establish nouns for articulatory acquisition in Tamil language using a picture articulation test.

Such a test would help in obtaining information regarding articulatory acquisition in normal Tamil speaking children. It would help in evaluation and planning therapy for speech disordered children, Such a test would be very useful in speech and hearing clinics since one of the primary concern of speech and language pathologists is to assess and improve the communication skills.

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Chapter -2

REVIEW

The discipline of speech pathology has made a unique contribution to the assessment of verbal behaviour in the development of the articulation test and related articulation assessment procedures which are clinical tools that have been developed primarily by speech and language pathologists.

The seemingly simple task of listening to a person's speech and noting errors of sound production readily opens the testing of articulation to a wide variety of approaches. Nevertheless, a concern that no speech sound be overlooked in an assessment probably motivated the creation of systematic procedures to elicit all speech sounds in an orderly fashion. A system designed to elicit each speech sound in the repertoire of a client also yielded an economy in test time. A systematic sequence of elicitation of words containing specific sounds probably takes less time than waiting for each sound to occur in spontaneous conversation. Ensuring that all speech sounds were tested in a brief span of time was perhaps the original reason for the development of tests of articulation. These were often constructed by individual clinicians.

Among the early contributions to test development beyond simple error identification, was the provision of normative data to assist a clinician in deciding whether a problem existed or not. Some attention has been recently given to establishing validity and reliability of tests.

It is axiomatic that no formal articulation test is better than the ears and the mind of the person who administers it. It is mandatory that the clinician be able to discriminate and identify what is heard when the client articulates a sound. This requires a sure knowledge of phonetics and a discriminating ear.

Present tests are an index of current professional status. As this rapidly changing profession undergoes its metamorphosis so will the tests.

Tests of Articulation:

Articulation tests are mainly grouped into informal and formal tests.

Informal tests: Since conversation is the final criterion by which we judge articulation proficiency, we should have some type of measure for sampling a client's articulation through his conversation. Spontaneous connected speech provides many different phonetic contexts and requires rapid co-articulation in its on going adjustments and changing tension. Ideally, the diagnostician has an opportunity to hear the patient as he converses with playmates and parents, if he is a child, or with peers if an adolescent or adult. The next best sample of speech is that obtained by a conversation between clinician and client.

There are some difficulties however. The first one concerns the clinician's ability to analyze all the possible errors in the client's free speech. This can usually be overcome by use of a tape recorder. The second difficulty is that if the conversation is completely unstructured in its phonetic content, the client

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may not use words containing all phonemes we want to assess. This difficulty can be circumvented if a stimulus picture or topic is used (Hutchinson '72). A final difficulty is that conversation may be too time consuming to be utilised for screening purposes.

II. Formal Tests

There are five different types of articulation tests - developmental, screening, predictive, proficiency and diagrammatic; although one test may serve more than one function.

Although there are important commonalities among persons with articulation disorders and among the disorders themselves, there are also important differences that must be considered when appropriate tests are being selected. These include age, sex, degree of severity of the disorder, purpose of referral, need of the client, causal pattern of the disorder, concerns of the family, personality and attitude of the client, level of intellectual functioning, motor co-ordination and educational, emotional and environmental factors. The rationale underlying test selection and other procedures must always be kept in mind. These selections will be based partly on client characteristics such as

(1) length (2) standardization, (3) thoroughness, (4) ease of administration, (5) appropriateness, (6) client appeal and (7) cost.

Developmental tests:

This procedure examines a child's articulation of several sounds and then evaluates the developmental status of each of the individual sounds tested. This is done by noting the age at which

the child's defective sounds are mastered by the children of the normative study.

When a child has not learned to produce a certain sound that is uttered correctly by his peers, the sound is considered to be defective in articulation.

The Hejna Developmental Articulation test is one like this. The test contains 25 items which assess phonemes in three positions in words. Sounds are listed in developmental order according to the age when children master them.

screening tests of Articulation:

The purpose is to identify persons who may have an articulation disorder; but not to describe it or make a diagnosis. The procedures are sometimes informal though formal tests are available. The aim is to detect those persons having defective articulation as quickly as possible such as entire class rooms of school populations.

Templin Darley Test has 50 items which may be used for screening. Winitz (1969) criticised it by saying that it provides only statistical normal to sort out children with deviant articulation. Bat Irwin (1972) points out that it is only a prelude to further testing.

Mc Donald's Screening test is made of the most frequently misarticulated sounds, but only the voiceless ones of cognate pairs. Such a test neglects those sounds on which child may make voicing errors.

The Kannada screening articulation test was devised by Ram Mohan Babu et al. (1972). The test consists of 54 cards each

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carrying a picture. Each picture elicits one sound or one blend, each in one position. Only selected Phonemes were tested in this test. Vowels were not tested as they are generally uttered correctly by the end of the second year.

A passage including all the phonemes of Kannada (except the aspirated ones) is included. Passage has easy readability.

Though screening tests are useful it has many limitations.

1) Most of the screening tests use limited sounds, the child may consistently misarticulate those which are not included and thus undetected during testing (2) And some children may consistently make an error on particular sound which may be corrected by themselves later. Hence selecting the child on the basis of screening test is of not much use when he may improve by himself.

Winitz (1969) suggests that the results of screening test along with the following criteria make it more meaningful.

- a) level of developmental achievement of phoneme contrast
- b) level of articulatory performance necessary for beginning school.
- c) Parental concern, if displayed.
- d) knowledge as to whether the child will correct himself.

predictive Test of Articulation:

One function of an articulation test is prediction – to determine those children who will or will not retain their early articulatory errors. The general procedure employed in studies designed to perform this function involves the selection of

- a) age levels and the interval over which the prediction is to be made.

- b) measures to be used as predictive variables.
- c) articulatory tests which will measure improvement at the end of the test interval.

A variety of measures have been selected as potentially predictive . Included are such measures as the number of articulatory error or when a stimulated with the correct production of the sound, the ability to learn other sounds and performances on speech sound discrimination tests.

Arndt, Elbert & Shelton (1971) used the degree of improvement during the first three therapy sessions as a measure of prediction of progress over 15 therapy sessions.

Sommers et al. (1961, 1967) & Irwin, West and Trombetta (1966) found that the number of sounds misarticulated has predictive value. Farquhar (1961) discovered that the articulatory discrimination skills of nursery kids did not predict their articulation development.

Predictive Screening test of articulation (PSTA) was given by Van Riper and Erickson (1973). The basic purpose of this test is to differentiate children who will master their misarticulations without speech therapy/from those who, without therapy, may persist in their's even by the time they reach III grade level. PSTA is administered to children at the I grade level. A cut off score of 39 was decided for this test.

However Winitz (1975) comments that articulation tests predict and diagnose poorly. He says that the only reliable function is of assessing phonetic proficiencie, the results of which are used to index incorrect sound production.

Diagnostic test of Articulation:

Such a test may be aged in deciding whether a child needs speech correction or not but frequently it is need with children already identified as articulatory problems to aid in prescribing the nature of speech correction. It provides detailed information about a child's ability to produce a wide range of speech sounds in a variety of positions and phonetic contexts.

Deep test of Articulation given by Mc Donald permits evaluation of speech sounds as the audible end products of a series of overlapping, ballistic movement.

It samples representatively the phonetic context in which the sound being observed might occur and provides a test long enough to permit observation of the degree of variability present in the speakers production of the sound.

A picture form (1964) a sentence form (1964) and a screening form for this test are available.

The rationale for this this was derived from Stetson (1951) who stated that the accurate possible positions for phonemes to occur are as the releasing and arresting sounds at the beginnings and endings of the breath phrases respectively. Mc Donald(1964) devised the Deep test so that each test phoneme can be assessed either proceeding or following every other possible phoneme. Mc Donald's theory holds that a speaker can achieve correct articulation more easily. When the test phoneme is presented in a constant blend than when it is presented in isolation.

The picture form the test is used with persons whose reading

ability is below third grade level. For those at or above third grade, the sentence Deep Test is used.

The record sheet provides blanks for recording types of mis-articulations and correct or incorrect articulation of the sounds tested. The progression continuum for any sound from almost never correct to almost always correct permits an evaluation of therapy. This test is widely accepted.

In Kannada diagnostic Articulation test (Ram Mohan Babu, Rathna et al. 1972) there are 112 items in three parts. Part I includes items to test the vowels, diphthongs and consonants. Part II is same as part I but the sounds are tested in different words. Part III tests blends.

In Indian languages there are no such standardized tests for articulation except the Kannada screening and Diagnostic Articulation test.

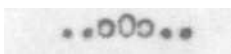
From the review of literature it is evident that articulation tests are important for assessment and moreover it gives a quantitative information which is useful for making comparisons among children being tested, as well as for pre and post treatment with-in subject comparisons.

In English language we have a number of procedures and instruments from which to choose. Each commercial test reviewed has its own strength and weaknesses. It is incumbent upon the clinician to be aware of the characteristics of each in order to be able to select which tests, or portions of them to choose for a particular individual.

The apparent nature and the severity of the clients speech and or language disorder will aid in determining which formal and informal tests to administer. The more severe the disability, the more important it is to use a battery of tests to describe.

India is a multilingual country. A test in one language cannot be used for other language. It is clear that there is a strong need for such tests in our country which would help in arriving at a correct appraisal and basis for further managements

The purpose of the present study was to construct an articulation test in Tamil and establish the norms for the same to enable to test and suggest further management procedures for Tamil speakers with misarticulations.



Chapter -3

METHODOLOGY

The clinician should have thorough understanding of how articulation tests are constructed. This is particularly true in a country like India which has many languages, in most of which there are no articulation tests. Further each language has several dialectical variations which is a factor that need consideration in articulation test construction.

It may become necessary for a clinician to construct his own test for that particular region. The clinician should therefore know what variables and procedures are to be considered in constructing an articulation test.

To completely understand the potential and limitations of a particular test too we should know how it was constructed. For, in the final analysis the clinical test is based upon the foundation of research.

First, a knowledge of the phonological aspects of that language in which the test is to be constructed is necessary. The phonemes or sub-phonemes actually used in the language should be isolated. Once the phonemes have been established, it will be necessary to determine at what age level they occur in the phonological development of a child. This is important as it will determine whether a misarticulation would be considered deviant or not.

The next step is to decide what kind of test we intend to construct. This is determined by the need for the test. we also

have to decide on

I. Methods of eliciting speech.

II. Methods of recording speech.

III. Methods of analysis.

I. Eliciting responses:

The methods of eliciting speech are very important. It is obvious that in any articulation test, the important thing is to get the subject to say something. and the way this is done is very important, as the technique selected may determine how much, if any, speech is elicited. It may also effect to a considerable degree the quality of speech obtained.

Procedures for eliciting a speech sample are

- a) connected speech
- b) sound inventories
- e) Stimulability testing
- d) contextual testing.

a) Connected speech: Since the ultimate objective of articulation remediation is correct production of sounds in spontaneous conversation, speech sounds must be assessed in some type of connected discourse. This will give a picture of the clients overall intelligibility and the consistency of individual speech sound, as long as the patient is co-operative and responsive.

The clinician may converse with the client about such things as hobbies, T.V., shows and or places the patient visited. The sample should be tape recorded so that they can be transcribed later.

Some clinicians have a client read a passage orally as an alternative method to obtain connected speech. It has been demonstrated that fewer errors will occur in such samples (Wright, Shelton et al. 1969).

Some have the client listen to a story while viewing the accompanying pictures and is then asked to repeat the story. This is designed to elicit particular phones in certain phonetic context.

Another method is having the client tell a story about a series of pictures selected to elicit target words and sounds.

While connected speech is the most valid sample of articulation there are some practical problems associated with this method.

1. Many individuals severe articulation problem may be almost unintelligible and thus it may be impossible to determine what they are attempting to say from a conversational speech sample.

2. Some children may be reluctant to engage in conversational dialogue with an unknown adult.

Thus it is an almost impossible task to obtain a spontaneous speech corpus that contains a representative sample of that language especially from children.

B) Sound Inventories: A widely used format for articulation testing is the three position sound inventory in which the client names single words in response to picture stimuli. This typically samples target sounds in initial, medial and final position of words.

The prefixes pre, inter-, and post are used to describe the location of a target sound within syllables with regard to the vocalic position.

The items can be presented in developmental sequence or in an

order that conforms with an analysis procedure.

An additional concern regarding the use of single word test stimuli is that speech does not occur in single words but rather in syllable strings. Fair Cloth and Taircloth (1970) reported that differences in the articulation errors identified have been found between single word tests and conversational speech samples. Shriberg and Kwit Kowski (1980) in a study of natural process reported a non-significant correlation between responses obtained through single word and connected speech samples.

Another problem with some speech sound inventories is that they typically elicit only a single utterance in each of the three word positions. Since the production of a sound may fluctuate widely, the clients customary articulatory pattern cannot be measured through the production of a single stimulus item (Me Donald, 1964).

These inventories often use picture to elicit spontaneous responses. In administration of this, the usual technique is to present a series of pictures to the subjects and ask him to name what he sees. Ordinarily these pictures are mounted directly or printed on cards so that the examiner can present them in order and rate desired for a particular subject.

Colour slides can also be used which will have greater appeal with children. Or the pictures may be presented through video- but the rate of presentation may be difficult to control.

The advantage of the pictures method of presentation is that they are compact and provide a wide variety of stimuli that can

be adopted to the interest and abilities of almost any child. But there are two major disadvantages: (1) it is difficult to represent isolated sounds (2) the picture sometimes fails to elicit the particular word that is desired. For Eg. picture of lips may elicit the response /mouth/. Thus the unwanted response may be elicited. This difficulty may slow down the test, But by proper selection of pictures and by careful attention to the details of presentations this can be overcome.

Imitation of a model or sentence completion can alternatively be used. Imitation generally produces more correct responses than spontaneous picture naming. However, performance may vary with age, scoring method and nature method and nature and severity of the articulation disorder.

In summary, these inventories provide an efficient and relatively easy method for obtaining a representative sample of articulatory productions.

C. Stimulability Testing:

This is another method to test the clients ability to repeat the correct form of error sounds. It consists of asking the respondent to imitate an auditory and or visual model of a sound, syllable or word containing the correct sound form.

Carter and Buck (1958) reported in a study of first grade children that stimulability testing can be used for prognostic purpose.

This testing is at best only a general guide for the identification of clients who may correct their articulation errors without intervention. The clinician must be aware that false

positive and false negative will be a problem since stimulability testing has not been shown to be a totally accurate prediction of spontaneous improvement.

D. Contextual testing: The identification of phonetic contexts where an error is produced correctly may provide the clinician with a measure of consistency.

This type of testing is primarily used to determine the direction of instruction rather than whether or not a person needs remediation. This testing is utilized to (1) measure consistency of misarticulations (2) to determine phonetic contexts in which a particular error sound may be produced correctly. This is of particular value when initiating a treatment programme.

II. Methods of recording responses:

The scoring system or transcription system used varies according to test purpose, personal preference and the transcription skills of the clinician. The type of scoring employed, however, may determine the type of analysis the clinician is able to do with data obtained, and the treatment strategies are based on type of analysis. In the least sophisticated scoring system, responses are simply scored as correct or incorrect based on the examiners perception of whether the sound produced is within the socially acceptable phoneme boundary for a particular linguistic context, such a system while it may be adequate for screening is not clearly recommended for those who are attempting a complete articulation assessment.

Van Riper and Irwin (1988) suggested the results of the examination be reduced under three heads.

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- a) general impression
- b) specific sounds:
 - 1. defective phoneme
 - 2. Type of defect
 - 3. Teat situation
 - 4. Position within a word.
- c) Variability of defective productions.

Methods of Analysis:

Different types of analysis used are:

- 1. pattern analysis
- 2. Kinetic Analysis
- 3. Phonological Analysis
- 4+ Distinctive feature analysis.

1. Pattern Analysis:

The purpose of pattern analysis is to discover the organisation underlying the sound errors within the child's phonological analysis is that it offers insight into the relationship among sound segments and the interaction between speech articulation and higher levels of linguistic organisation.

The number of segment in error may influence the direction of treatment programme.

2. Kinetic Analysis:

Perhaps the most basic type of pattern analysis consists of a place, manner and voicing analysis. In such analysis, misarticulated sounds are reviewed to determine whether similarities exist in terms of their voicing, manner of production and place of articulation. This facilitates the identification of patterns such as

voiced for voiceless sound substitutions, replacement of fricatives by stops, or the substitution of linguavelar sounds by lingua - alvelora sounds.

3. Phonological Process Analysis:

(Compton 1975, weiner 1978, Mc Reynolds & Elbert 1978, Hodson 1980, Shriver and Kwistkowski, 1980)

Phonological process may be defined as patterns of sound usage that are modifications or simplifications of the adult phonology. In terms of pattern analysis it is expected that processes will reflect similarities in what may appear to be dissimilar articulatory errors.

The following common phonological processes are seen in the normal development of children's phonology (Ingram 1976)

1. Cluster reduction.
2. Assimilatory processes
3. Syllable structure processes
4. Harmony processes.
5. Feature contrast processes.

Quantification of the occurrence of processes is achieved by calculating the percentage of instances of occurrence of a process of the total opportunities for its occurrence.

Natural process analysis: Shriberg and Kwiatkowski (1980) define this as meeting the following conditions. (1) an underlying representation is simplified at the production or surface level and (2) is present in a number of languages across the world. They identified 8 natural processes of speech. 1) final consonant 2) velar fronting 3) stopping, 4) palatal fronting, 6) liquid

simplification, 6) assimilation, 7) cluster reduction and 8) unstressed syllable deletion.

Because of the nature of the procedure for obtaining speech samples, it is more time consuming, but it can be abbreviated. A definite virtue of this process is the completeness and clarity of the instructions.

A -Distinctive feature Analysis

Only Fisher Logemann has incorporated a distinctive feature analysis into its test format.

Distinctive feature systems are binary- they describe a feature as being either present or absent. This model does not apply to articulation positioning, which has a multiplicity of points along a line. A binary system does not fit a physiologic model as complex as the movements of the mouth lips, tongue, and velum actually are. In addition the configuration of the tongue and the manner of release are critically important parameters in articulation but they are completely excluded in a binary system.

Walsh (1974) says that in some cases the distinctive feature system are not specific enough, in others; in others they are too specific.

Pollack and Rees (1972) feel that it provides a measure of the severity of the defect. This is true, but it can be misleading if applied uncritically.

Organizing the data is the next step. The data may be organized in terms of type of phonemes, phonetic categories, distinctive features and even non-segmental aspects.

Interpretation :

This is the next stage. This problem solving task is critical to making appropriate recommendations and planning effective treatment.

Standardization:

Once the test has been constructed and the procedure of administering the test is determined, the test must be administered to a certain number of normal children (subjects). This is a kind of pilot study to determine how subjects perform on the test . From the results of this study one will find out which. If any, items are too difficult or too easy for that particular age group. The test can then be suitably modified and administered to a large sample which is representative of the normal population. Norms are thus obtained for the group under consideration.

Variables affecting testing:

Johnson et al (1952) have attributed some of the variables in articulation test to (1) the subject and (2) the examiner.

Subjects articulatory performance may vary from time to time and from day to day in relation to his mood, degree of fatigue, Interest in communicating, security in speaking situation and other factors pertaining to physical, motivational and emotional conditions.

The examiner fluctuates in how critical he is and how discerningly he listens. Temporal reliability of the examiner

is another factor to be considered, at different times the observer listens differently depending upon how harried he is or how tired, or what he is timid to listen for etc. In addition to the above, the variables due to interaction of subject with the examiner also plays an important role (Winitz 1969).

Methodology of the present study:

The aim of the present study is to construct a test of articulation in Tamil which would serve as a screening test to assess the misarticulations in children.

The study was conducted in the following steps.

1. Construction of the test
2. Establishment of norms.

1. Construction of the test:

There are 10 vowels and 24 consonants in Tamil language (Appendix. 1). The selected speech sounds are as follows.

Vowels: Front vowels (i), (ii), (e) and (ee)

Central vowels (a) and (aa)

Back vowels (u) (uu) (o) and (oo)

Consonants: (p) (b) (t), (t) (d) (c) (j), (E) (g)

(s) (s) (m) (n) (n), (n), (n), (n), (l)

(I) (r) . (r) . (v) and (y)

Words with these sounds in the initial, medial and final were used. 86 words in initial position, 100 words in medial positions and 23 words in final positions were selected for the present study. In total 214 words were selected on the following criterion. The words were:

1. meaningful
2. picturable
3. unambiguous and
4. easy for the younger children to understand.

Theae words formed the overall material for the study and they are given in the appendix-ii.

Subjects:

70 literate Tamil speakers in the age ranee of 15-30 yrs. were selected as subjects for the purpose of test construction.

Method:

The subjects were given the word list and were instructed to rate the familiarity of words. Five levels of familiarity were listed as follows.

1. Highly familiar (H.f.) - words which you know the meaning of and use in every day communication.
2. Familiar (F) - words you know the meaning and use often
3. Fairly familiar (F.f)- words that you know the meaning of when given la a context and use sometimes.
4. Just familiar (J.f.)- that you come across but whose meaning you are not sure of.
5. Unfamiliar (Uf) - words which you are not at all familiar with.

The data thus obtained was analysed and those words which were rated as highly familiar by 75% of the subjects were considered for the test. whenever two or three words for the same speech sound were rated highly familiar by 75% of the subjects the most picturable word was selected.

These words were picturised in simple line drawings. These pictures formed the test material (samples given in the App.iii) This was chosen because of the advantages it has in eliciting responses from younger children for articulation testing. This point has been discussed in detail under sound inventories earlier.

II. Establishment of norms:

Before administering the test on school going population, a pilot study was done. Five children between the age of 3 and 6 were randomly selected and were given the test. Sixty five items (10 vowels and twenty four consonantal for which consistent responses were obtained were included in the final test format.

Subjects:

180 school going children in Coimbatore city in the age range of 3 to 6 years

1. whose mother tongue was Tamil and
2. who belonged to Middle socio-economic group
3. did not show any physical or sensory deformities
4. had no history of ear discharge and
5. were rated to have normal speech by a speech pathologist

were selected as subjects. They were divided into six groups on the basis of their age, each group representing a 6 month gap in chronological age; from the next eg. 3-3.6, 3.7-4 and so on. Each group consisted of 15 boys and 15 girls. This age range was selected as it has been found in most of the western studies that children acquire most of the sounds in this age range.

Test material:

The Tamil articulation test prepared consisted of sixty five items which included all the vowels and consonants of Tamil in ini-

:30:

tial.medial and final positions. Blends were not included as they are not present in that language.

Procedure for- administration of the test:

The children were instructed to name the pictures shown to them before the direct testing the children were shown four non-test cards to get familiarized with the tester and testing condition, approximately fifteen minutes were spent for each child.

The responses were elicited by showing pictures and if the child did not know the name of the picture, he was given forced choice type questions. If there was still no response he was asked to repeat the name after the examiner.

The responses were audio recorded for later quantitative and qualitative analysis. The following symbols were used in evaluation.

- a) articulated correctly ()
- b) substituted – the sound by which it was substituted was written down.
- e) distorted (d)
- d) omitted (o)

The sound was considered to be acquired at an age when 90% of the children of that particular age group articulated it correctly.

The data thus obtained was grouped and statistically analysed. Mean, standard deviation and cut-off scores were obtained.

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Chapter - 4

RESULTS AND DISCUSSIONS

The test was administered to 180 school children in the age range of 3-6 years. They were divided into 6 age groups of six months interval. The test was scored on the basis of the frequency of occurrence of the correct responses. The data was statistically treated by obtaining the mean, percentage and variance. ANOVA was used to obtain the variance. The two-way classified data were transformed using arcsine transformation. For the transformed data linear additive model was assumed.

Results are discussed under three main headings.

1. Age vs. acquisition.
2. Sex Vs. acquisition
3. Order of acquisition of the sounds.

In general it was found that there existed a significant difference between sexes at 1% level, significant difference between the performance in different age groups was not noticed at 6% level.

The mean articulation scores, percentages and S.D. for different age groups were calculated and are given for boys and girls separately in Table IA and IB.

TABLE I A (Boys)

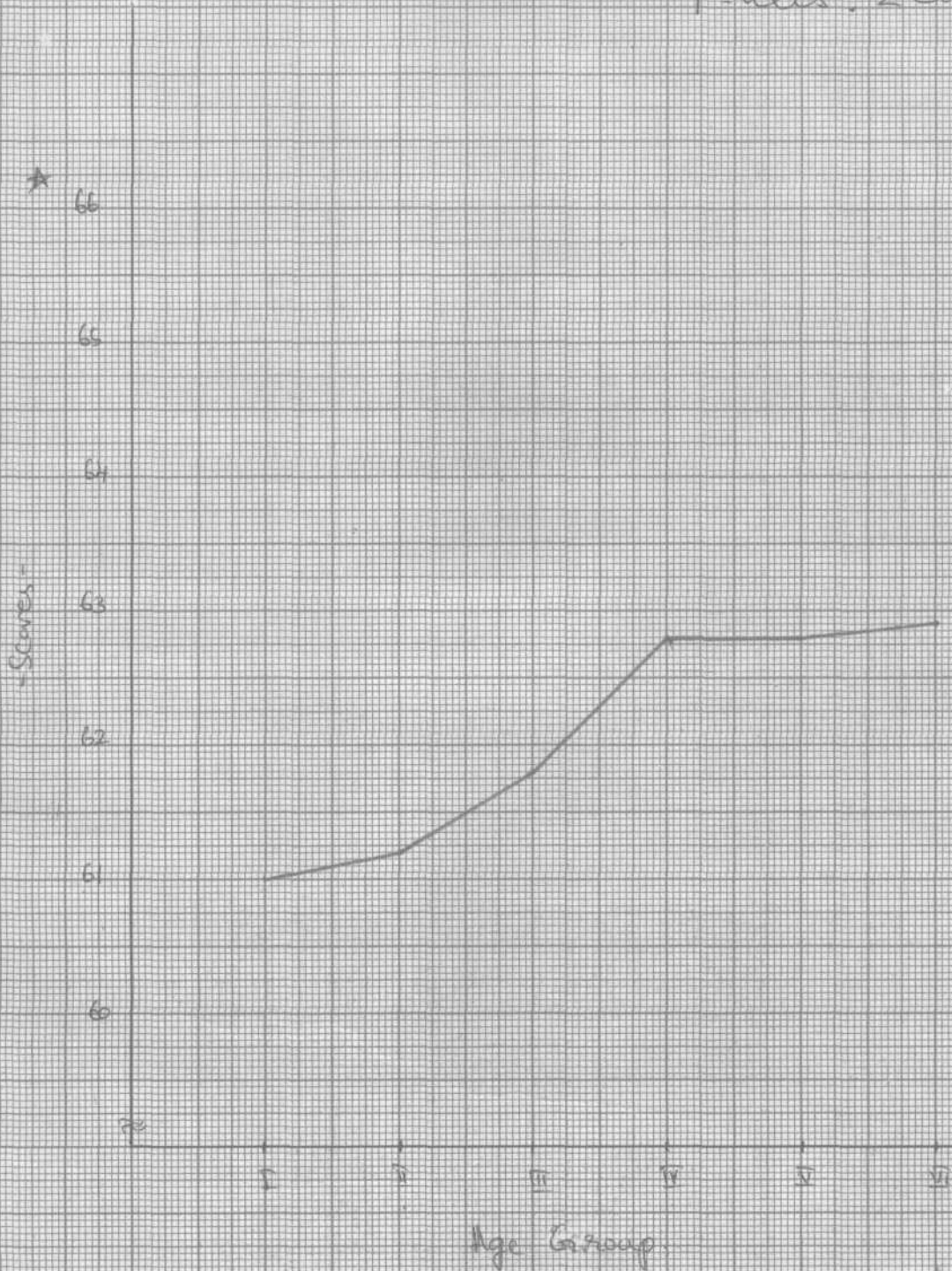
Group	Age range	Mean	%	S.D.
I	3.0 - 3.6	61.00	92.51	2.56
II	3.7 - 4.0	61.06	92.52	2.46
III	4.1 - 4.6	60.53	91.71	4.66
IV	4.7 - 5.0	61.93	93.83	2.28
V	5.1 - 5.6	62.53	94.74	2.41
VI	5.7 - 6.0	63.06	95.55	2.25

Graph I

Mean Articulation score for different age groups (combined)

scale X-axis: 2 cm - 1 grp

Y-axis: 2 cm - 1 score



* Maximum Score Obtainable on the test

Graph II

Mean Articulation score for different age groups.

Scale x-axis - 2cm - 1 Group

y-axis - 3cm - 1 score

— Boys

— Girls

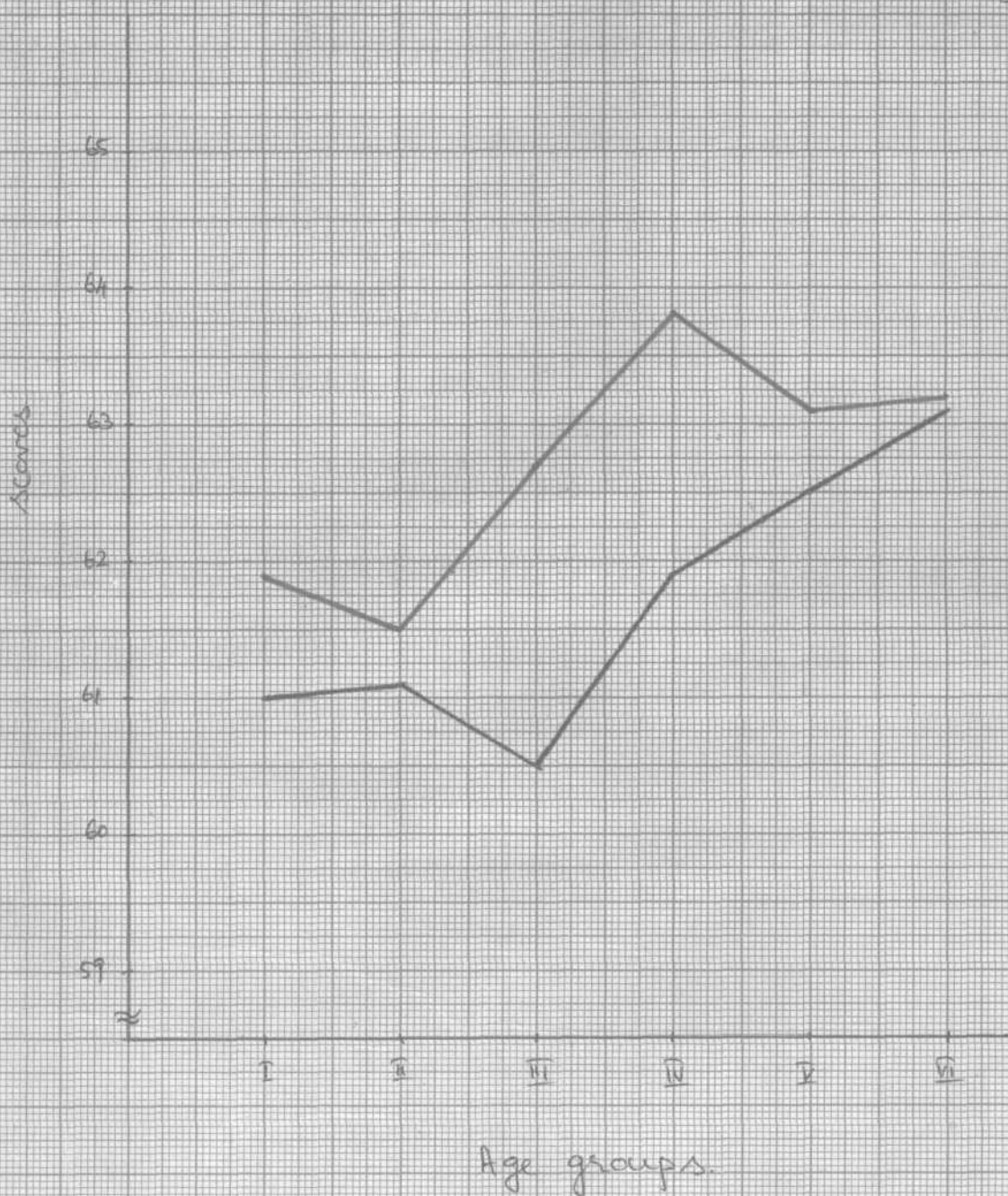


TABLE I B (Girls)

Groups	Age-range	Mean	%	S.D.
I	3.0 - 3.6	61.8	93.73	1.78
II	3.7 - 4.0	61.53	93.22	2.03
III	4.1 - 4.6	62.73	95.25	2.65
IV	4.7 - 5.0	63.8	96.66	1.82
V	6.1 - 5.6	63.13	95.55	2.35
VI	5.7 - 6.0	6S.66	94.94	2.16

1. Age vs. Acquisition:

The articulation score was directly proportional to the age in that the scores increased as the age advanced. Graph I and Table II show the articulation scores in different age groups. It was observed that in the combined score (Graph II) that there is gradual increase from group I to III and then sudden increase from group III to IV, and then onwards there is very insignificant increase.

TABLE II

Group	Age range	Mean score (combined)
I	3.0 - 3.6	61.4
II	3.7 - 4.0	61.29
III	4.1 - 4.6	61.63
TV	4.7 - 5.0	62.86
V	5.1 - 5.6	62.83
VI	5.7 - 6.0	62.86

The findings of Wellman (1931) Poole (1934) and Templin (1957) as shown in Table III, indicated that "phoneme" development is correlated with age in that some sounds are mastered, earlier than others.

TABLE III

Sound	Templin	wellmen	Poole
m	3	3	3.5
n	3	3	4.5
ng	3	_0	4.5
P	3	4	3.5
f	3	3	5.5
h	3	3	3.5
w	3	3	3.5
y	3.5	4	4.5
k	4	4	4.5
b	4	3	3.5
d	4	5	4.5
g	4	4	4.5
r	4	5	7.5
s	4.5	5	7.5
ah	4.5	-P	6.5
ch	4.5	5	-b
t	6	5	4.5
th	6	_0	7.5 ^a
v	6	5	6.5 ^a
l	6	4	6.5
th	7	-b	6.5
z	7	5	7.5 ^a
zh	7	-b	6.5
j	7	6	-b
hw	-0	_0	7.5

o sound was tested but was not produced correctly by 75%
at the oldest age tested

a - Reports shifts in those sounds

b - sound not tested or not reported.

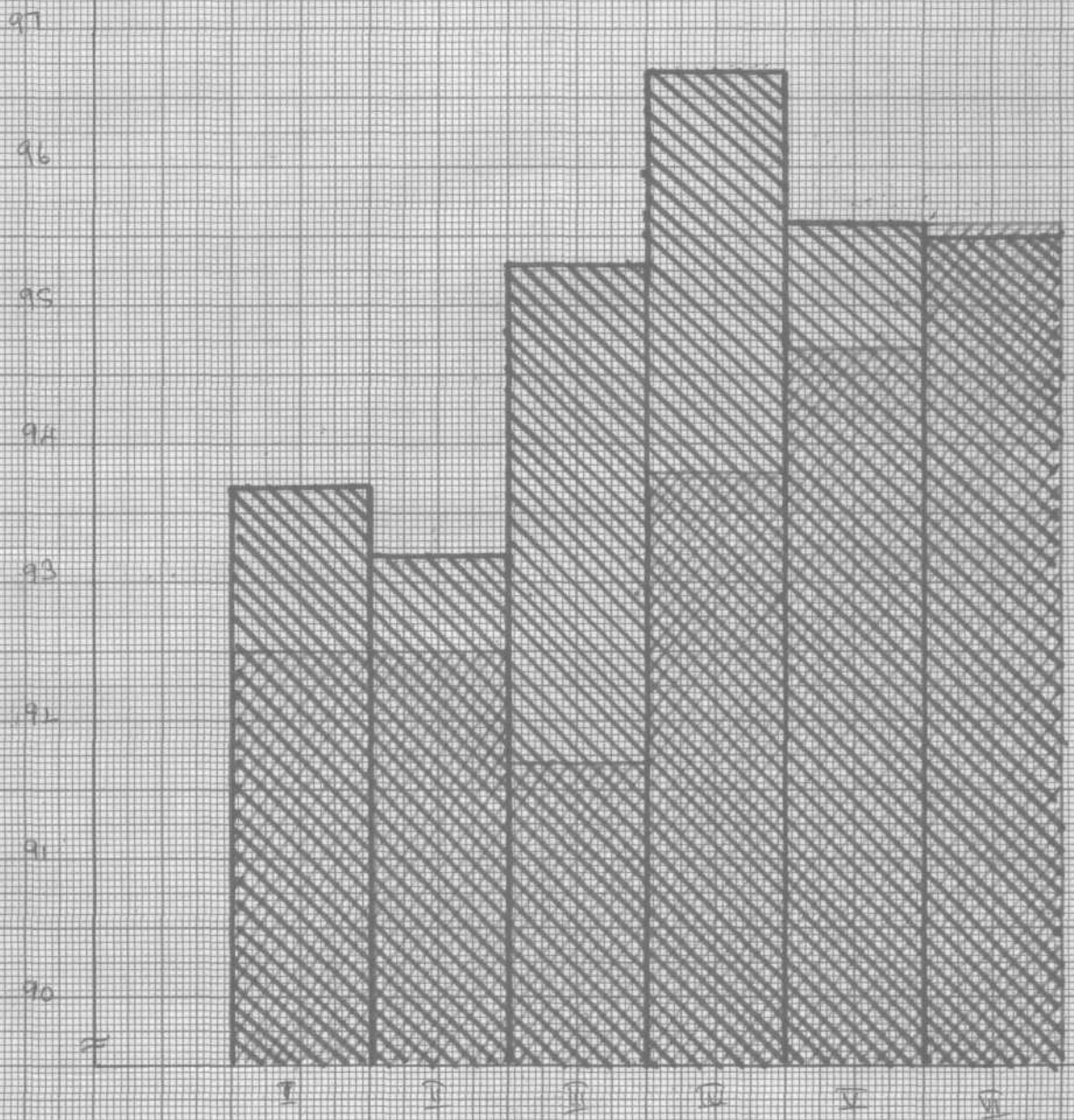
Percentage of scores in different age groups

scale: x axis: 2 scale = 1 grp

y axis: 2 scale = 1 score

▨ Boys

▩ Girls



The results of the present study confirm those of the above in that articulation increased with age.

It is evident that because of the increasing maturity all motor skills increased as the age increased. So also the articulatory skills.

2. Sex vs. acquisition:

The difference between male and females in terms of articulatory skills were found to be significantly different at the level of 5% as given in Table IV. Females exhibited superior articulatory skills when compared to the male population in all the age groups as shown in graph II and graph III. In general the articulatory skills increased.

The articulation score varies differently in both the sexes. In males the articulation score decreased between the group II and III and from then on there was a continuous increase in the articulation scores. In females the articulation score reduced between group I and II and IV and V. There was steep increase of score observed between groups II and IV

Roe and Millson (1942) and Winitz (1959a) reported no significant difference between articulatory skills of males and females.

Perkins (1977) and Winitz (1969) stated that sex is a minor variable in the development of articulatory skills. Perkins stated the resultsare conflicting, differences reported are small and they are virtually non-existent in well controlled studies.

Perkins (1978) states that although the sex of a child does not appear to be a factor significantly females do tend to be slightly advanced of males in articulatory acquisition at certain age.

Table V

	3 yrs	3.6 yrs	4 yrs	4.6 yrs	5 yrs	5.6 yrs	6 yrs.	
STOPS	P							
	b							
	t							
	s							
	d							
	h							
	g							
	k							
	c							
	q							
	FRICATIVE	ʃ						
		ʒ						
m								
n								
ɱ								
ɲ								
ɳ								
l								
LATERALS		ʎ						
		ʟ						
FLAPS	ɾ							
	ɽ							
TRILL	ʀ							
FRICATIVE-	v							
CONTINUED	w							

Chart showing the age of articulatory acquisition of the sounds by 90% of the children and above

TABLE IV

SV	DF	SS	MS	F-Ratio
Age group	5	S ₂ : 492.6	M ₂ : 98.92	3.21**
Sex	1	S ₁ : 147.8	M ₁ :147.8	4.8*
Interaction		S ₃ :148.6	M ₃ :29.72	0.97NS
error		S ₄ :5174.29	M ₄ :39.8	-
Total	179	s -	-	-

Templin (1963) has suggested that this variable is probably of little significance. According to him many of the differences are because of the increasing equanimity of the speech environment.

In the present study the difference between the males was significant at the level of 5%. However to arrive at any conclusion the experiment needs to be repeated on a larger population.

3. Order of acquisition of Sounds

It was generally observed at all the vowels and most of the consonants except / ɕ / (voiceless retroflex), / ɻ / (retroflex lateral), / ɻ / (voiced retroflex palatal lateral) and / r / (voiced alveolar flap) were acquired by the age of 3 yrs. Table V shows the development of consonants in 3 to 6 yrs. old Tamil speaking children. Articulation development for a particular sound was assumed to be completed, if 90% of the children articulated then properly.

These results of the present study were compared with the studies of Templin (1957), Wellman (1931) and Tasneem Banu

(1977) to see whether the order of acquisition was similar in English and Kannada.

An examination of Table VI reveals that the age of acquisition for different sounds is approximately the same when compared with the other three studies, but there are few discrepancies.

The fricative / ζ / was not acquired by children in the present study even at 6 yrs., but in the study of Templin (1987) it was acquired at 4.5 yrs. and in that of Tasneem Banu (1977) it was acquired at 5.1 yrs. This may be because the Tamil phonemic system does not comprise of this sound and it is a borrowed sound. The sounds acquired are discussed separately under six groups: stops, fricatives, laterals, flaps, trill and fricative continuant.

Stops: In general all the stops in this study were acquired by the age of 3 yrs. similar results were seen in the study of acquisition of articulation in Kannada by Tasneem Banu (1977). But they were acquired earlier when compared to the Templin(1957) and wellman (1931) studies.

Among the stops, the voiceless retroflex / ζ / was acquired at an earlier age (3 yrs) in the present study when compared to the studies of Templin (1967; 4½ yrs) and wellmans (1931: 5 yrs.)

The voiced retroflex / d / was found to be acquired by 3 yrs which was early when compared to that reported by Tasneem Banu, 1977(3½ yrs), Templin, 1957(4 yrs) and wellman 1931 (5 yrs.)

TABLE -VI

SOUND	Age of Acquisition		In Indian Language	
	Templin	Wellmen	Tasneem Banu	Present study
m	3	3	3	3
n	3	3	3	3
ng	3	★	#	#
p	3	4	3	3
f	3	3	#	#
h	3	3	★	#
w	3	3	#	#
y	3.5	4	3	3
k	4	4	3	3
b	4.3	3	3	3
d	4	5	#	3
g	4	4	3	3
r	4	5	4.6	★
s	4.5	5	3	3
sh	4.5	#	5.1	6
ch	4.5	5	3.7	3
t	6	5	#	3
th	6	★	3	#
v	6	5	★	3
l	6	4	3	3
th	7	#	#	#
z	7	5	#	#
zh	7	#	#	#
j	7	6	3	3
hu	★	★	#	#

: 50 was tested but was not produced correctly by
90% of the subjects at the oldest age tested

Sound was not tested or not reported.

Similar results were seen for /c / and / j / which were acquired at the age of 3 yrs. in the present study. These were acquired late in English. In the study by Templin (1957), at the age of 4.5 yrs. and 7 yrs. in Wellman (1931) stud at 5 yrs. and 6 yrs. In English these two speech sounds are considered as affricates whereas in Tamil they are stops, which may be a reason for their early acquisition.

Fricatives: The acquisition of 2 fricatives varied widely * for voiceless alveolar fricative / s / the difference in acquisition in Kannada and Tamil was not much. * /s/ was acquired at the age of 3 yrs.

In Tamil / ʃ / occurs only in initial and medial positions whereas in English it occurs in initial, medial and final positions. It was noted that / ʃ / was acquired late (6 yrs.) in the present study when compared to the studies of Templin (1967) at 4.5 yrs. and Tasneem Banu (1977) at 5.1 yrs.

This late acquisition may be attributed to the phonetic system of Tamil which originally does not include / ʃ /. It is a borrowed sound.

Nasals: In general it was noted that all the nasals were acquired by 3 yrs, which is found to be same as in Western studies.

Laterals: There are three laterals in Tamil Voiced alveolar lateral / l / voiced retroflex lateral / ɭ / and voiced retroflexed palatal lateral / ɻ / .

/ l / was found to be acquired earlier (3 yrs) when compared to English speaking children.

/ l / occurs only in medial and final positions in Tamil language. Medially it occurs as a single consonant between two vowels. Even though this sound was acquired earlier it was not

produced consistently till the 6 yrs. of age.

/ l / occurs only in medial and final position. This is not found in the Indo-Aryan languages and English. This was not acquired till the age of 6 yrs. Because of the fine adjustment of the tongue required for the production of laterals it may not be possible for the child to acquire it earlier.

Kumudavalli (1973) found that the distinction between alveolar and retroflex sounds were the last to be acquired both in reception and production.

Flaps: Voiced alveolar flap / r/ was not acquired till 6 yrs which is comparatively late when compared to other studies. In the studies of Templin (1957) it is acquired at the age of 4 yrs; in wellmsn (1931) at the age of 5 yrs. and in the study by Tasneem Banur (1977) at the age of 4.6 yrs.

This sound occurs in all the position in Tamil. In the initial position it was found to be consistently correct at the age of 6 ys. However in medial and final position it was not found to be acquired even at the age of 6 yrs. This was found to be substituted, / t / and vowel / o/, and generally / r/ were omitted in the final position. Trill / r/ is a voiced alveolar sound, This occurs only in word medial position as a single consonant between two vowels. This sound is not found in Indo Aryan languages and English. Even / r / was found to be substituted by / t /.

Fricative continuants voiced bilabial fricative continuant / v / and / y / were acquired earlier in Tamil.

/ v / occurs in initial and medial position. In the study of

Templin (1957) it is found to be acquired at 6 yrs. in the study of Wellman (1930) it was found at the age of 5 yrs. and in the study of Tasneem Banu (1977) it was not acquired till the age of 6½ years. In Kannada even though this sound was acquired in the younger age group, it was not articulated consistently till 6½ yrs.

Generally it was found that sounds which were not acquired by the children were either substituted or omitted, no errors of distortion were observed.

The earlier phonological acquisition in Tamil speaking children may be attributed to the culture. As the same is observed in Kannada also it may be possible that the eastern population earlier in phonological acquisition than the western population.

It may also be that the Tamil speaking school going children acquire it earlier as against other Tamil speaking children.

To arrive at any conclusion regarding this, further study need to be conducted in different parts of Tamil Nadu involving different dialect.

About the test itself:

The test as such is found to be very useful. None of the pictures were found to be ambiguous.

It is easy to administer and can be completed within 16 minutes.

Young children needed to be prompted to elicit the words.

The cut-off scores are given in percentage in the Table VI.

TABLE VI

Group	Age range	Boys	Girls
I	3.0 -3.6	92.57	93.73
II	3.7 -4.0	92.52	93.22
III	4.1 -4.6	93.71	95.25
IV	4.7 -5.0	93.83	96.66
V	5.1 -5.6	94.74	95.55
VI	5.7 -6.0	95.55	94.94

However to us it us a diagnostic test it needs to be standardised on larger population.

It was found that most of the Tamil sounds in the present study were acquired by 3 yrs. Hence it could be suggested that children below 3 yrs. need to be tested in detail for misarticulation.



Chapter-5

SUMMARY AND CONCLUSION

This study was carried out to design an articulation test in Tamil for diagnostic and therapeutic purposes, since no such standardized tests are available.

Ten Vowels and Twentyfive Consonants of Tamil were selected for the present study. Two hundred and fourteen words with these sounds in various word positions, which were picturable and unambiguous were selected and a word list was prepared. This list was administered to Tamil speakers in the age range of 18-30 yrs. for familiarity ratings. 5 point rating scale was provided. The words which were rated as highly familiar by 75% of subjects were considered for the test. These words were picturized on cards of 4" x 3" size to make the test.

For obtaining the normative data this test was administered to 180 normal school children in the age range of 3-6 yrs. selected from different schools of Coimbatore City. They were divided into six age groups of six months interval each. The cards were visually presented to elicit oral output. These responses were recorded manually. Audio recording was also done.

The data for each age group was statistically analysed. Mean and cut-off scores were obtained. ANOVA was used to obtain the variance.

It was found that performance varied from one age group to another. As the age increased the scores also increased.

:44:

The difference between male and females in terms of articulatory skills were found to be significantly different. Females exhibited superior articulatory skills when compared to males, except for a slight decrease between V and VI groups.

It was observed that all the vowels were acquired by the age of 3 years. Most of the consonants were acquired by the age of 3 years except fricative / ʃ / laterals ɭ and / ɮ /, flap / r / and trill / ɽ / .

/ ʃ / was acquired at 6 years / ɮ /, / ɭ / / r / were not completely acquired by 6 years even though they were found in the younger groups. / ɽ / was acquired by 4½ yrs. Most of the misarticulated sounds were either substituted or omitted. No errors of distortion were observed.

When compared with the Western studies it was noticed that eastern population acquired speech sounds earlier.

The early articulatory acquisition in Tamil speaking children may be attributed to cultural differences.

The cut-off scores for all the age groups are provided.

In general the pictures used in this test were found to be of use. None of them were ambiguous which indicates that the test can be used as a diagnostic articulation test. However before using it as a diagnostic test further standardization of the same is necessary. This warrants further study in terms of the following.

:45:

1. Standardization of the test on large population
- 2+ Administration of the test to Tamil speaking Children with different dialects to find out the dialectal differences.
3. Collecting data for the test below age of 3 yrs.
4. Studying farther variables in acquisition of articulation like socio-economic status, birth rank, intelligence, laterality auditory discrimination etc.
5. Administering the test of articulation to the clinical population, to test the validity of the test.

It can be concluded that the present articulation test in Tamil would be found helpful in finding out the articulation problems, planning and choosing therapy techniques and in estimating prognosis.

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BIBLIOGRAPHY

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Appendix- 1

a. The vowel phonemes are given in the following chart

	FRONT		CENTRAL		BACK	
	Short	long	Short	Long	Short	Long
High	i	ī	a ā		u	ū
mid	e	ē			o	ō
low						

b. The consonants are given in the chart below:

	Bilabial		Labio	Bental	Alveo	Retro	Palatal	Velar	Glottal
	Vd	VI	Dental	Vd VI	lar	flex	Vd VI	Vd VI	Vd VI
					Vd VI	Vd VI			
Stops	b	p			t	d ɖ	j c	K K g	
Frica- tives					s	ʃ			h
Nasals	m			<u>n</u>	n	ɳ	ɲ	ŋ	
Laterals					l	ɭ + ɮ			
Flap					r				
Trill					r				
Friction less con- tinuents			v				y		

Vd - Voiced

VI - Voiceless

+ - Voiced retroflexed palatal lateral

o - lax velar stop

* APPENDIX *

Appendix- 1

a. The vowel phonemes are given in the following chart

	FRONT		CENTRAL		BACK	
	Short	long	Short	Long	Short	Long
High	i	ī			u	ū
mid	e	ē			o	ō
low			a	ā		

b. The consonants are given in the chart below:

	Bilabial Vd VI	Labio Dental	Rental Vd VI	Alveo lar Vd VI	Retro flex Vd VI	Palatal Vd VI	Velar Vd VI	Glottal Vd VI
Stops	b p			t	d t	j e	K k g	
Frica- tives				s	ʃ			h
Nasals	m		<u>n</u>	n	ɳ	ɲ	ŋ	
Laterals				l	l+ɭ			
Flap				r				
Trill				<u>ɾ</u>				
Friction less con- tinuents		v				y		

Vd - Voiced

Vl - Voiceless

+ - Voiced retroflexed palatal lateral

o - lax velar stop

Appendix - 11

List of words given for familiarity ratings.

Instructions:

This is a test to rate the familiarity of a few Tamil words. Please go through the words carefully and mark the degrees of familiarity as follows:

Highly familiar (H.f.): Those words which you know the meaning of and use it in every day communication

Familiar (F): Those words you know the meaning of and use it.

Fairly familiar (F.f): Those words you know the meaning of when given in context and use it sometimes.

Just familiar (J.f): Those words you come across but not sure of its meaning.

Unfamiliar (U.f): Those words which are not at all familiar.

Name :

Age :

sd	No	Words	H.f	F	F.f.	T.f	u
a-	1	அணிலம் anil					
	2	அடுப்பு adupu					
	3	அண்ணம் annam					
	4	அம்பு ambu					
	5	அல்லி alli					
-a-	6	பட்டம் padam					
	7	கத்தி katt _i					
	8	மரம் maram					
	9	நகம் nagam					
	10	கண் kan					
ā-	11	ஆமை āmay					
	12	ஆடு ādu					
	13	ஆறு āru					
	14	ஆப்பிள் āppil					
	15	ஆரஞ்சு ārañju					
-ā-	16	பாம்பு pambu					
	17	மலை mālay					
	18	மாங்காய் māngāy					
	19	கால் kāl					
	20	மான் mān					
-ā	21	நிலா nilā					
	22	பலா pala					
	23	ஆயா āyā					
	24	ரோஜா rōjā					
	25	புரா purā					
i	26	இலை ilay					
	27	இரண்டு irandu					
	28	இஞ்சி iñji					
	29	இரகு iragu					
	30	இட்லி itli					
-i	31	கொடி kōli					
	32	செடி cedi					
	33	இட்டி itti					
	34	எணி ēni					

sd	NO	Words	H.f	F	F.f	J.f
i-	35	இ	i			
	36	இ.சீ.சீ.மரம்	iccamarai			
	37	இ.சீ.சீ.	isan.			
-i-	38	விடு	vidu			
	39	விடு விண்ணை	vinay			
	40	விபம்	vi bam			
	41	மின்	min			
	42	ஜிப்	ji p			
-i	43	தி	ti			
	44	தினி	teni			
u-	45	உரல்	ural			
	46	உடடு	udadu			
	47	உலக்கை	ulakka			
	48	உருள்கியும்டு	urulay kilangu			
	49	உப்பு	uppu			
-u-	50	முடி	mudi			
	51	குடை	kuday			
	52	புஜம்	bujam			
	53	புல்	pul			
	54	முடி	mul			
ū-	55	உசி	usi			
	56	உர்	ur			
	57	உர்ஜல்	urnjal			
	58	உர்ஜல்	urjal			
	59	உர்ஜல்	urugay			
ū-	60	கூரை	kuray			
	61	நூல்	nul			
	62	முட்டை	muttay			
	63	சூரியன்	suriyan			
	64	பூச்சி	pucci			
e-	65	எரம்பு	erumbu			
	66	எரமை	erumay			
	67	எலி	eli			
	68	எடு	edu			

	69	என்று	eḷḷu
-ē-	70	ஏய்ய	ēḷay
	71	ஏலு	ēḷu
	72	ஏலக்காய்	ēḷakkāy
	73	ஏசு	ēsu
-ē-	74	தேர்	tēḷ
	75	தேர்	ter
	76	தேய்க்காய்	tēngāy
	77	தேனி	tēni
	78	சேய்ய	sēlay
o-	79	ஒண்ணு	onnu
	80	ஒட்டகம்	oḷḷagam
	81	ஒட்டை	oḷḷadai
	82	ஒட்டியாணம்	oḷḷiyanam
	83	ஒன்பது	onbadu
ō-	84	ஒண்ணாணி	ōṇan
	85	ஒடு	ōḍu
	86	ஒட்டு	ōḷṭu
	87	ஒடம்	ōḍam
	88	ஒடை	ōḍagi
k-	89	கடவு	kadavu
	90	கண்	kaṇ
	91	கை	kai
-k-	92	கக்காய்	caḷḷakāy
	93	உலக்கை	ulakkai
	94	கத்தரிக்காய்	kaṭṭarikkāy
	95	வெண்டைக்காய்	veṇḍaykkāy
	96	நெல்லிக்காய்	nellikkāy
-g-	97	குரங்கு	kuṇṅgu
	98	சங்கு	saṅgu
	99	சிங்கம்	siṅgam
-k-	100	நகம்	naḷam
	101	புத்தகம்	puṭṭakam
	102	முகம்	mukam
c	103	சேவி	sevi

	104	ഈവി	eāvi
-c-	105	പാപ്പായ	paecay
	106	പുക്കി	pūcci
	107	കുക്കി	kucci
	108	പിപ്പായ	piccay
j-	109	ജാന്നൽ	jannal
	110	ജാദി	jadi
	111	ജാലാദയ	jalladay
-j-	112	ബുജാമ	bujam
	113	മാന്ജാൽ	mañjal
	114	പാഞ്ചു	pañju
-č-	115	പാട്ടാമ	paṭṭam
	116	കാട്ടു	kaṭṭu
	117	പുട്ടു	puṭṭu
	118	കാട്ടിൽ	kaṭṭil
	119	കൊട്ടിൽ	koṭṭil
d-	120	ദാപ്പാ	dappā
	121	ദാമാരാം	damāram
-d	122	കാദയ	caḍay
	123	വാണ്ടു	vaṇḍu
	124	കാദയ	kaḍay
	125	സുദാമ	sūdam
č-	126	താമാരായ	tāmaray
	127	താരാസു	tarāsu
	128	കാവായ	kaḷalay
	129	കാട്ടാ	kaṭṭā
-č-	130	പാട്ടു	paṭṭu
	131	പൊട്ടാൽ	poṭṭal
p-	132	പുലി	puli
-p-	133	കാപ്പാൽ	kappal
	134	പാപ്പാ	pāppā
	135	കിക്കു	ciḱḱu
	136	കാറുപ്പു	karuppu
	137	പാപ്പാലി	pāppāli
-b-	138	കാമ്പു	kaṁbu

	139	செம்பு	cembu
	140	கரும்பு	karumbu
	141	ஏறும்பு	erumbu
b-	142	பொம்பை	bommay
ச-	143	சார்பு	šart
S-	144	சுத்தியல்	suttiyal
	145	சிலந்தி	silandi
	146	சுப்பு	suppu
-S-	147	காசு	kāsu
	148	காராசு	karāsu
	149	பாத்தாசு	paṭṭāsu
	150	முத்தாய்காசு	muṭṭaykāsu
-n-	151	நுங்கு	nuṅgu
-n-	152	பாநாமி	panāmi
	153	பாத்தாமி	paṭṭāmi
	154	வாந்தி	vandi
	155	வாந்தியல்	vandiyal
-n	156	பென்	pen
	157	மாந	man
n-	158	நாதி	nadi
	159	நாய	nāy
	160	நாக்கு	nāṅku
	161	நாந்து	nāndu
	162	நிலாமி	nīlāmi
-n	163	சாநால்	šannal
	164	காநாமி	kannāmi
-n	165	வாநாநா	vannān
	166	ராசிகா	rašikan
-n-	167	காநாமி	kaṅṅi
	168	பாநாமி	panāmi
m-	169	மலாய	malay
	170	மலாய	malay
-m-	171	கரும்பு	karumbu
	172	ஏறும்பு	erumbu
-m	173	பாநாமி	panāmi

- <u>l</u> -	174	പുലി	pa <u>l</u> am			
	175	കളുത്തു	ka <u>l</u> u <u>l</u> ay			
	176	വെള്ളപ്പുഴ	vā <u>l</u> ay <u>l</u> am			
- <u>l</u>	177	മുറിയ	tā <u>l</u>			
	178	മീനിയ	si <u>mi</u> l			
- <u>l</u> -	179	മുറി	ū <u>l</u> i			
	180	കുലം	ku <u>l</u> am			
	181	വെള്ള	va <u>l</u> i			
	182	വെള്ളപ്പുഴ	va <u>l</u> ayal			
	183	കോലം	cō <u>l</u> am			
- <u>l</u>	184	കേൾ	tē <u>l</u>			
	185	വെള്ള	vā <u>l</u>			
<u>l</u> -	186	ലട്ട	laddu			
	187	ലട്ടക്കുറി	lat <u>l</u> umi			
	188	ലട്ട	lay <u>l</u>			
	189	ലട്ട	lā <u>l</u> i			
- <u>l</u> -	190	പാലി	pa <u>l</u> li			
	191	പാലം	pā <u>l</u> am			
	192	പാ	pa <u>l</u>			
	193	കാ	ka <u>l</u>			
<u>r</u> -	194	രാത്രി	rā <u>l</u> tinam			
	195	രാത്രി	ra <u>l</u> bar			
	196	രാത്രി	ro <u>l</u> ti			
	197	രാത്രി	rā <u>l</u> i			
- <u>r</u>	198	രേ	ēr			
	199	രേ	tēr			
	200	രേ	kār			
<u>r</u> -	201	നെരി	ne <u>r</u> i			
	202	നെരി	a <u>r</u>			
<u>v</u> -	203	വെള്ള	vā <u>l</u> ay			
	204	വെള്ള	vā <u>l</u> i			
	205	തവള	tā <u>l</u> ay			
	206	പാവ	pa <u>r</u> vay			
	207	പാവ	pa <u>l</u> am			
<u>y</u> -	208	യാ	yā <u>l</u> am			

-y-	209	ᱠᱤᱨᱤᱰᱮ	muyal				
	210	ᱠᱤᱨᱤᱰᱮ	mayil				
	211	ᱠᱤᱨᱤᱰᱮ	Sutiyal.				
-y.	212	ᱠᱤᱨᱤᱰᱮ	uay				
	213	ᱠᱤᱨᱤᱰᱮ	milakay				
	214	ᱠᱤᱨᱤᱰᱮ	pay.				

Name :

Appendix III

Response scoring

Age :

Sex :

Sheet.

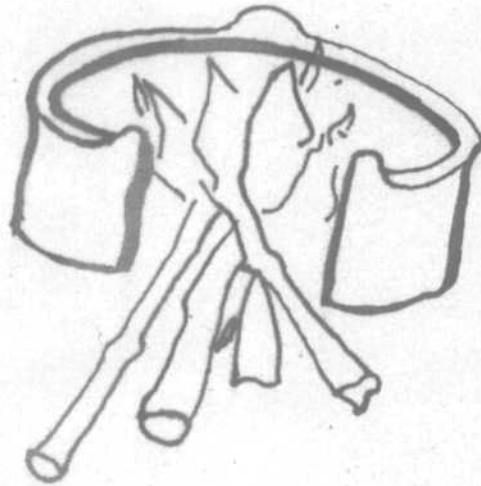
sd	Words	CR	S	O	D	sd	Words	CR	S	O	D
a-	அடுப்பு adup <u>u</u>					-ē-	கொண்டி kōṇḍi				
a-	கண் ka <u>n</u>					o-	புலகை pu <u>l</u> ka <i>i</i>				
ā-	அராஜ āra <u>ṅ</u> ḡu					ō-	பு p <u>u</u>				
ā-	கால் ka <u>l</u>					oḍu	பு p <u>u</u>				
ā	கொண்டி ko <u>ṇ</u> ḍi					k-	கை ka <i>i</i>				
i-	இலி i <u>l</u> i					-k-	கட்டிக்கை ka <u>t</u> ṭa <u>r</u> i <u>k</u> ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					g-	கொண்டி ko <u>ṇ</u> ḍi				
-i	கொண்டி ko <u>ṇ</u> ḍi					-k-	கட்டிக்கை ka <u>t</u> ṭa <u>r</u> i <u>k</u> ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					c-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					-c-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					j-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					-j-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					-t-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					d-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					-d-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					t	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi					-t-	கை ka <i>i</i>				
-i	கொண்டி ko <u>ṇ</u> ḍi						கை ka <i>i</i>				

-p- புலி
 puli
 -p- பப்பா
 pappā
 பப்பா
 b- பெயர்ச்சை
 boimmay
 -b- கடுங்க
 karumbu
 s- சாரி
 sārī
 s- சீய
 sīy
 sippu
 -s- காசு
 kāsū
 -ñ- மாங்காய்
 māngāy
 -ñ- வாண்டி
 vaṇḍi
 -ñ- ~~பெண்~~
 pen
 ñ- நாய்
 nāy
 -ñ- சாண்டல்
 sannal
 -ñ- மீன்
 mēn
 -ñ- பந்தல்
 paṇḍal
 -ñ- மஞ்சள்
 māṅṅal
 m- மாலை
 mālay
 -m- லாசல்
 lāsul
 -m- எரம்பல்
 erambu
 -m- மாரம்
 māram

-l- வாலைய்ப்புலி
 vālayppulam
 -l- சிமிட
 simiḍ
 -l- வலாய்
 valay
 -l- தேள்
 tēl
 l- லாரி
 lāri
 -l- பல்லி
 palli
 -l- பல்
 pal
 r- ரொட்டி
 roḍḍi
 -r- ~~கடுங்க~~
 karumbu
 -r- கார்
 kār
 -r- நெற்றி
 neṭṭri
 v- வாலைய
 vālay
 -v- தாவாய்
 tāvay
 y- யானை
 yānai
 -y- முயல்
 muyal
 -y- வாய்
 vāy

Sample Pictures

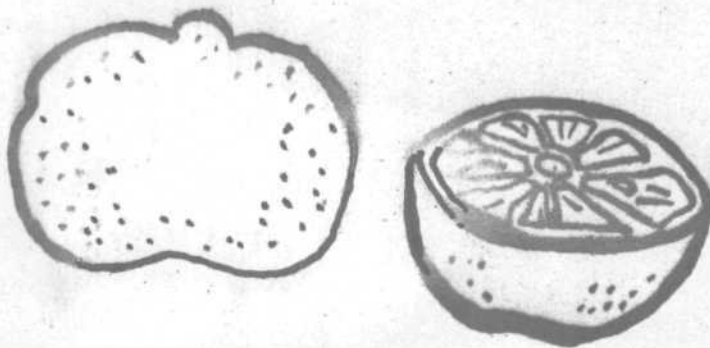
1. adupu



2. kan



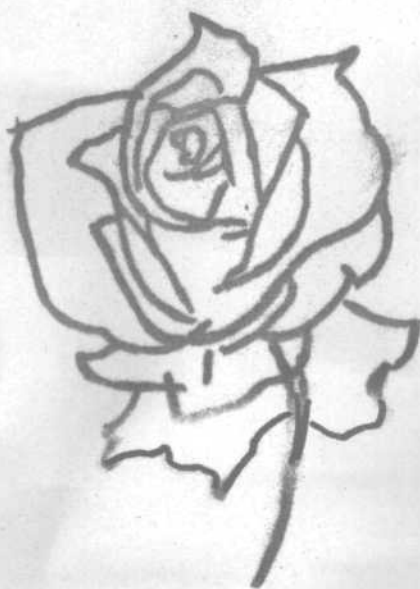
3. ārañju



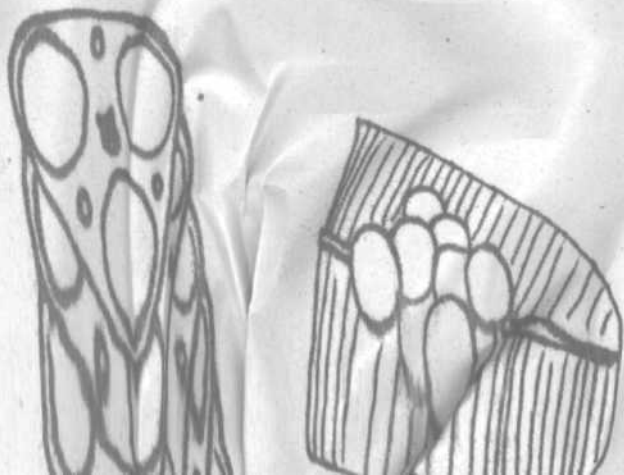
4. käl



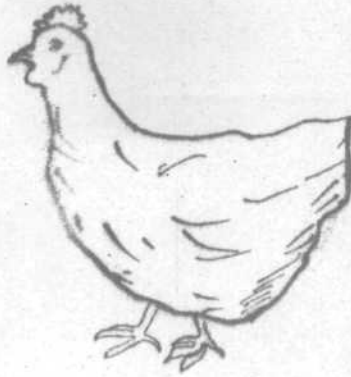
5. rōjā



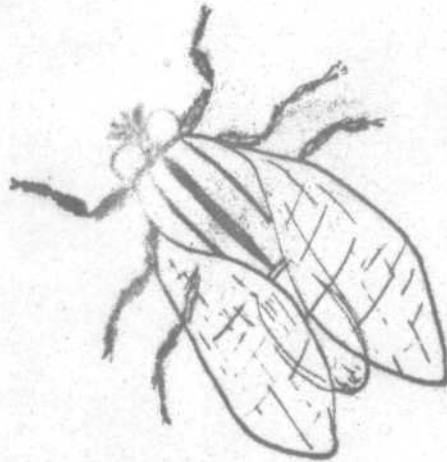
6. itli



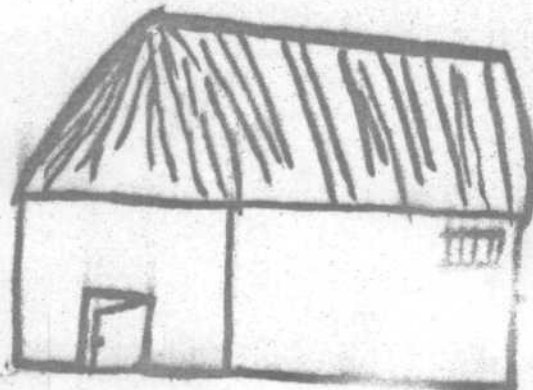
7. kōli



8. ū



9. vīdu



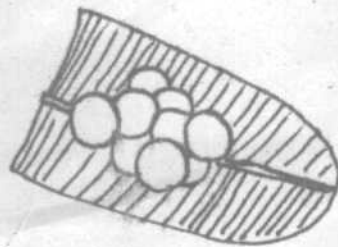
4. kāl



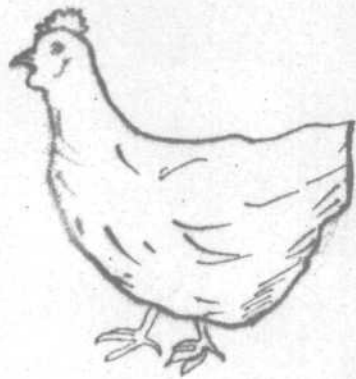
5. rōjā



6. itli



7. kōli



8. ī



9. vīdu

