

PHONOLOGICAL PROCESSES IN YOUNG STUTTERERS

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Dissertation submitted as part fulfillment for the
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All India Institute of Speech and Hearing

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DEDICATED TO

MY PARENTS

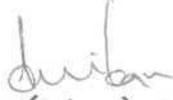
AND

TO THOSE WHO INVOLVE THEMSELVES
IN HELPING THE HANDICAPPED

CERTIFICATE

This is to certify that the Dissertation entitled "PHONOLOGICAL PROCESSES IN YOUNG STUTTERERS" is a bonafide work, done in part fulfillment for the second year M.Sc. (Speech and Hearing) of the student with Reg. No. M 9215.

MYSORE
1994


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CERTIFICATE

This is to certify that the Dissertation entitled
"PHONOLOGICAL PROCESSES IN YOUNG STUTTERERS" has been
prepared under my supervision and guidance.

MYSORE
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Savithri.S.R
DR. S.R. SAVITHRI
GUIDE

DECLARATION

This dissertation entitled "PHONOLOGICAL PROCESSES IN YOUNG STUTTERERS" is the result of my own study under the guidance of Dr. S.R. SAVITHRI, Lecturer, Department of Speech Science, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier at any other University for any other Diploma or Degree.

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TABLE OF CONTENTS

CHAPTERS

	Pages
I. INTRODUCTION	1-5
II. REVIEW OF LITERATURE	6-20
III. METHODOLOGY	21-24
IV. RESULTS AND DISCUSSION	25-38
V. SUMMARY AND CONCLUSION	39-41
BIBLIOGRAPHY	
APPENDIX	

CHAPTER I

INTRODUCTION

"Stuttering is a disorder that occurs when the forward flow of speech is interrupted by a motorically disrupted sound, syllable or word or by the speakers reaction there to" (Van Riper, 1982). The term stuttering means:

- I a) Disruption in the fluency of verbal expression which is b) characterized by the involuntary audible or silent repetitions or prolongations in the utterance of short speech elements, namely sounds, syllables, and words of one syllable. These disruptions c) Usually occur frequently or are marked in character and d) Are readily controllable. II Sometimes the disruptions are e) accompanied by accessory activities involving the speech apparatus, related or unrelated body structures or stereotyped speech utterances. These activities give the appearance of being speech related struggle.
- III. also there are not infrequently f) indication or report of the presence of an emotional state ranging from a general condition of excitement or tension to more specific emotions of a negative nature such as fear, embarrassment, imitation or like g) the immediate source of stuttering, some incoordination expressed in the peripheral speech mechanism; the ultimate cause, is presently unknown and may be complex or compound". (Wingate 1964)

Stuttering has been viewed as a disorder of language, articulation, learning, neurological, laryngeal, timing etc. There have been various studies in the area of Stuttering and Articulation". While studies have suggested interesting explanation for the phenomenon of stuttering. These findings by Freeman and Ushijima, (1975) suggests non-reciprocity in the muscle systems of stutterers, that of Zimmerman's (1980) suggests that, stuttering could be a disorder of movement. Starkweather and Amster, (1987), opine that stuttering behaviours are related to the rate of speech production. Van Riper (1971) viewed stuttering as a reflection of abnormal co-articulatory timing. This area has been mainly explored through reaction time studies, Electromyographic studies (Van Riper 1971, Platt and Basili 1973, Ford and Luper, 1975), Spectrographic studies (Stromsta, 1965, Holland and Starkweather 1982, Suchitra 1985, Mohan, 1988, Revathi 1989, Raghunath, 1992) and High speed Cinefluorography (Zimmerman, 1980a, Zimmerman, 1980 b).

The EMG data indicated that during stuttering, tremor activity, simultaneous contraction of the antagonistic articulatory muscles, delayed contraction and other abnormalities were present. While the cinefluorographic data indicated, a systematic repositioning of articulators preceding the release from oscillatory or tonic behaviours, the spectrographic data suggested lesser ability of stutterers to slow articulatory movements. All these studies

indicate that the speech planning and execution are impaired in the stutterers.

There have also been quite a few studies that have investigated articulation disorders in young stutterers. Various investigations have noted percentage of stutterers with articulation disorders. While a few investigators have relied on reports of clinicians, teachers and parents, the others have investigated articulation disorders using tests for articulation.

The results of the studies have indicated, no significant difference between normals and stutterers in terms of the articulatory capabilities (Mc Donald, 1928; Perozzi, 1970). However, some investigators have reported the presence of misarticulation in Stutterers (Berry, 1938b; Darley 1955; Bloodstien, 1958; Williams and Silverman 1968; Mielke Timmons and Willeford, 1971; Blood and Seider, 1981; Cantwell and Baker 1985. Beitchman, Nair, Clegg and Patel, 1986.).

The enormous amount of research work in this area has led the researchers discover many new and fascinating phenomena associated with stuttering. One such finding is the co-occurrence of disordered phonological process with stuttering.

Phonological processes refer to the "systematic nature of child's words and restructuring of adults words" (Macken

and Fergusson, 1981). If these process persist in child's speech for an abnormally long time then it is considered as disordered phonological processes.

(Studies in the past have reported the percentage of children for whom stuttering and articulation disorders co-occur; but have not tried to analyse or categorize them. The first attempt to analyse and categorize the speech sound errors of young stutterers within a linguistic framework (i.e., to categorize the errors according to presence, frequency and type of phonological processes exhibited), were made by Louko et al (1990). The purpose of their study was to compare the phonological processes exhibited by children who stutter with those exhibited by their normally fluent peers, and to relate these phonological processes to typical measures of stuttering and other speaking variables. The subjects were 30 stuttering children (mean age of :4 years 4 months) and matched normally fluent peers (mean age of :4 years 6 months). The results indicated that the stutterers exhibited a greater number and variety of phonological processes, than their normally fluent peers. Further more, the young stutterers also exhibited more 'atypical' processes than their normally fluent peers.)

(While the above study provided the information regarding the occurrence of specific types of phonological processes in children who stutter, this information was based only on mother child conversations. The speech samples were

not only different from child to child, but also did not cover all the consonants of English in various phonetic environments. This limitation of the study made comparisons among children in the percent usage of specific phonological processes, difficult.

However, this kind of study, creates new insights about the stuttering, throws light on factors that might have been overlooked in a stuturer during the therapy; carry clinical implications and give rise to new lines of research. In this context, the present study was planned. It aimed at investigating the phonological processes in Kannada speaking stuttering children in the age range of 3 to 7 years. Specifically samples, elicited through narration of standardized pictures and Kannada Articulation test were used to delineate the phonological processes of twelve stutters which were compared with the that of twelve normal children matched for age-and-sex with stutters.

CHAPTER II

REVIEW OF LITERATURE

The review has been organised under the following.

Headings:

- I. Phonological Process - definition
- II. Phonological Process - varieties
- III. Stuttering and phonological processes

I. Phonological Process - Definition:

The concept of phonological process was introduced for the first time by Stampe (1973) to explain a systematic relationship between adult words and children's production of these words. The term phonological process has evolved to designate systematic sound changes that affect classes of sounds or sound sequences (Edward and Shriberg, 1983).

Linguists refer to these simplifications as, realization rules eg: $x - y/z$ i.e. X is substituted by or realized as Y in the environment Z. These phonological processes appear to be used regardless of the particular language the child is learning and a given child will quickly master certain difficulties and thereby obviate the need for the corresponding process. (Vihman, 1988).

II. Phonological Processes: Varieties

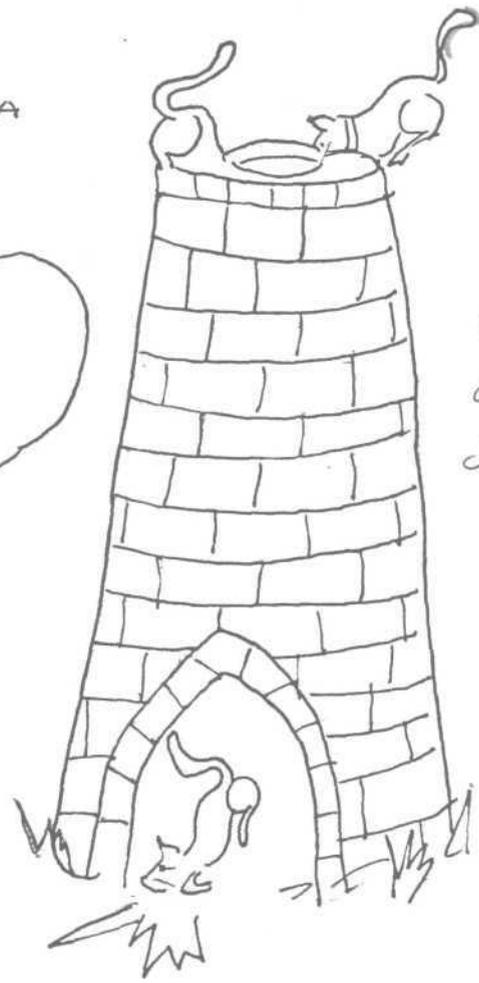
Several authors have listed the phonological processes occurring in normal children. All these are summarized in table I. A total of 42 phonological processes have been identified which are described of as follows:

1. Restructuring (R): It is a rule that changes all the items subject to change at much the same time. Example /tiek/ for /keik/. As long as a rule is operating /teik/ and /keik/ would be neutralised to /keik/, and as soon as the rule disappears they would be separated.
2. Plural formation (PF): Either there are no overt plural markers, or it is pluralised by addition of coronal continuants.
3. Puzzles (P): Is a phenomenon where the child can produce the sequence correctly, but only as the reflex of the wrong input. Example: /fik/ for /thick/, but a child may say /oik/ as the equivalent of /stik/.
4. Metathesis (M): This pattern is characterised by transposition or reversal of two segments in a word.
5. Absolute exception (AE): are those items in childs vocabulary which not only fail to undergo some realisation rule, by so failing appear with a surface form otherwise disallowed by the conventions putatively internal to his system.

	Lass (1979)	Smith (1973)	Ingram (1976)	Pollock (1991)	Grunwell (1981)	Bankson et al (1981,88)	Dunn et al (1985)	Louko et al (1990)	Weiss & Lilly White (1987)
1.Restructuring		+							
2.Plural Formation		+							
3.Puzzles		+							
4.Metathesis		+				+			+
5.Absolute Exceptions		+							
6.Recidivisms		+							
7.Vowel and C consonantal Harmony		+		+	+				+
8.Cluster reduction	+	+				+	+	+	+
9.Assimilation	+		+			+	+		
10.Devoicing of Final Consonants			+			+	+		
11.Prevoicalic voicing of voiced consonants			+			+	+		
12.Final Consonant deletion	+				+	+	+	+	+
13.Weak syllable deletion					+			+	+
14.Reduplication	+				+	+			
15.Unstressed syllable deletion	+				+		+		
16.Coalescence					+	+			+
17.Epenthesis					+	+	+		+
18.Fronting	+				+	+			+
19.Backing					+	+			+
20.Stopping	+				+	+	+		+
21.Affrication					+	+			+
22.Gliding of liquids					+	+	+	+	
23.Vocalization					+		+	+	
24.Deaffrication					+		+		+
25.Glottal Replacement					+				+
26.Lateralization					+				
27.Nasal cluster Reduction									
28.Velar Fronting							+	+	
29.Backing to velar							+	+	
30.Diminutization							+		+
31.Denasalization			+						+
32.Apicalization			+						
33.Liquid cluster reduction			+						
34.Diphthongization				+					
35.Diphthong reduction				+					
36.Multiple processes									+
37.Doubling									+
38.Depalatalization			+				+	+	
39.Inter dentalization								+	
40.Labialization			+					+	
41.Vowel changes								+	
42.Vocalization			+				+	+	+

Table I Various Phonological Processes.

THREE CATS FELL INTO A
CHIMNEY



Cat - PF
dell - AE
chinmey - M

6. Recidivism (REC): Is a phenomenon in which there is loss of systematic contrast, after this has once been established by the child.

Example: dait is substituted for side and light. However after the appearance of !, side is substituted by dait and light is substituted by lait.

7. Vowel and Consonant harmony (VH and CH respectively): Is a phenomenon where the place of articulation of initial and final consonant/vowel tend to harmonise.

8. Cluster Reduction (CR): Is a phenomenon where clusters are made simple.

9. Devoicing of final consonant (DFC): Voiced obstruents are devoiced in final position
10. Prevocalic voicing (PV): Voicing of voiceless consonants in prevocalic positions.

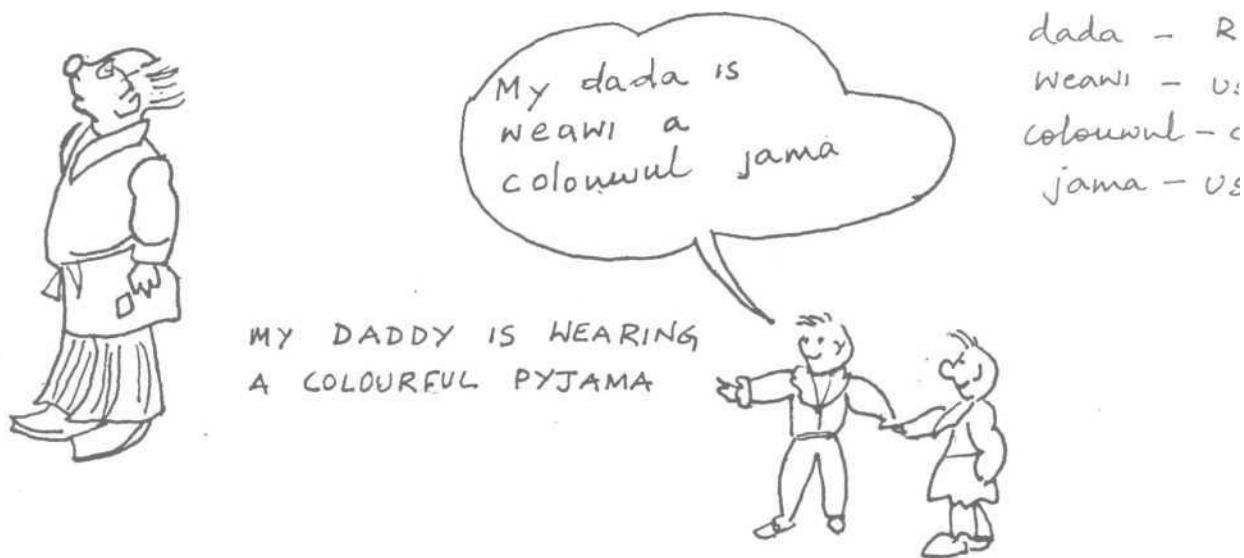
WE ARE CELEBRATING
OUR DOGS BIRTHDAY
WITH CUSTARDS AND
ICE CREAM.



Celebrating - c
doks - DFC
bitlday - WSI
tutad - CH
xthki:ms - CR

11. Final consonant deletion (FCD): Deletion of final consonant in a word.
12. Weak syllable deletion (WSD): The common environment for this process is an unstressed, immediately pretonic, initial syllable.
13. Unstressed syllable deletion (USD): Similar to weak syllable deletion.
14. Reduplication (RED): A syllable or a portion of syllable is repeated or a target word is repeated.

15. Coalescence (C): Characteristics of features from two adjacent sounds combine so that one sound replaces the others.
16. Epenthesis (EP1): A segment, usually the unstressed vowel /I/ is inserted.



17. Fronting (FR): Substitutes are produced anterior or forward to the standardised productions.
18. Backing (B): Sounds are substituted or replaced by segments produced posterior to a further back in oral cavity than the standard production.
19. Stopping (STP): Fricatives or affricates are replaced by stops.
20. Affrication (AFF): Fricatives are replaced by affricates.
21. Gliding of liquids (GL): Prevocalic liquids are replaced by glides.

22. Vocalization (V): Liquids or nasals are replaced by Vowels.

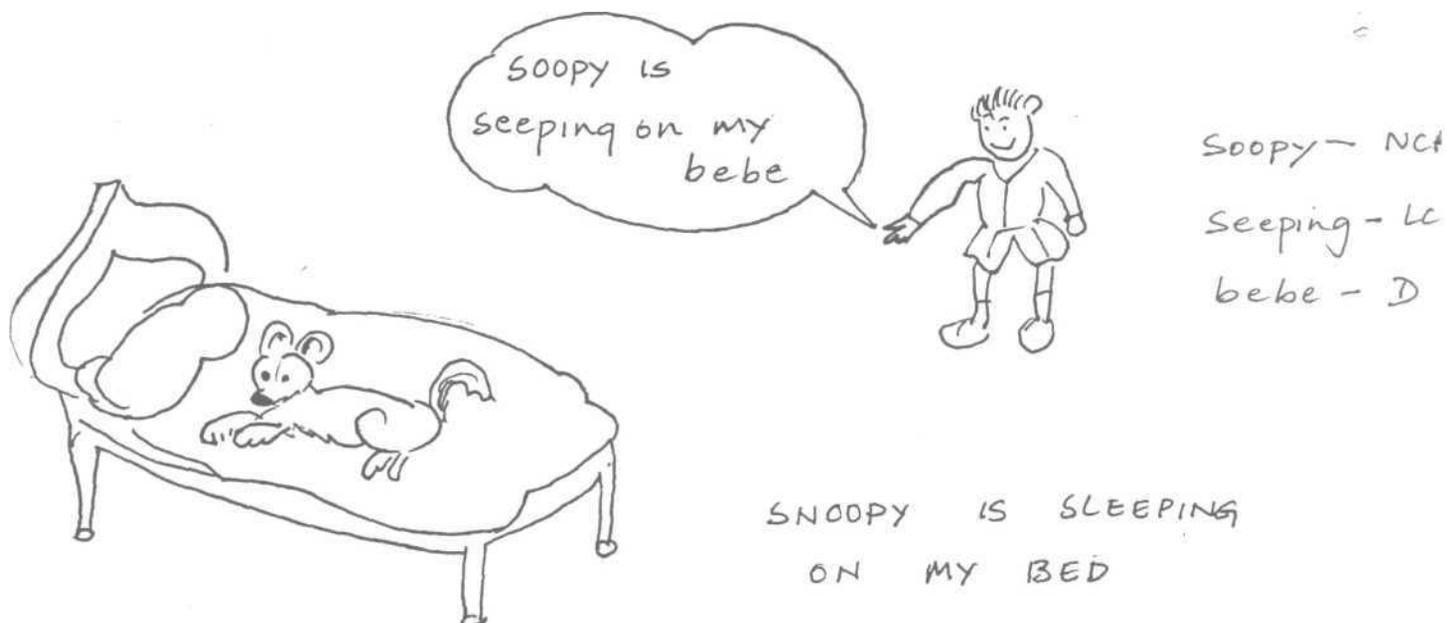


23. Deaffrication (DA): Affricates are replaced by fricatives.
24. Glottal replacement (GR): Glottal stops replace segments usually in either intervocalic or final position.
25. Lateralization (L): Fricatives are produced with lateral emission or are replaced by a lateral fricatives.
26. Nasal cluster Reduction (NCR): Nasal clusters are made simple.
27. Velar Fronting (VF): Velars are replaced by alveolars.
28. Backing to Velars (BV): Alveolars are replaced by velars; this may include fricatives.
29. Diminutization (DIM): Refers to addition to vowel /i/ to a word.

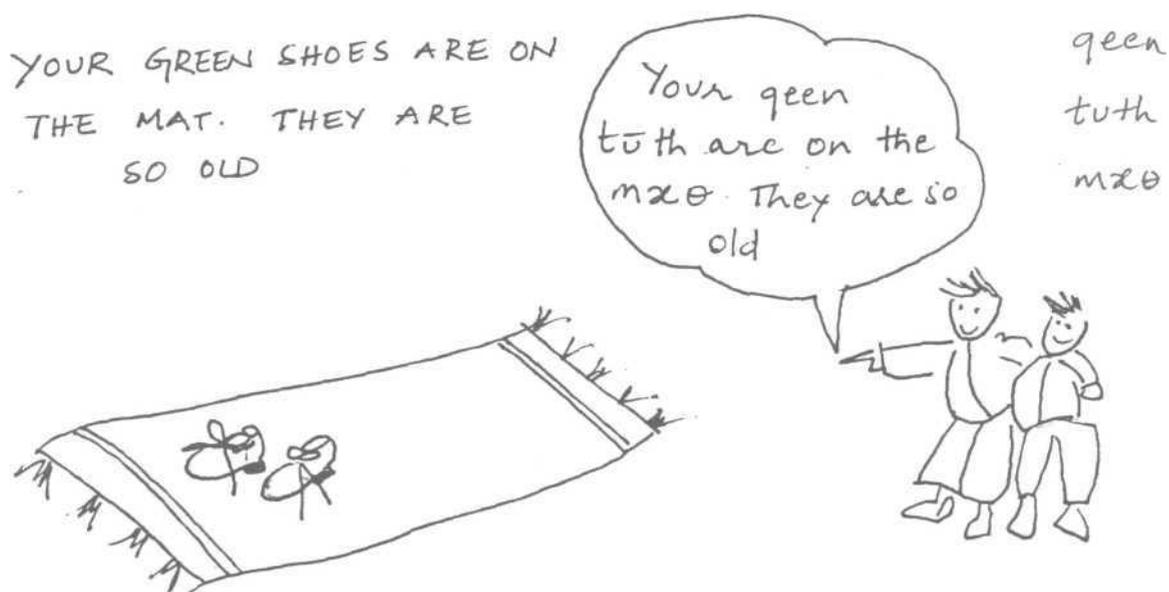


30. Denasalization (DEN): Absence of nasality for a nasal sound.
31. Apicalization (AP1): Refers to shift from a labial to alveolar phoneme.
32. Liquid Cluster Reduction (LCR): The liquid is usually deleted.
33. Diphthongization (DIP): Substitution of a diphthong.
34. Diphthong reduction (DR): Deletion of a diphthong from a word.
35. Multiple Processes (MP): Refers to applying more than one phonological process when producing a single word, rather than using only one process per word.

36. Doubling (D): Is a process of repeating a word, usually a monosyllabic word, resulting in a multisyllabic word.



37. Depalatalization (DP): Palatals are replaced by alveolars.
38. Interdentalization (ID): Refers to a sound produced in the front of the mouth being replaced by an interdental.
39. Labialization (LAB): Refers to a labial sound replacing a front sound.
40. Vowel changes (VC): Vowels may be lowered, diphthongized, reduced to (ə).
41. Vocalization (V): Syllabic or post vocalic liquids are replaced by vowels.



III Stuttering and Phonological Processes

There is not much information regarding the phonological processes in young stutterers. There have been only two studies; one by Louko et al, 1990. and the other by Wolk et al 1993:- These studies describe the speech of stutterers and non-stutterers within a linguistic framework i.e., analysing and categorizing speech sound errors according to frequency and type of phonological processes exhibited.

The purpose of Louko et al (1990) study was two fold;

1. To compare the phonological processes exhibited by children who stutter and their normally fluent peers and

2. to relate these phonological processes to typical measures of stuttering and other speaking variables.

Subjects for this study were 60 children; 30 who were stutterers and 30 who were normally fluent. The stuttering children had a mean age of 4 yrs 6 m and were sex-and-age matched with the normally fluent children who had a mean age of 4 yrs 6 m. Each child was audio and video taped, while informally interacting with his/her mother. They were instructed to talk and play as they would at home, using specific set of toys, objects and pictures.

For each child the experimenter orthographically transcribed the utterances until a sample of 300 intelligible words were obtained. A detailed notes of all the different phonological processes were made. Each child was then placed either under normal phonology category or disordered phonology category. The authors tried to identify types of phonological processes exhibited by stuttering children and their normally fluent peers, the total number of process and the frequency of their occurrence specifically. The above measures of phonology were related to variables like stuttering frequency, duration sound prolongation index and subjects age.

(Results indicated that children who stutter are more likely to exhibit speech sound errors than their normally fluent peers. The stutterers as a group exhibited 18 different phonological processes, while their normally fluent

peers exhibited 11. It was also evident that the frequency of only cluster reduction did not have an equal probability of occurring in both the subjects, that is, significantly more young stutterers than normally fluent children exhibited cluster reduction.)

In addition to this, (the young stutterers exhibited phonological processes that could be considered atypical. (Edward and Shriberg 1983). They were glottal replacement, backing and laterlization. No atypical processes were exhibited by the normally fluent children. It was also found that 12 out of 30 children exhibited disordered phonology (characterized by either age - inappropriate or atypical phonological processes), as compared to 2 out of 30 age and - sex matched normally fluent peers)

The (results of the second part the study indicated; that children who stuttered were significantly more likely to be described as having disordered phonology than were children who did not stutter.)

12 out of 30 stutterers exhibited disordered phonology and the rest 18, normal phonology. Pearson product 0 moment correlation matrix indicated negative correlation between age and number of phonological processes and between phonological category (DP or NP) and number of phonological processes. None of the other variables were significantly correlated.

This study has thrown light on a few issues. For example,

1. That, the two disorders could be independent of one another with regard to etiology, interaction, manifestation.
2. That, they could share the same etiology, but be different manifestations of it.
3. A possible interaction among themselves eg. exacerbating one another. Wolk et al (1993) have attempted to the answer these questions.

The 'limitation of the above study lies in the data collected from the subjects. The data comprised of, mother-child conversations and thus the speech sample varied from child-child making more standardised and objective comparisons across children, difficult.

The above limitation was overcome by study done by Wolk et al, (1993). The purpose of their study was to assess differences in stuttering, phonological and diadokinetic behaviours in young children who exhibit both stuttering and disordered phonology and children who exhibit only one of the disorders. Subjects were 21 male children (aged 4-6- years), representing three groups of seven children each, a) Stuttering and normal phonological abilities (S+NP), b) Stuttering and disordered phonology (S+DP) c) Normal fluency and disordered phonology.

Speaking conditions included, loosely structured conversation between mother and child, A picture naming task that provided adequate opportunity to elicit a wide range of consonant cluster sequences and all English consonants in initial, medial and final word positions was employed.

The diadokinetic task included the sequences /p^hp^h/, /p^ht^h/, /t^hk^h/, /p^ht^hk^h/ and their voiced counterparts.

One of the main findings of the study was the significant difference in sound prolongations between young stutterers with and without phonological disorders. Specifically, S+NP children evidenced more sound prolongation while S+DP children evidenced more sound/syllable repetitions. The findings that S+DP were more apt to produce sound prolongation, may reflect the fact that these child are beginning to react behaviorally to their speaking difficulties. Another possible interpretation of the above findings is an extension of Stromsta's (1986) theory of intra phonemic disruptions, proposing sudden intra phonemic interruptions at the level of syllable.

Thus the S+NP children may have difficulty at the level of vowel or in the transitions from vowel to the initial consonant of following syllable, giving rise to sound/syllable repetition and the S+DP children may have greater difficulty at the level of consonant or transition from consonant to vowel, within the same syllable, leading to prolongation.

The authors found no statistically significant differences in diadokinetic rates across all four pairs of DDK syllables among the three groups of children. Also there were no statistically significant differences in percent consonant correct (PPC) or in Process Density Index (PDI) between the two groups of phonologically disordered children.

refers to the percentage of consonants correctly produced in the sample out of the total number of consonants attempted and DPI refers to the average number of process applications per word.

The findings suggest that phonological behaviour was similar across the two disordered phonology groups, where as differences in stuttering were observed across (S+DP) and (S+NP) groups. This lends support to the notion of two form of stuttering - one that co-occurs with DP and one that is independent of DP. This would suggest a PD as the dominant disorder and stuttering as the co-morbid disorder.

These two studies indicate the possibility of disordered phonological processes in stutterers, However, there is a need for studies involving children in various age groups to know more about phonological process and stuttering. In this context the present study was planned. It aims at comparing the phonology of 12 kannada speaking young stutterers in the age range of three to seven years, with their age-and-sex matched normally fluent peers.

CHAPTER III**METHODOLOGY**

The subjects chosen for this study were twelve child stutterers in the age range of three to seven years (three each in the age group of 3-4 Years, 4-5 Years, 5-6 Years and 6-7 Years) and twelve normally speaking children matched for age and sex with stutterers. (Table - II)

Age Range	3-4 Years	4-5 Years	5-6 Years	6-7 Years
Males	3.15 3.10 3.11	4.4 4.6 4.9	5.1 5.2 5.6	6.5 6.5 6.11
Females	Nil			

Table II : Subject details.

All these subjects were Kannada language speakers. The severity of dysfluency varied between mild to severe in the child stutterers. All the subjects were of normal intellectual ability, had normal hearing and normal oral speech mechanism. There was no report of any other disability in these children. A few of these subjects had undergone therapy while the rest had no therapeutic intervention. However, this was not considered as a variable in the present study.

MATERIAL: The material used in this study were developed by Nagapoornima (1990) for 3-4 years old children, Indu (1990) for 4-5 years old children, Yamini (1990) for 5-6 years old children and Rajendra Swamy (1991) for 6-7 years old children, for fluency test. They comprised of 13 pictures of 3-4 year old children, 6 sets of connected pictures for 4-5 year old children, 6 sets of mooshik cartoons for 5-6 year old children and pictures depicting Panchatantra stories for 6-7 year old children.

Procedure:

Initially rapport was built up with each subject by an acquaintance before the day of recording. Speech sample was collected using pictures of Kannada Articulation test (K.A.T, form A and B). Subjects were tested individually in a quiet environment. They were shown one picture at a time and were instructed to name them. When the subject was unable to name, he was instructed repeat after the experimenter. When errors in the production of target phoneme occurred, the production of the same phoneme was rechecked for its consistency using a different stimuli from form B.

In the second half of the recording, pictures of fluency test were shown to the children and the children were asked to either name, describe or narrate what they depict, depending on their age level.

For the 3-4 years old, children thirteen pictures of animals were shown and the experimenter made queries about the pictures. For eg: where do you find one?, what does it eat?, Is it big/small? etc for the 4-5 years old children connected pictures were shown and the subjects were asked to describe them. With 6-7 yr old children, Panchatantra pictures depicting moral stories were used. The subjects were instructed to narrate the story by referring to the pictures. In case of misperception or picture ambiguity, the subjects were helped in deciphering the pictures.

All these speech samples were audio recorded in a cassette. The recorded speech samples were transcribed verbatim and the various phonological processes were identified.

These phonological processes were tabulated and the number, percent and frequency of occurrence of each phonological process were calculated. The percent of occurrence of a phonological process was calculated by the following formula.

$$\frac{\text{Number of times a process occurred}}{\text{Total number of words spoken}} \times 100$$

Percent of occurrence was considered as high if a value of 5% or more was obtained.

Frequency of occurrence of phonological processes was

defined as the number of subjects showing each of the process and the frequency of occurrence of a phonological process was considered high if it occurred in 50% or more number of subjects.

The phonological process processes which were common to both stutterers and normals and which were specific to stutterers were identified and this data was used to describe the way in which stutterers used phonological processes.

CHAPTER IV

RESULTS AND DISCUSSION

The following abbreviations are used in the Results and Discussion.

Consonantal Harmony (CH), Fronting (FR), Cluster Reduction (CR), Final Consonant Deletion (FCD), Palatalization (PAL), Vowel Change (VC), Addition (ADD), Affrication (AFF), Metathesis (M), Frication (FRIC), Stopping (STP), Multiple Processes (MP), Lateralization (L), Depalatalization (DP), Epenthesis (EPI), Diminutization (DIM).

Process seen in Kannada speaking children specifically, are the following.

1. Backing to retroflex (BR): Substitution of retroflex for a front sound.
2. Substitution of a trill (SOT): Substitution of /r/.
3. Initial Consonant Deletion (ICD): refers to deletion of medial consonant.
4. Medial Consonant Deletion (MCD): refers to deletion of medial consonant.
5. Stress (STR): Emphasis on a particular sound.
6. Substitution of glide (SOG): Substitution of /j/.

7. Interchange of place of articulation (IPA): The neighbouring consonants assume, each others place of articulation.
8. Change in place of articulation (CPA): refers to change in place of articulation for a particular sound which is still perceived as the same sound.

I. Varieties of phonological processes

The results indicated that around 14 common phonological processes were exhibited by Kannada speaking normal children and stutterers. They were: viz., consonantal harmony (CH), fronting (FR), cluster reduction (CR), Final Consonant deletion (FCD), Palatalization (PAL), substitution of trill (SOT), Initial consonant deletion (ICD), Vowel Changes (VC), Stress (STR), Medial Consonant deletion (MCD), Addition (ADD), Backing to retroflex (BR), Affrication (AFF), and metathesis (M):

Table III shows the phonological processes exhibited by individual subjects.

3.15Y	S - CH, <u>FR</u> BR PAL DIM CR FCD IPA, PAL+BR
	N - CH <u>FR</u> <u>CR</u> FCD ICD VC ADD
3.10Y	S - <u>FR</u> BR CR CH SOG MCD DOS
	N - FR
3.11Y	S - <u>FR</u> VFC, SOV, SOT, SOG, MCD, CH, IPA, PAL+CR BR, BR+ADD
	N - <u>FR</u> SOT PAL
4.4Y	S - <u>FR</u> MCD M
	N - FR M ICD FCD BTR CH CR ADD
4.6Y	S - FR, CH, ST, FCD+EPI, PAL, CR, DP, VC
	N - NIL
4.9Y	S - FR, BR, SOV, SOT, AFF, CR, CH, LAT, ADD, FRIC, FRIC+CR, FCD
	N - NIL.
5.1	S - <u>FR</u> . LAT, FCD, VC
	N - <u>FR</u> , ICD, MCD, BR
5.2Y	S- FR STR, BR, CPA, ICD FCD PAL CR CH
	N - ICD, FCD PAL, <u>CR</u> CH M ICD
5.6Y	S - FR, M <u>CR</u> CPA CH ICD FCD MCD IC, DEV, M,SOB, DEV+FRIC+DEL
	N - FR M ICD BR, PAL+DEL+ADD
6.5Y	S - <u>FR</u> , <u>BR</u> , FRIC, AFF, CR, DEL+VC, ST, M, CR+DP, CR+DV, PAL+A+DEL, DEL
	N - FR AFF
6.5Y	S - <u>FR</u> ST CR ADD
	N - FR AFF
6.11Y	S - CR MCD
	N - CR FR.

Table III: Phonological Process of individual subjects

S - Stutterer N - Normal

The phonological processes underlined, occurred several times in the speech sample of the child.

The results indicated that the stutterers (as a group) exhibited 24 varieties of phonological processes, and the normal children (as a group) exhibited 14 varieties of phonological processes. While the 3-4yr, 4-5 yr, 5-6 yr, 6-7yr, old stutterers exhibited 17,18,20,and 14 varieties of phonological processes respectively, normal children in these age range exhibited 10,8,14 and 4 varieties of phonological processes respectively.

The varieties of phonological processes exhibited were more in young stutterers compared to normal children. This is shown in figure 1.

II. PERCENT AND FREQUENCY OF OCCURRENCE OF PHONOLOGICAL PROCESSES

a. Percent of occurrence of Phonological Process:

The results indicated that FR and CR occurred maximally in all the age groups in both normals and stuttering children. Among the stuttering children, in the age group of 3-4 yrs, FR occurred maximally followed by BTR, PAL and CR. In the age range of 4-5 yr, 5-6 yr and 6-7 yrs., FR occurred maximally followed by CR. In normal children in all the age groups the percent occurrence of phonological process was lesser than that of stuttering children. Among stuttering

TYPES OF PHONOLOGICAL PROCESSES →

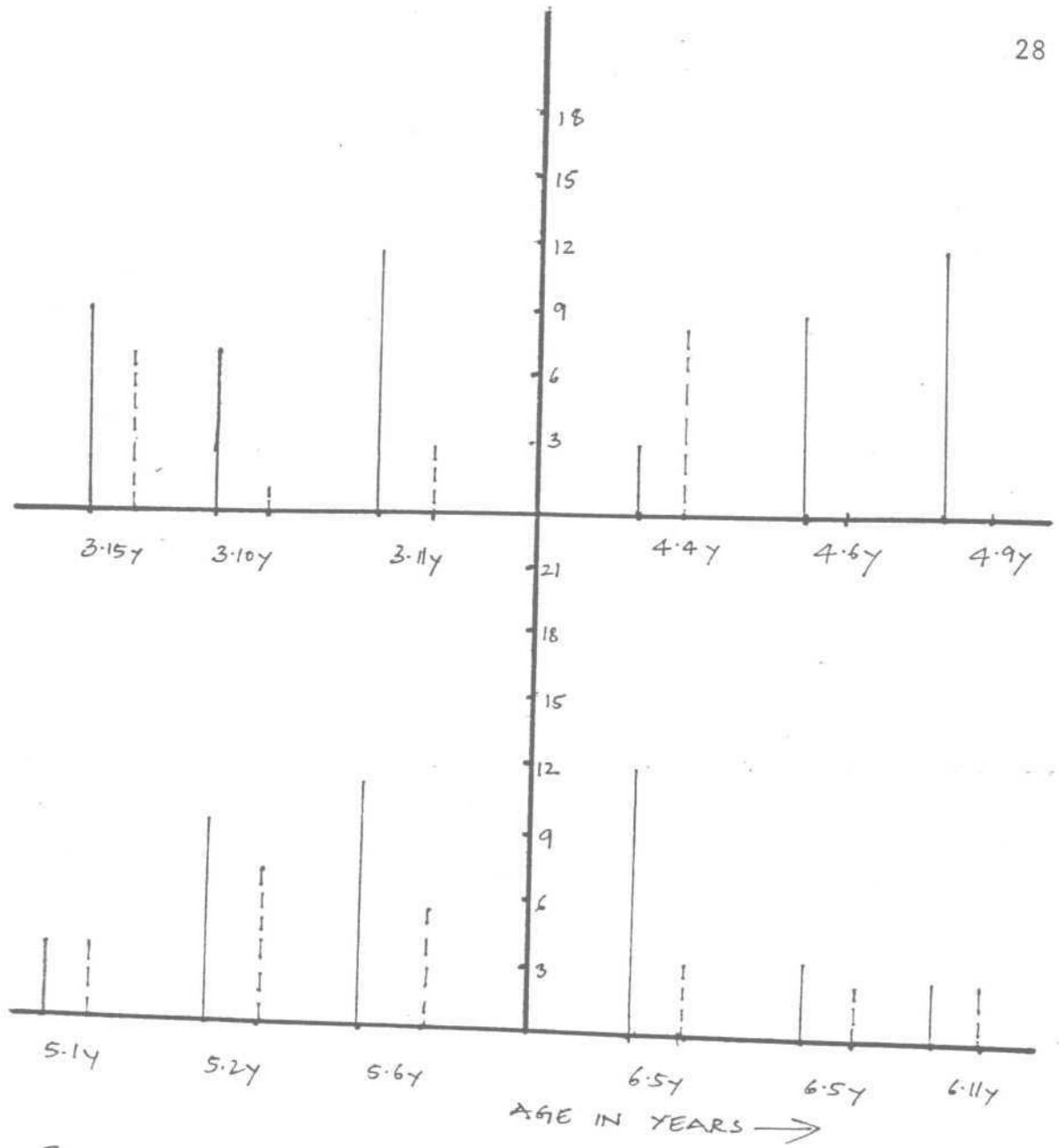


FIG 1 : VARIETIES OF PHONOLOGICAL PROCESSES.
IN STUTTERING AND NORMAL CHILDREN.

———— STUTTERERS
----- NORMALS.

children, while the percent occurrence of FR varied widely across the age groups, that of CR was almost steady. Also the percent occurrence of phonological process were maximum in the age range of 5-6 yrs. However, the same was not true among normal children. Though there were variations in the percent occurrence of phonological process it was not as wide as in stuttering children. This is shown in Fig 2. Figures 3 to 6 show the percent of occurrence of phonological process in various age groups.

b. Frequency of occurrence of phonological process:

Figure 7 shows the frequency of occurrence of phonological processes in normals and stuttering children. While in stuttering children FR and CR occurred maximally, in normal children FR and ICD occurred maximally. In general the frequency and occurrence of phonological processes was more in stutterers except for ICD and SOT.

III. Phonological processes specific to stutterers:

The results of the present study indicated ten processes specific to stutterers; viz., Stopping Frication, Multiple processes, Lateralization, Depalatalization, Substitution of glide, Epenthesis, Interchange of place of articulation, Diminutization and change in place of articulation. Lateralization was the only processes among these that was exhibited by a 5.2 yr old normal child. Fig. 8 depicts the specific phonological process.

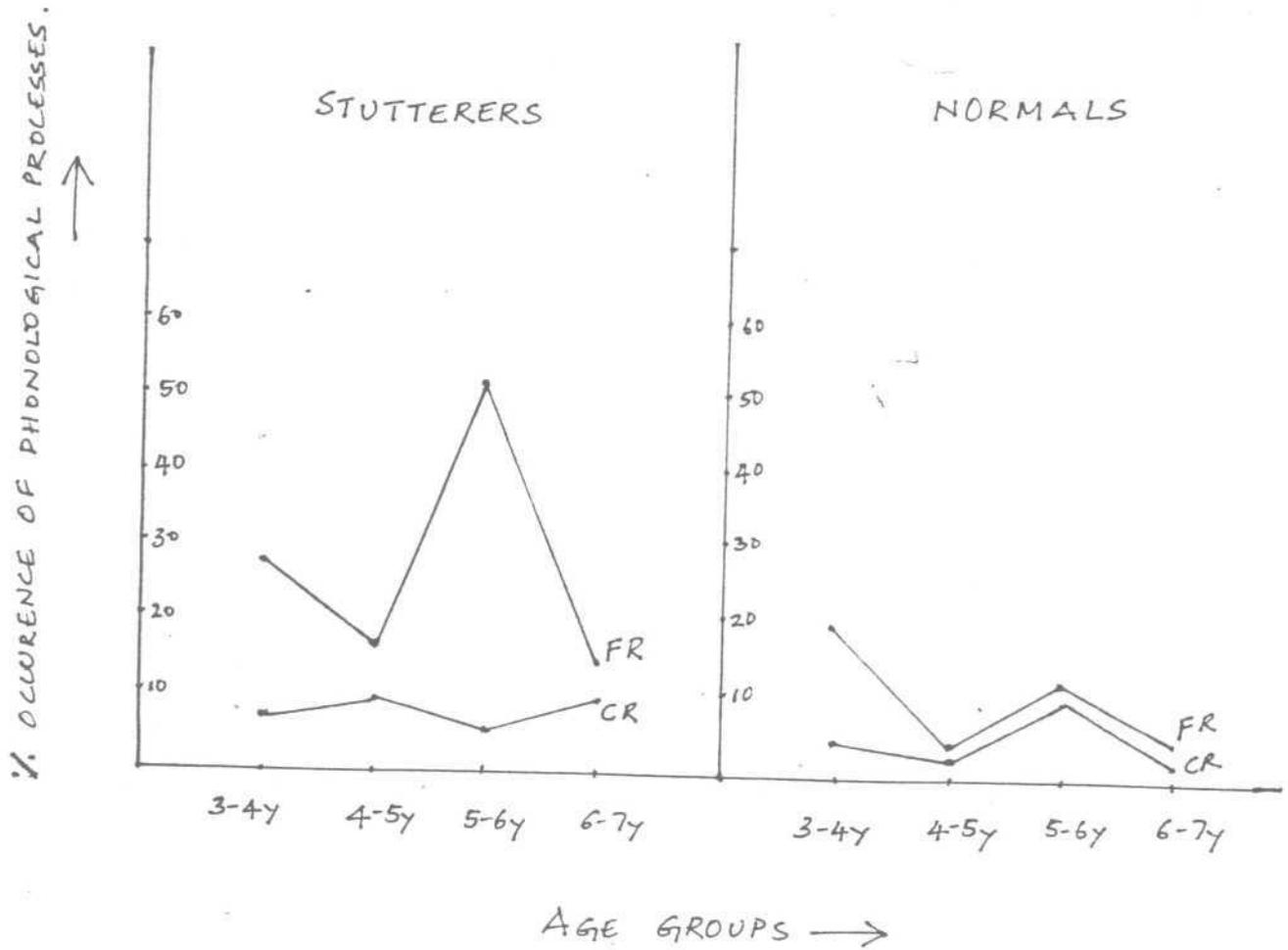


FIG 2 PERCENT OCCURENCE OF FR AND CR IN
NORMAL AND STUTTERING CHILDREN.

PERCENT OCCURENCE OF PHONOLOGICAL PROCESSES ^{29 (b)} →

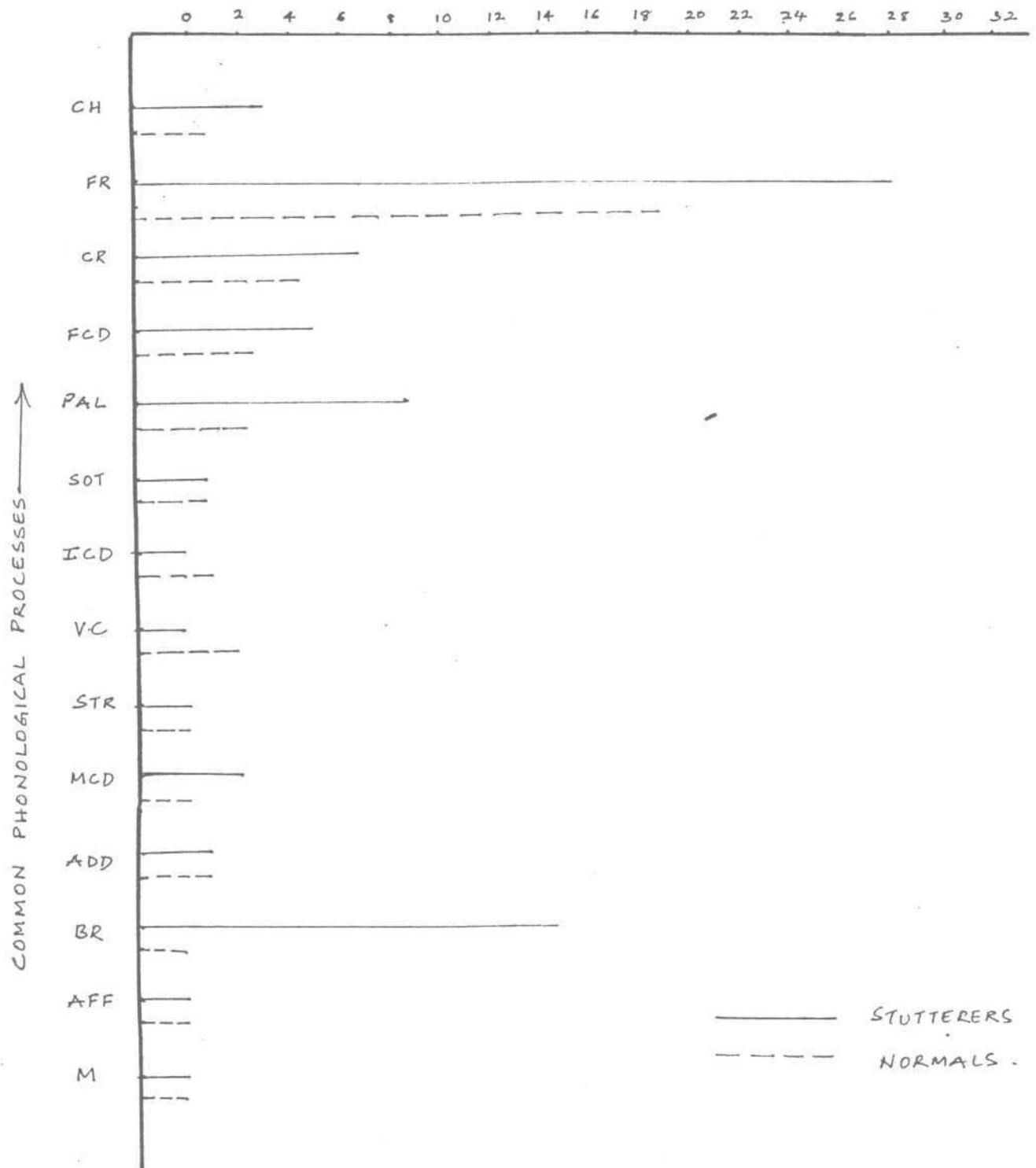


FIG 3 PERCENT OCCURENCE OF PHONOLOGICAL PROCESSES IN 3-4 YRS OLD CHILDREN

29 (c)
 PERCENT OCCURENCE OF PHONOLOGICAL PROCESSES →

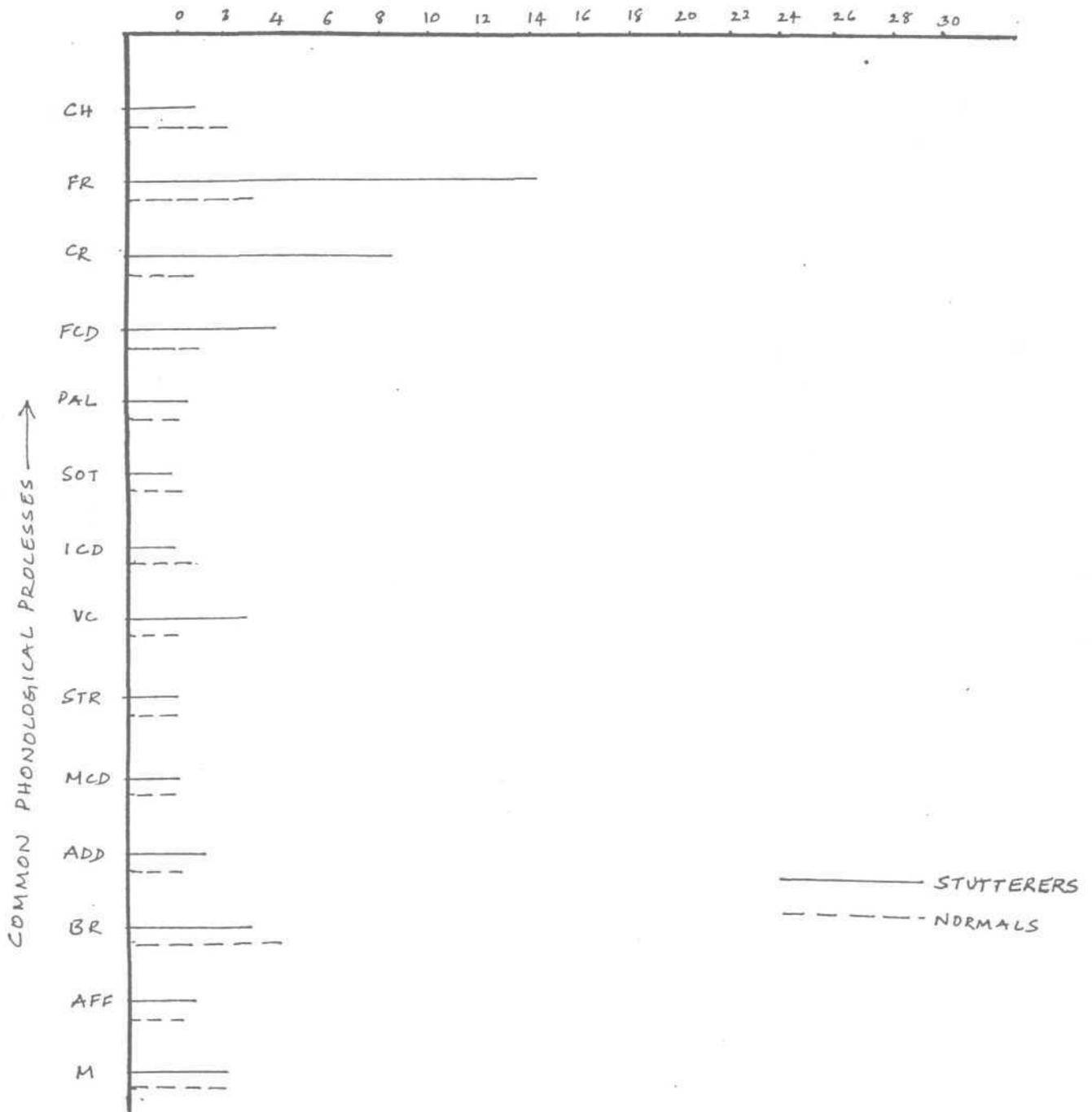


FIG 4 . PERCENT OCCURENCE OF PHONOLOGICAL PROCESSES.
 IN 4-5 YEAR OLD CHILDREN.

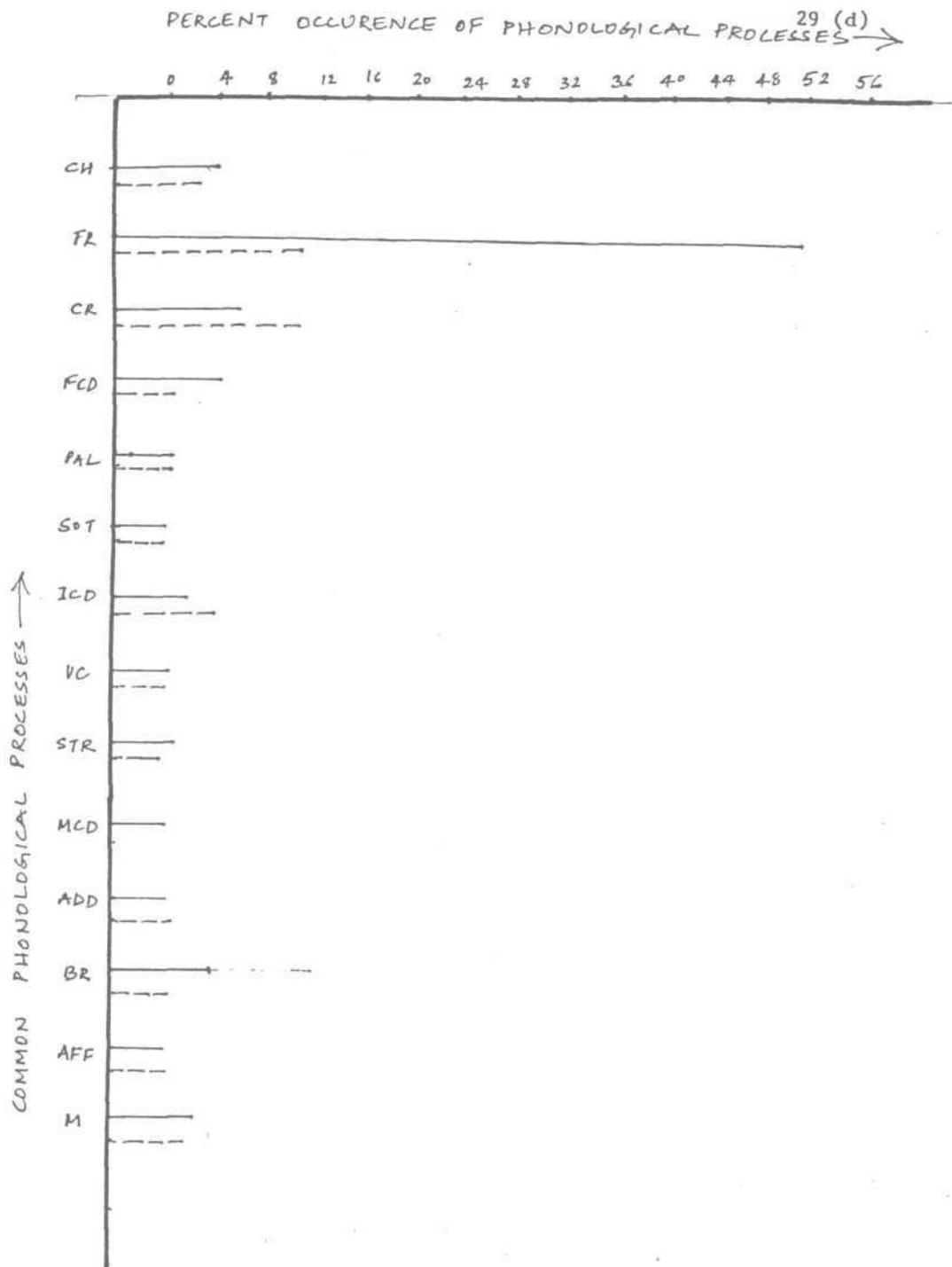


FIG. 5 PERCENT OCCURENCE OF PHONOLOGICAL PROESESSES IN 5-6 years OLD CHILDREN.

———— STUTTERERS
 - - - - - NORMALS.

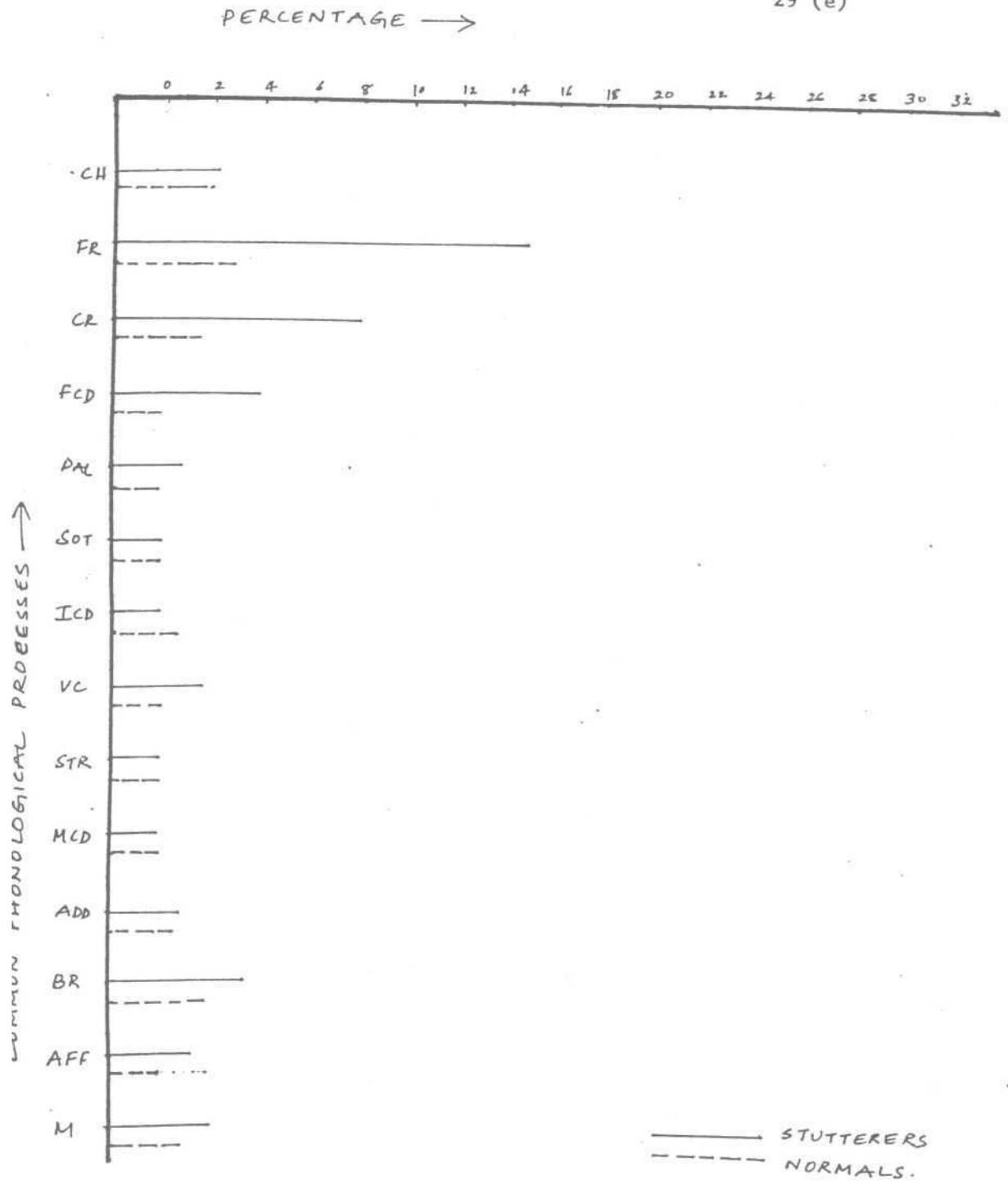


FIG 6 PERCENT OCCURENCE OF PHONOLOGICAL PROCESSES IN 6-7 years OLD CHILDREN.

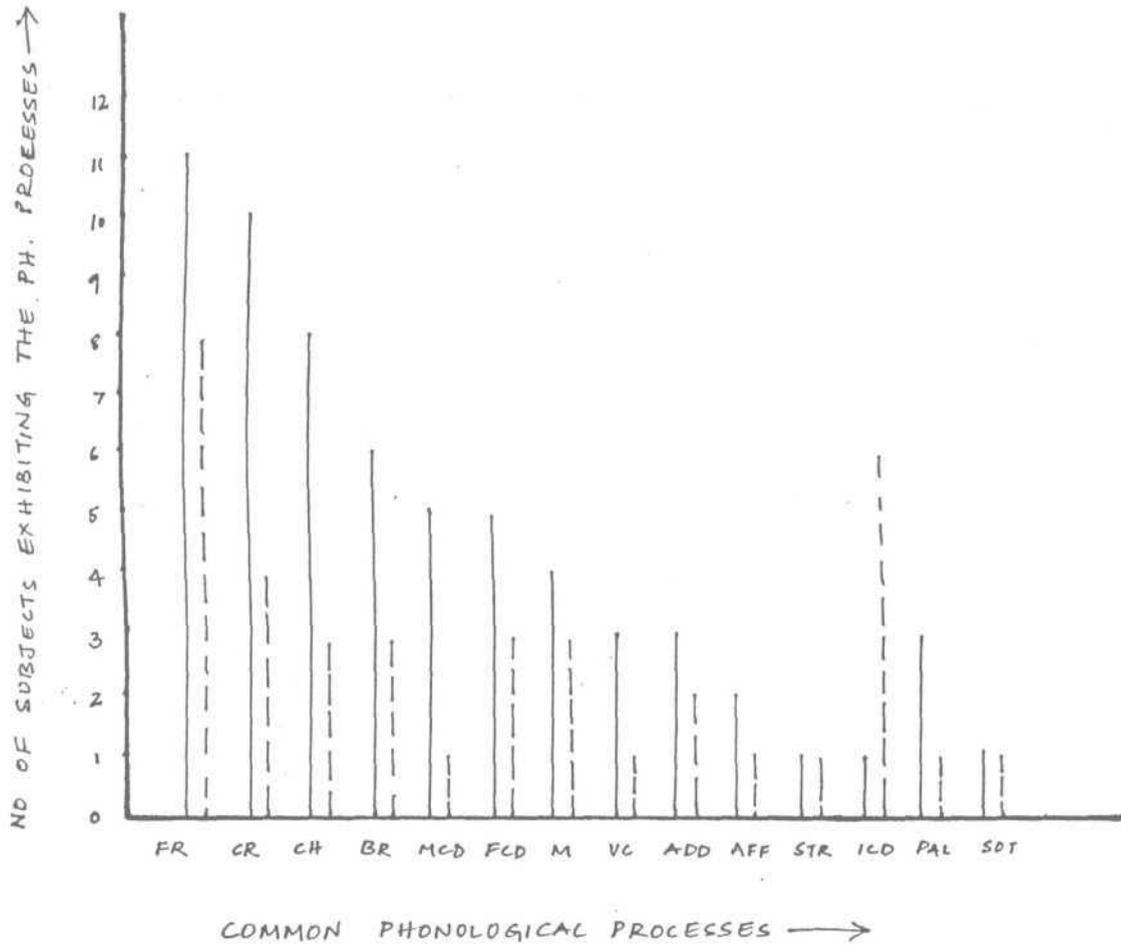


FIG 7. FREQUENCY OF OCCURENCE OF PHONOLOGICAL PROCESSES.

— STUTTERERS
 - - - - - NORMALS.

While the processes like DIM, SOG, IPA, DP, EPI, CPA were seen in less than 50% of the subjects, MP, LAT, FRIC and SIP were seen in 50% are more of the subjects. The results indicate that, more number of stutterers substitute manner of articulation, than place of articulation.

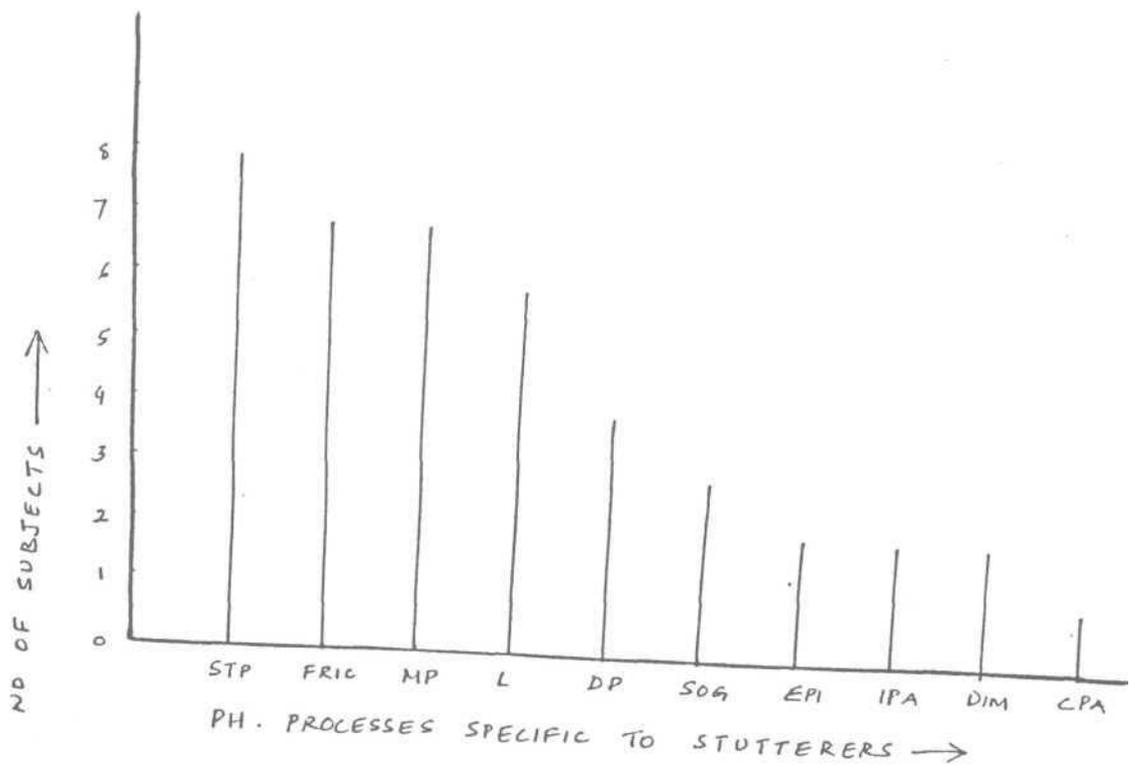


FIG 8. SPECIFIC PHONOLOGICAL PROCESSES.

IV. COMMON PHONOLOGICAL PROCESSES ELICITED THROUGH K.A.T AND PICTURE DESCRIPTION

It was observed that the types of phonological processes elicited were greater on using K.A.T than on employing picture description task, with a few exceptions in the age group of 4-5 yrs. and 5-6 yrs.

In the 3-4 yr age group, all the subjects (N and S) showed greater varieties of phonological processes in K.A.T than in the picture description task. In the 4-5 yrs age group, (4.4yrs old and 4.9 yr.old subjects) the number of common phonological processes elicited through K.A.T and picture description were zero. This does not indicate that the children showed no phonological processes at all but indicates that there were no common phonological processes among stutterers and normal children. However, the varieties and total number of processes elicited in these age groups were more on employing K.A.T than on employing picture description task.

In the 5-6 yrs age group, the common phonological processes elicited through K.A.T and picture description were same for 5.1 yr old normal and stutterer. Also the total no of processes elicited were maximum on employing K.A.T than on employing picture description.

In 6.7 yr age group, the common phonological processes elicited through K.A.T, in both stutterers and normal children were greater than, those elicited through picture description. These findings are depicted in Fig 9.

DISCUSSION:

The results reveal several points of interest. First of all, young stutterers exhibit more varieties of phonological processes than normal children. This lends support to previous research (Louko et al, 1990) which indicates that young stutterers as a group exhibit greater variety of phonological processes. Second, the percent of occurrence phonological processes and the frequency of their occurrence were more in stutterers as compared to their age-sex-matched normals.

These two findings suggest a relation between stuttering and phonological processes. One of the reasons for their co-occurrence could be that the young children learn their problem sounds, due to over correction of their faulty productions. Children thus tend to work hard to produce those sounds accurately and quickly. This could be counter productive to children's speech fluency.

Third, the number of phonological processes increase with age, from 3 to 6 yrs, with a peak at 5-6 yrs. However, they reduce in the age group of 6-7 yrs.

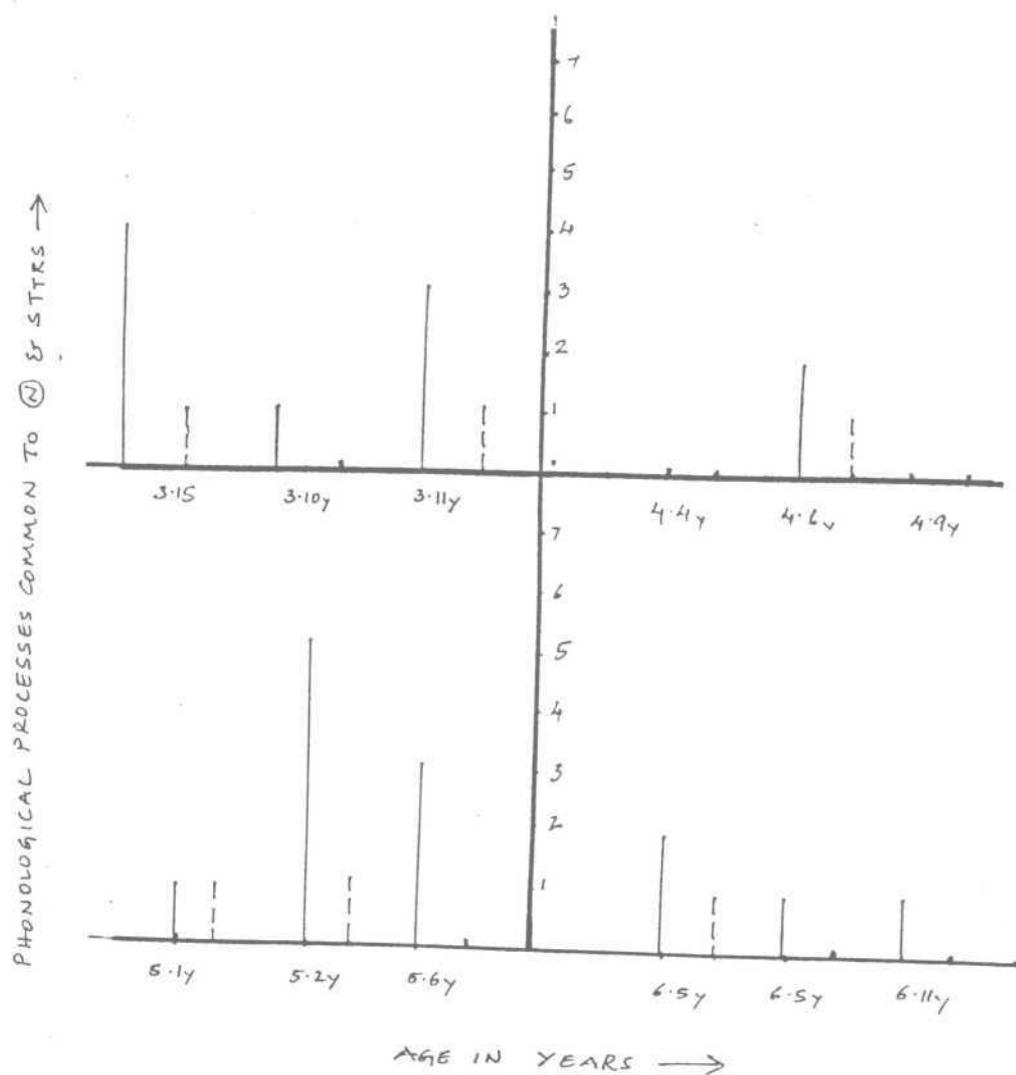


FIG 9: Phonological processes elicited through K.A.T and picture description.

———— STUTTERS
 - - - - - NORMALS.

With the 5-6 yr and 6-7 yr old children picture naming was employed as a task for kannada articulation test, but with 3-4yr and 4-5 yrs olds imitation task was employed. As picture naming is more complex than imitation, the 5-6 yr old might have showed more phonological processes than the earlier age groups. The reduction in the number of processes in 6-7 yr old children can be attributed to physiological maturation. Also, the difference in the number of processes in different age groups can be attributed to the appearance and disappearance of the phonological processes for eg: BR marked its appearance in 4-5 yr age group and CH was not seen in 6-7 yr age group.

Fourth, some processes were specific to stutterers and not seen in normal children. 50% or more stutterers showed FRIC, STP, LAT and M.P. FRIC, STP and LAT refer to manner of articulation. It is possible that M.P. could include one of the above processes. Manner of articulation is dependent on the area of constriction necessary for the phoneme production. As making a construction is a difficult task when compared to achieving the place of articulation, it is possible that the stutterers have more difficulty in these. LAT, FRIC, and STP are considered as deviant phonological processes by various authors (Weiss and Lilly White, 1987, Louoko et al, 1990). Since 83.33% of stutterers have exhibited one or more of these three deviant phonological process, it could be speculated that some percent of stutterers have disordered phonology.

Louko et al, (1990), Wolk et al, (1993), suggest that stutterers who exhibit disordered phonology may represent a sub group of stutterers. Thus the nature and course of remediation may be different for these children than for stutterers without is disordered phonology.

Conture (1990) suggests that, in children who stutter and exhibit speech sound problems, one needs to weigh the two problems. If articulation errors are consistent and severe enough, remediation of these errors are necessary. These children only need assistance in developing a physically easier, less hurried or rushed means of initiating and maintaining speech than careful, conscious, physically precise and over articulated productions of sounds.

Further, conture says that, in stutterers who are almost or completely unintelligible, it is difficult to give an experience of unhurried and physically easier forms of communication, because they are often bothered by listeners asking them to "say that again", what did you say" etc. According to conture, much more needs to be explored in this area.

Fifth, KAT test elicited more number of phonological processes than the picture description task in both stutterers and normal. K.A.T., has a consistent set of words, consisting of all phonemes of kannada language in a wide variety of phonetic environment. Each child was thus

given the same number of opportunities to exhibit each process. This advantage not only elicited more number of processes in the subjects, but also made the comparisons among subjects more objective.

Sixth, large number of variations were observed within the subjects of same age groups. Speech stimulation, encouraging baby talks, socio-cultural factors etc could have played a role.

It seems that disordered phonology and stuttering coexist, if not in all stutterers. This finding leads one to put forth several questions.

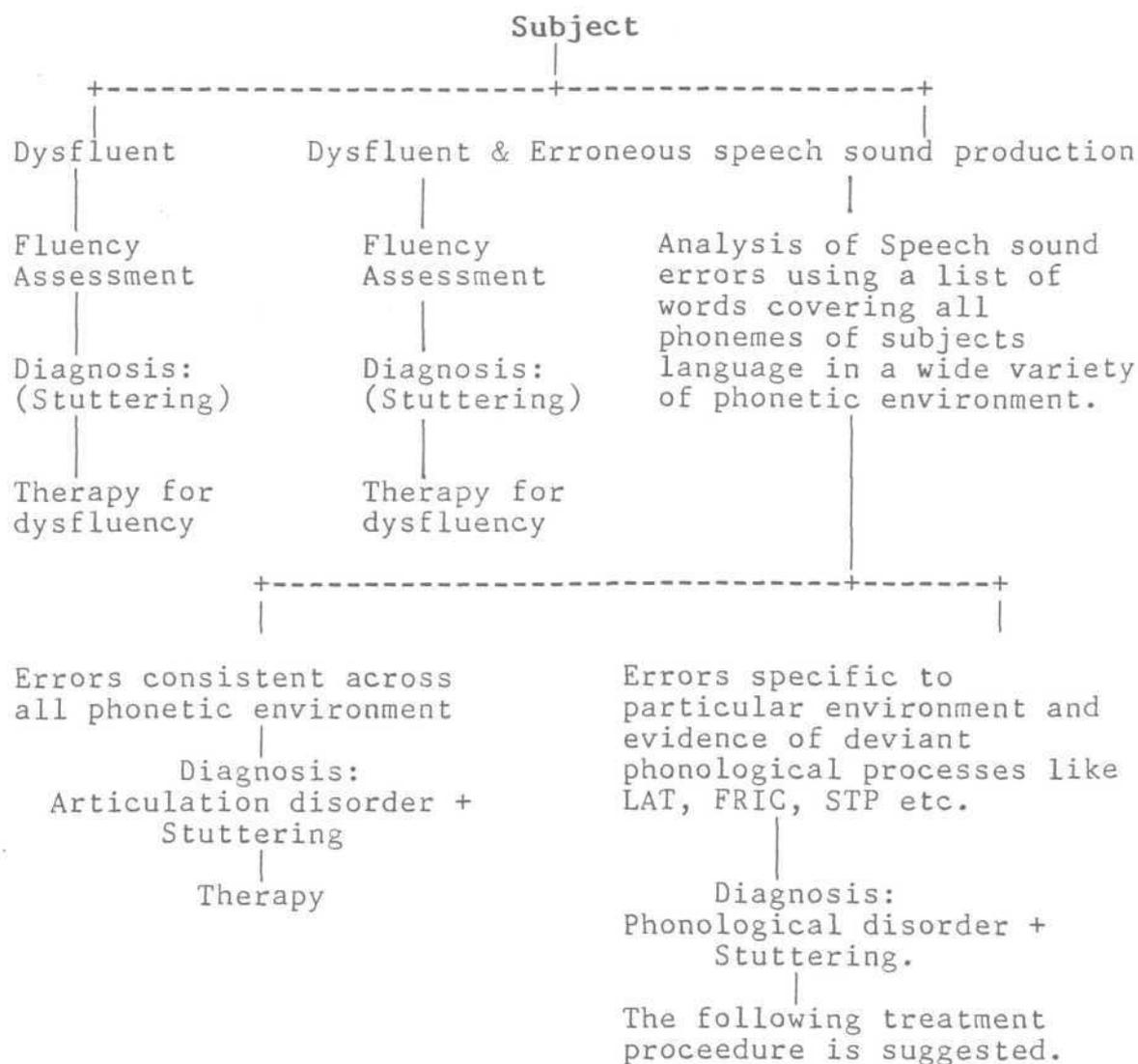
1. What does co-existence of the two disorders mean ?
2. Does one disorder influence the condition/status of another ?
3. Which one of the two disorders, has to be intervened first?

Coexistence of the two disorders could mean, that the two disorders, simply co-exist, or that the two disorders share the same etiology but yet result in different manifestation (Louko et al, 1990). Whether one disorder influences the condition / status of another is yet to be ascertained. However, in some instances, it is seen that the children stutter after therapy for articulation problem. It is probable that, they begin therapy too early for their

articulation problem, with the result that even though their articulation improves they learn their problem sounds and realize that, they have to work or be careful to produce these sounds correctly precisely and quickly. This may actually exacerbate their stuttering (Conture 1990).

As regards to the third question, one needs to weigh the two problems. If articulation errors are consistent and severe enough, remediation of these errors may be necessary. Children should not be given instructions in how to work at, force out or be careful or cautious in production of their problem sounds. They require help in developing a physically easier, less hurried or rushed means of initiating and maintaining speech rather than careful, cautious, physically precise over articulated productions of sounds. (Conture, 1990).

In the light of these findings the following procedure for assessment and management of young stutterers has been suggested:



A weightage for the severity of stuttering and phonological disorder could be used as follows:

Severe	-	3
Moderate	-	2
Mild	-	1

Depending on the weightage, if the presence of the phonological disorder contributes more to the communicative difficulty than stuttering does, then the phonological disorder needs to be remedied first, as the listeners reaction to the deviant speech production may in itself increase the dysfluency. If, however, the contribution of the phonological disorder to the communicative difficulty is less, then, the dysfluent speech is first remedied followed by correction of deviant phonological processes.

Further, the percent phonological process exhibited by the normal children in this study, could be used as cut-off scores (percent of occurrence of phonological processes for LAT, STOP & FRIC was zero, for normals)

Age	Cut of Scores
3 - 4 y	12.95%
4 - 5 y	4.44%
5 - 6 y	14.82%
6 - 7 y	2.42%

It would be interesting to assess the fluency and phonological processes in stuttering children which would be helpful for the treatment as well as contribute towards the concept of sub-grouping in stutterers.

CHAPTER V

SUMMARY AND CONCLUSION

The term Phonological process refers to systematic sound changes that affect classes of sounds or sound sequences (Edwards shriberg, 1983)

The present study aimed at comparing the phonological processes of three to seven years old, Kannada speaking stutterers with their normally fluent peers.

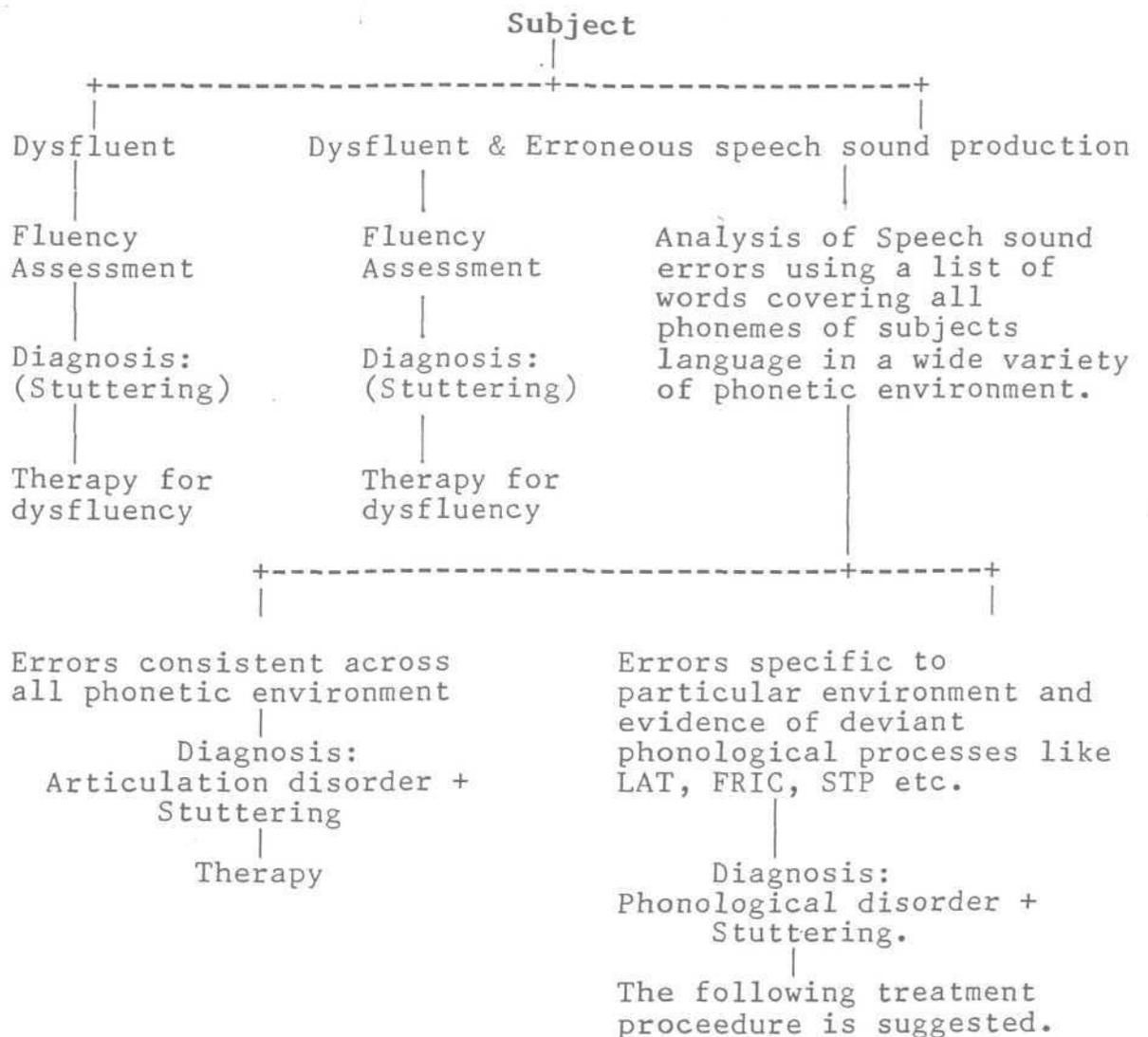
The speech samples of these children were obtained using Kannada Articulation Test and picture description task. The speech samples thus, obtained were analyzed for phonological processes: (Varieties, number, frequency and percent occurrence and specific processes)

The results indicated that Kannada Articulation Test elicited more number of processes than picture description task. The young stutterers were found to exhibit more varieties and more number of processes than their fluent peers. The frequency and percent occurrence of these processes were also high in the young stutterers than their fluent peers. Further, ten phonological processes: Stopping Frication, Multiple processes, Lateralization, Depalatalization, the Substitution of glide, Epenthesis, Inter change of place of articulation, Dimunutization and change in place of articulation were identified that were

specific to stutterers and not seen in normal children. Among these, Stopping, Frication and Lateralization were deviant phonological processes.

It appears that phonological disorder co-exist in a percentage of stutterers.

In the light of these findings the following procedure for assessment and management of young stutterers has been suggested.



A weightage for the severity of stuttering and phonological disorder could be used as follows:

Severe	-	3
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APPENDIX

I

Subject: ^c

Yashwant

Recorded on 13/10/98

76296

290 - 340

Syn 6mlhr

Δ: Mild Stuttering

Family history:
2 of his paternal
cousins have stg

OME - (N)

Intelligence - (N)

Hearing - (N)

No therapy

* Filled Pauses throughout the
Sample

K.A.T Sample: 84 words

ಕಲ್ಲುಮನೆ / ಕಲ್ಲುಮನೆ - Fronting

ಪುಸ್ತಕ / ಪುಸ್ತಕ - Metathesis

ಬಿಚ್ಚಿಕೊಡು / ಬಿಚ್ಚಿಕೊಡು (ಬಿಚ್ಚಿಕೊಡು) deletion(?) 'addit'

ಫಿ ಎ ಓರೂ - Epin thesis

ಬೆಕ್ಕು - cluster reduction

ಓಓ - Fronting

ಬೇವು - Fronting

ಕೊಕ್ಕು - Consonantal harmony

ಎಓ - Ant production of /u/

ಕೆಓ - - - -

ಬೆಕ್ಕು - cluster reduction

ಬಿಚ್ಚಿಕೊಡು - Initial consonant deletion

ಬಿಚ್ಚಿಕೊಡು - Final " "

PATIENT DATA SHEET.

FORM - B - DIAGNOSTIC ART

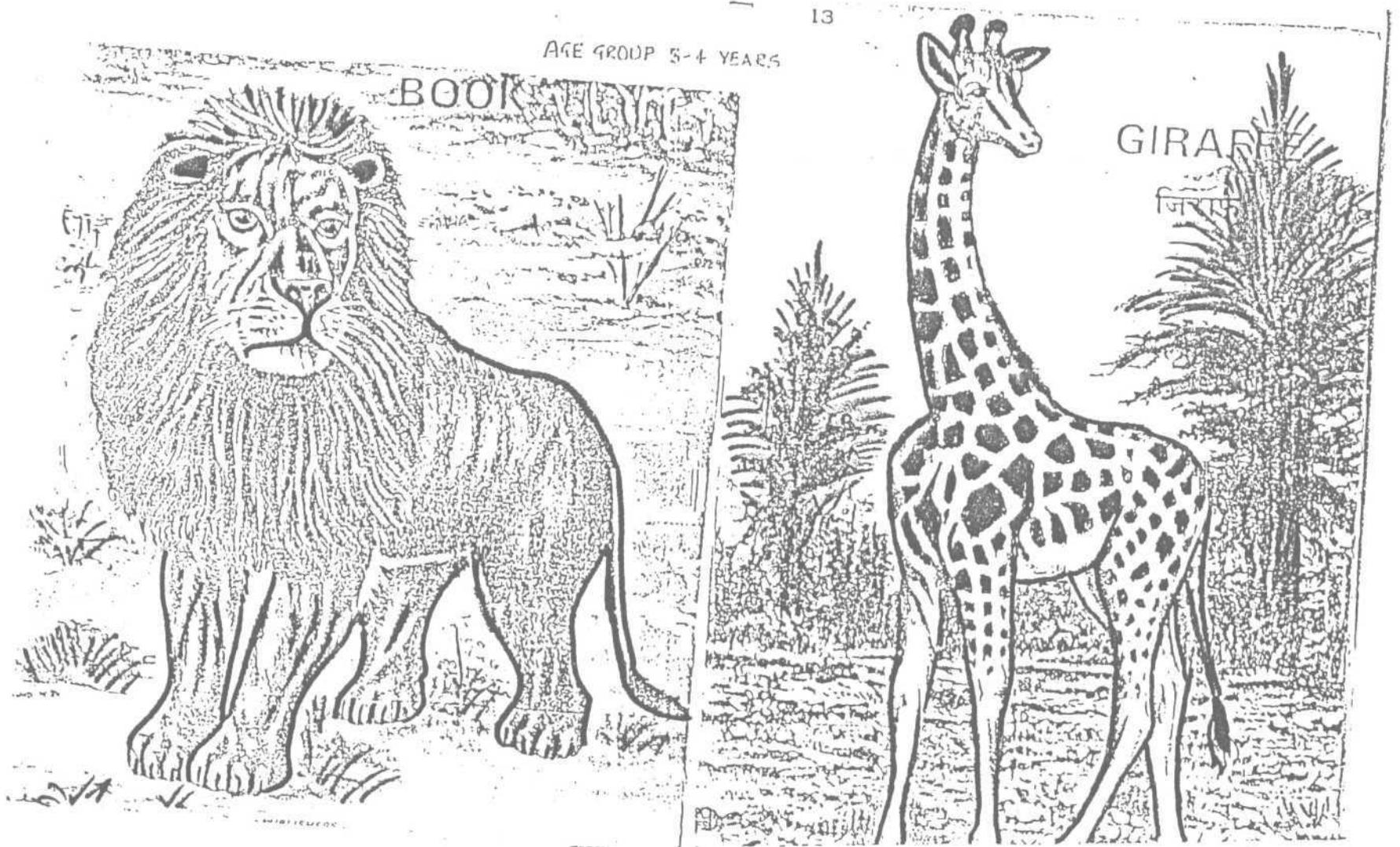
Key: Please mark substitutions with phone
omissions (-) distortions (x).

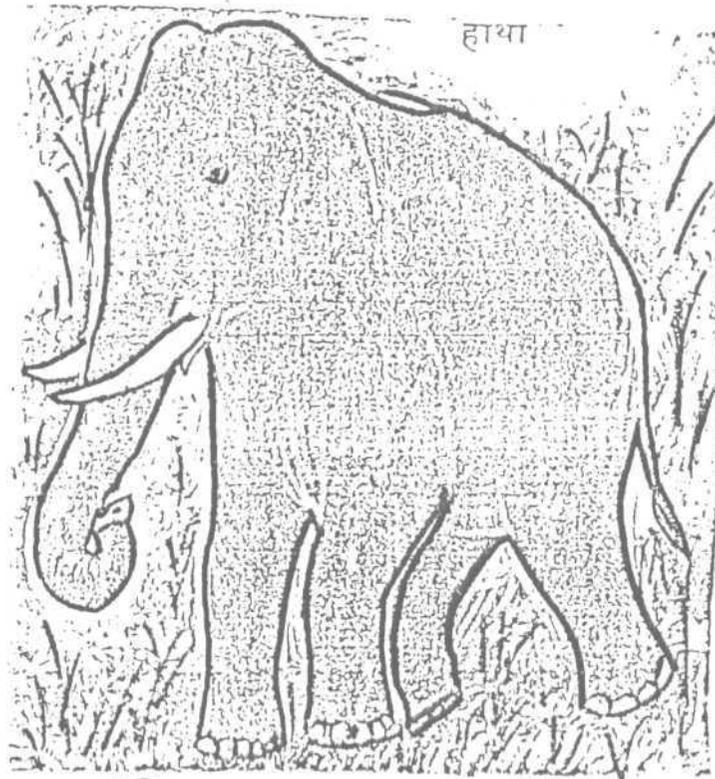
Sl. No.	Phoneme to be tested	Card No.	Initial position	
			Check word	Response
1.	ಅ	1.	ಅಳಿಲು	
2.	ಆ	2.	ಆನೆ	
3.	ಇ	3.	ಇಲಿ	
4.	ಈ	4.	ಈ ಳಿಗಮಪಿ	
5.	ಉ.	5.	ಉಗುರ	
6.	ಊ	6.	ಊಟ	
7.	ಎ	7.	ಎಲೆ	
8.	ಏ	8.	ಏಳು	
9.	ಐ	9.	ಐದು	
10.	ಒ	10.	ಒಂದು	
11.	ಓ	11.	ಓಲೆ	
12.	ಔ	12.	ಔಷಧ	
13.	ಕ	13.	ಕನ್ನಡಕ	
14.	ಗ	15	ಗಡಿಯಾರ	
15.	ಚ	17.	ಚಮಚ	
16.	ಜ	19.	ಜಡೆ	
17.	ಟ	21.	ಟೋಪಿ	
18.	ಠ	23.	ಠಡೆ	
19.	ಠ	25.		
20.	ಠ	26.	ಠಕ್ಕಡಿ	
21.	ಠ	28.	ಠಾಳಿಂಜಿ	

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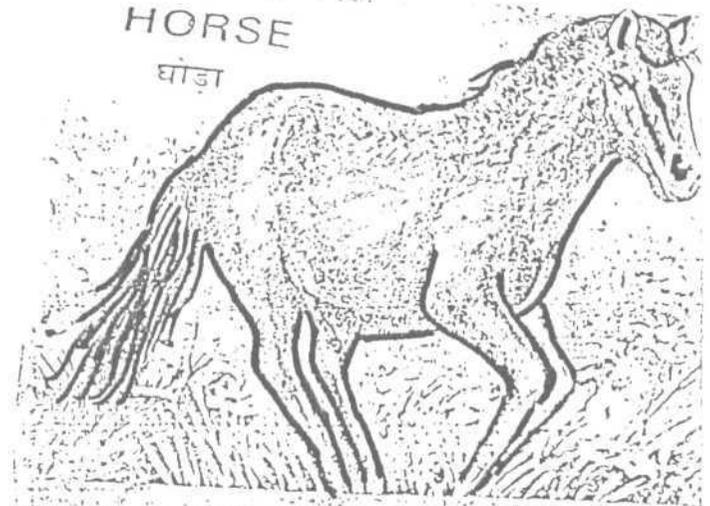
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MATERIAL FOR PICTURE DESCRIPTION TASK.

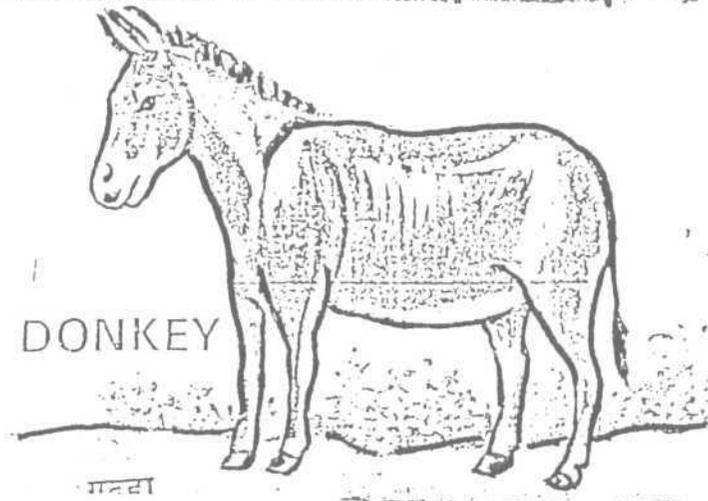




हाथा

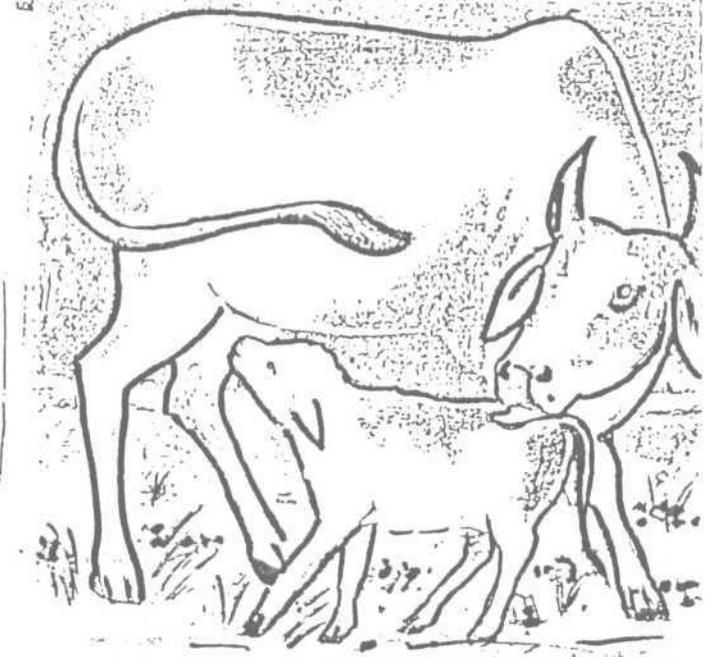


HORSE
घोडा



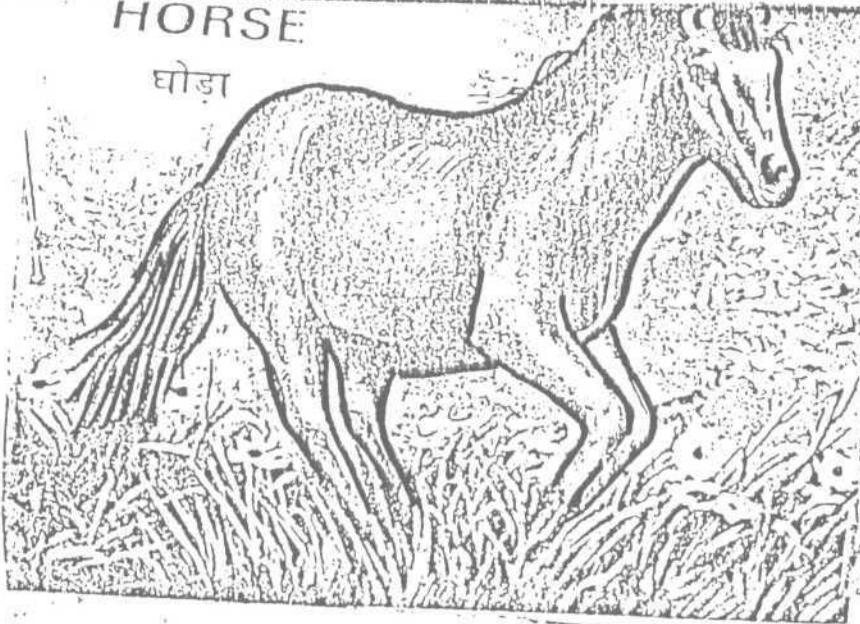
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मन्दी



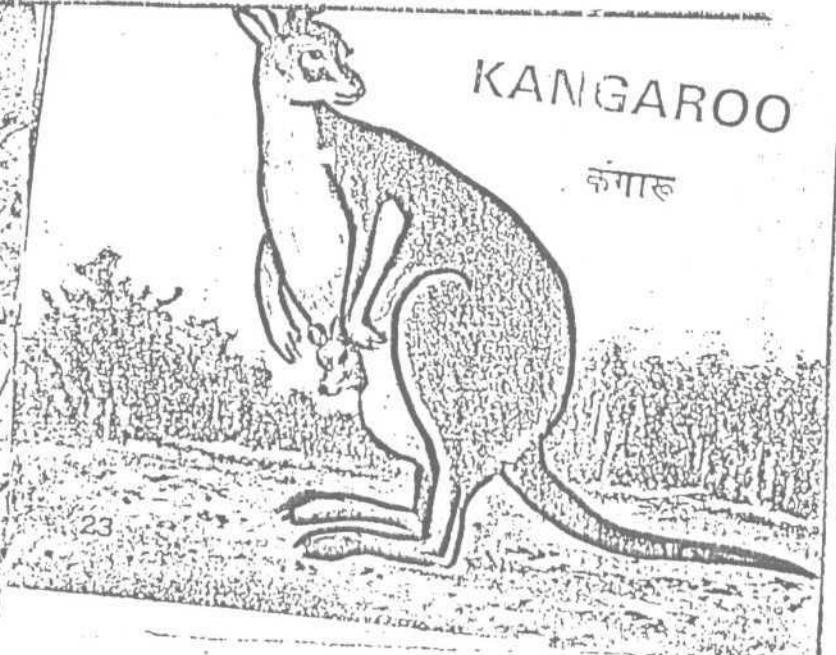
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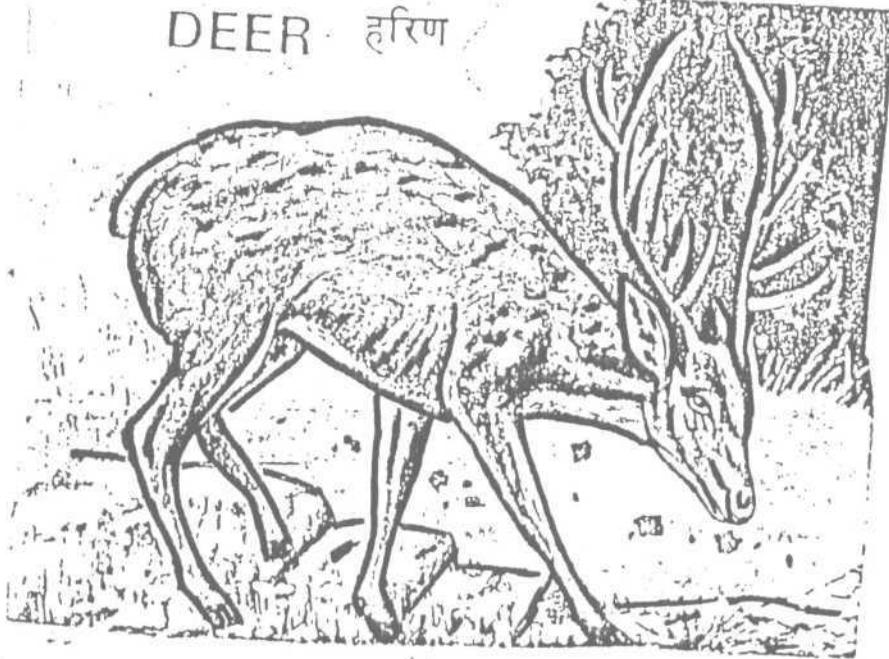


KANGAROO

कंगारू

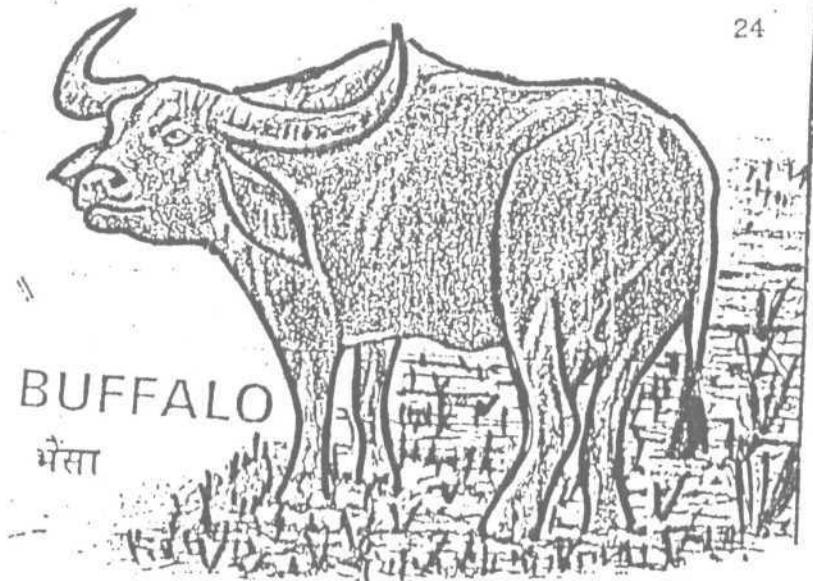


DEER हरिण



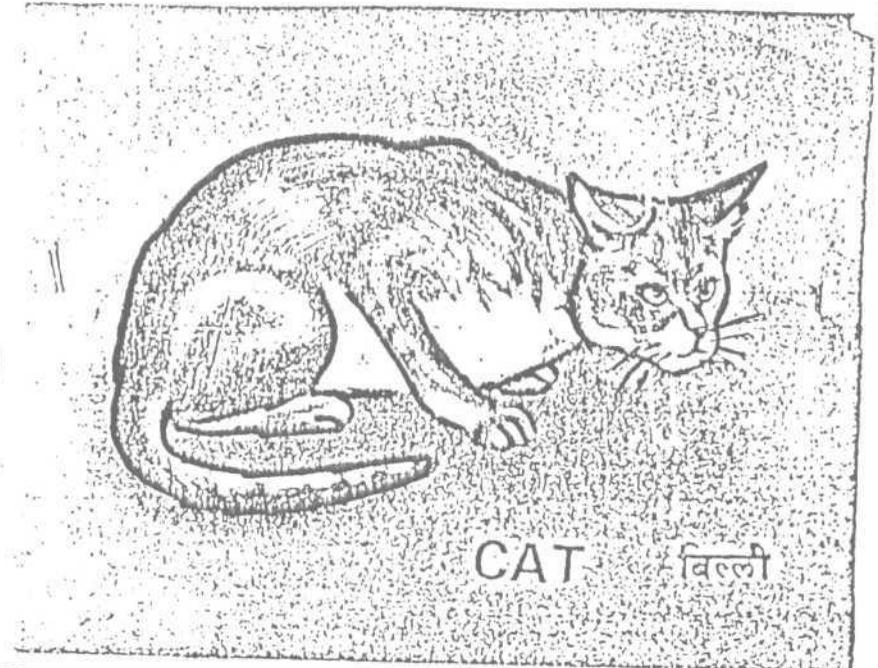
BUFFALO

भैंसा



SQUIRREL

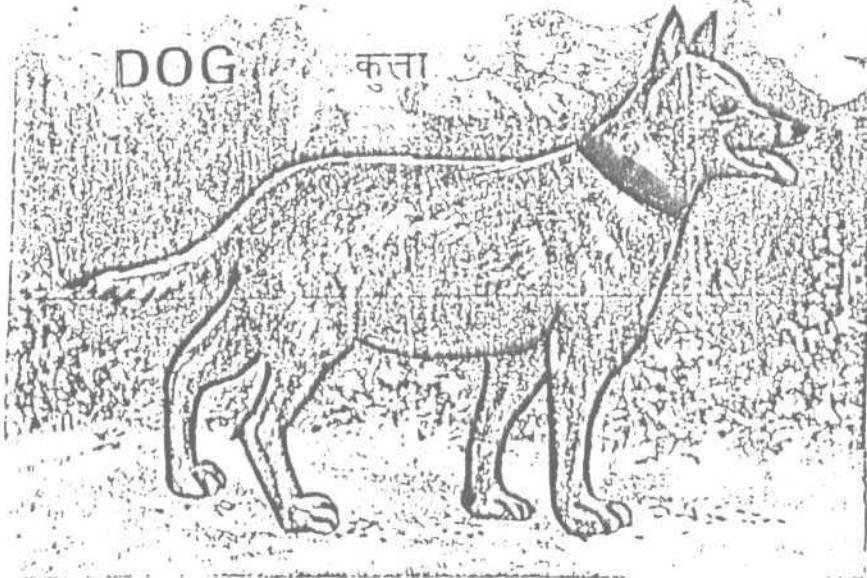
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CAT बिल्ली

DOG

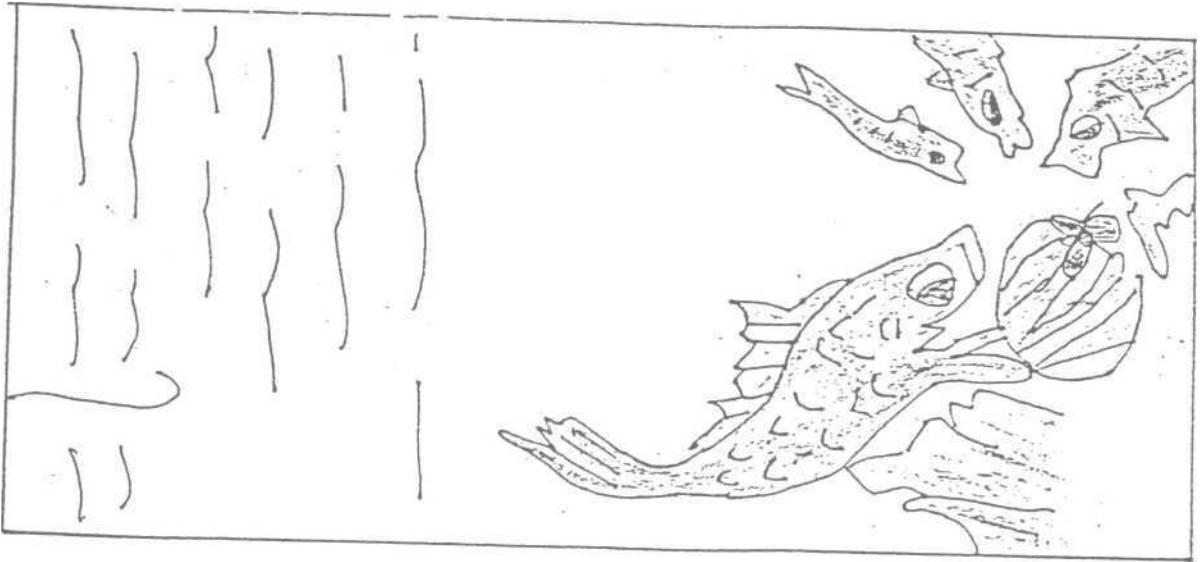
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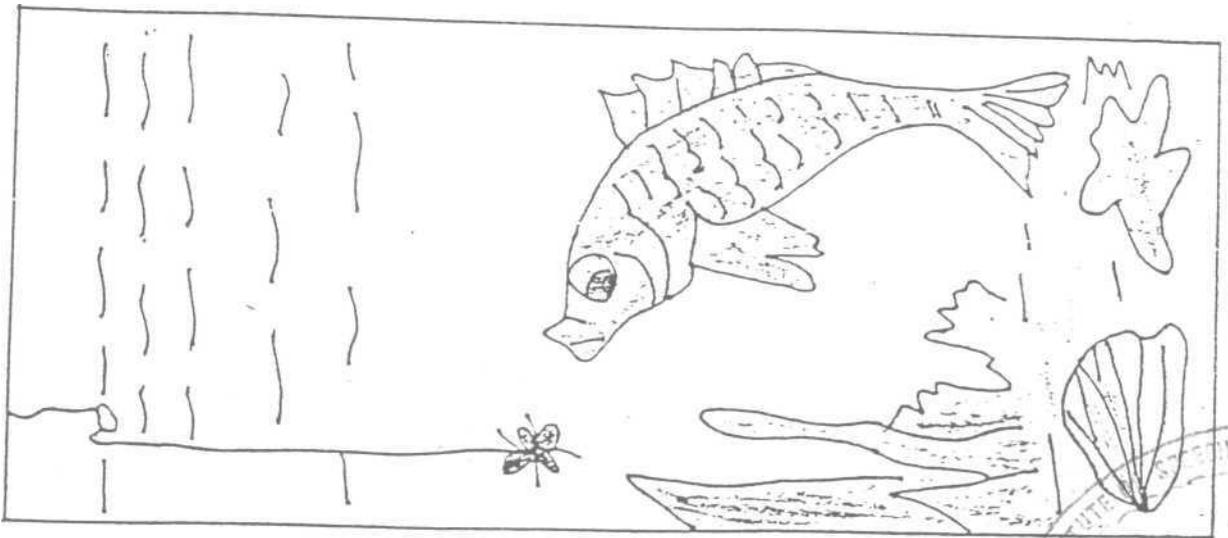
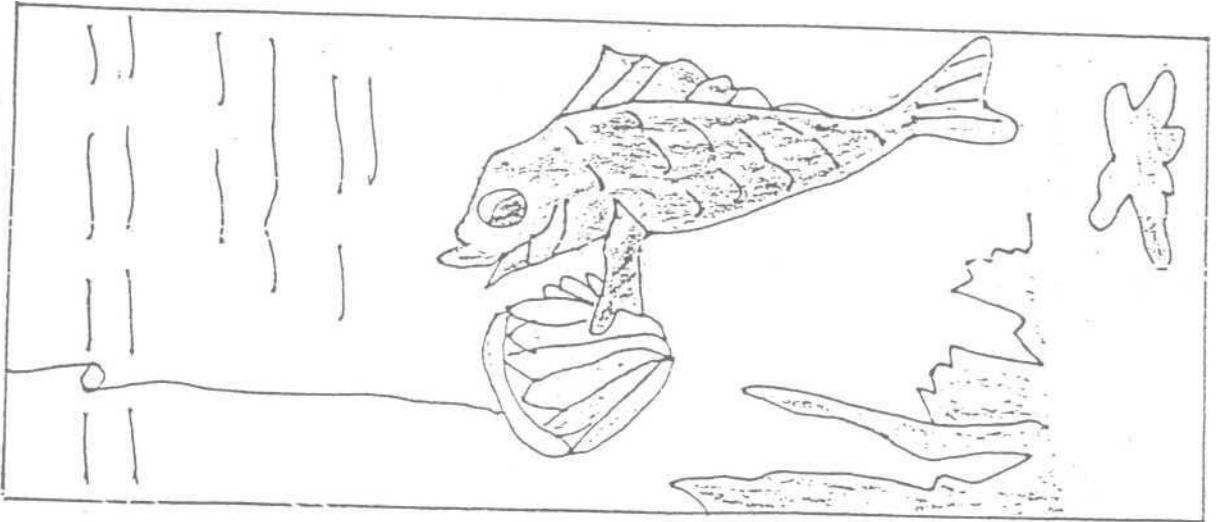
RABBIT

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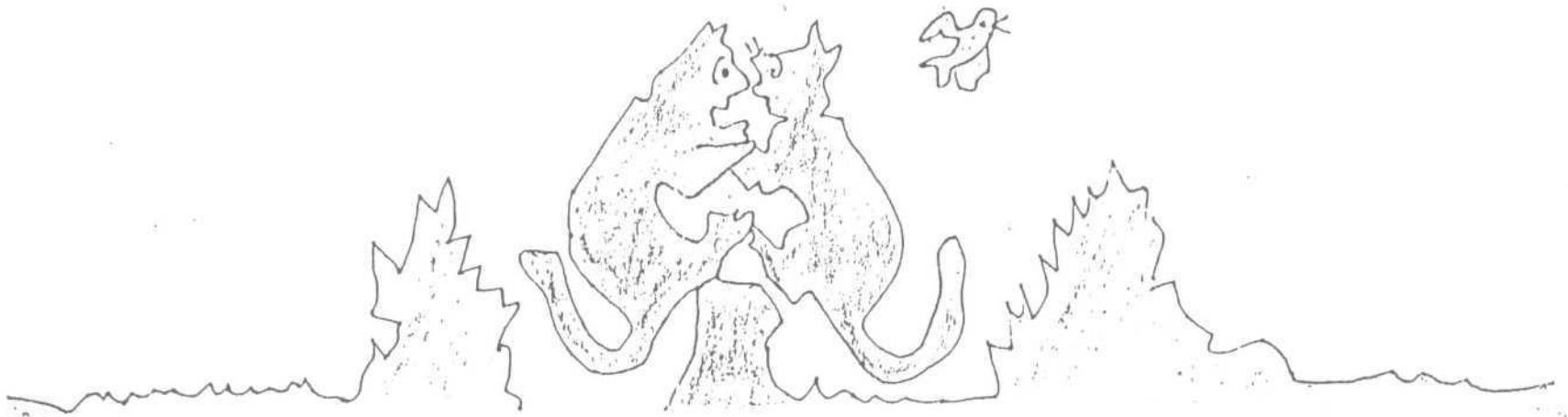
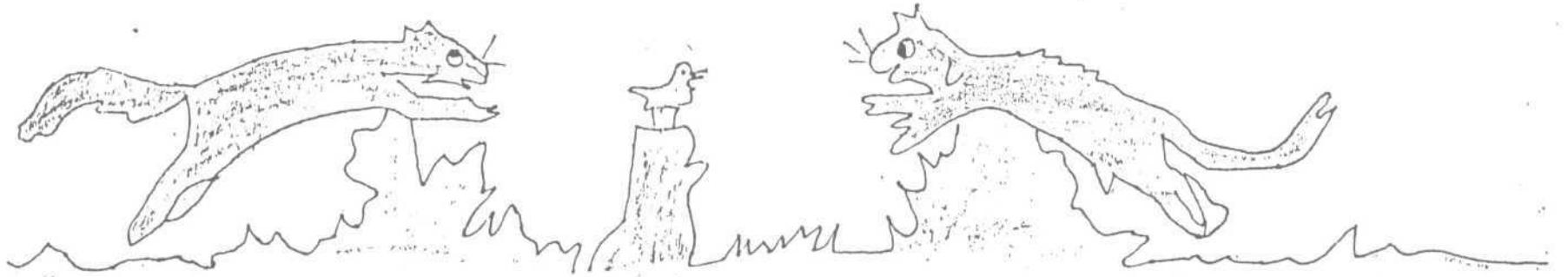
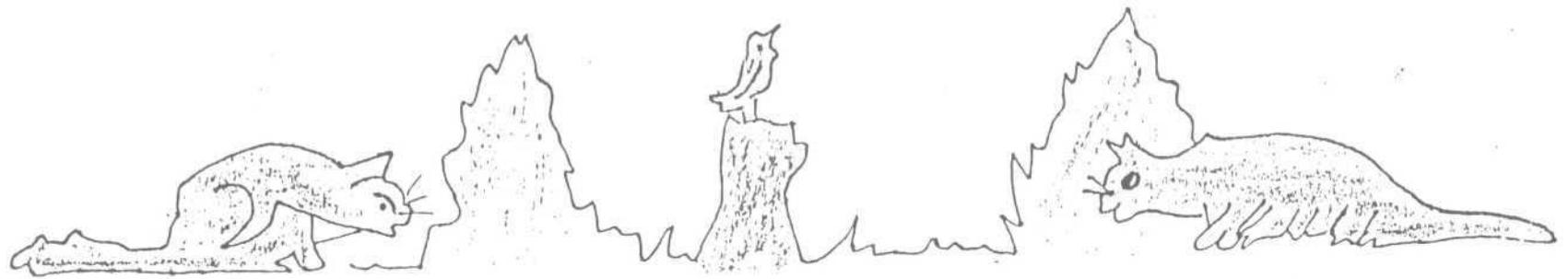


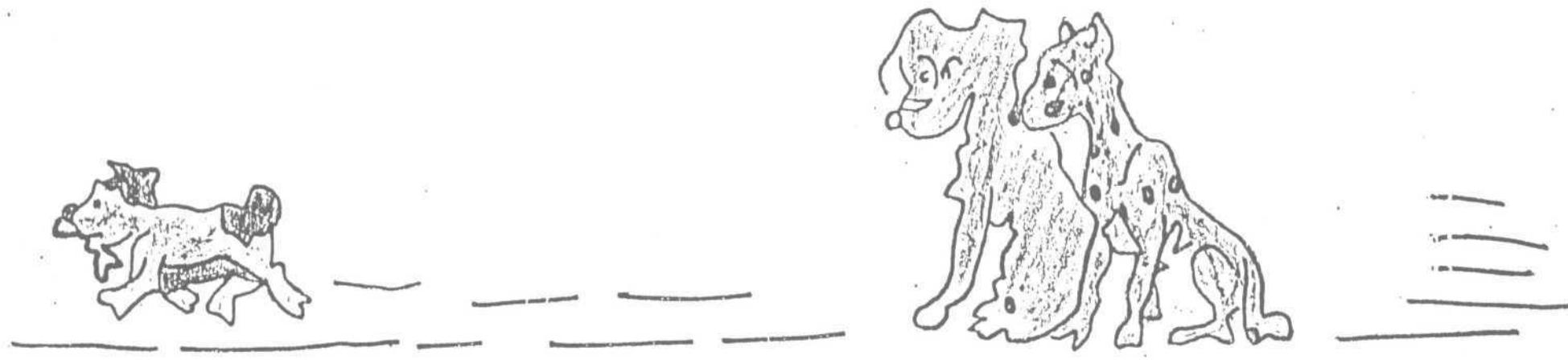
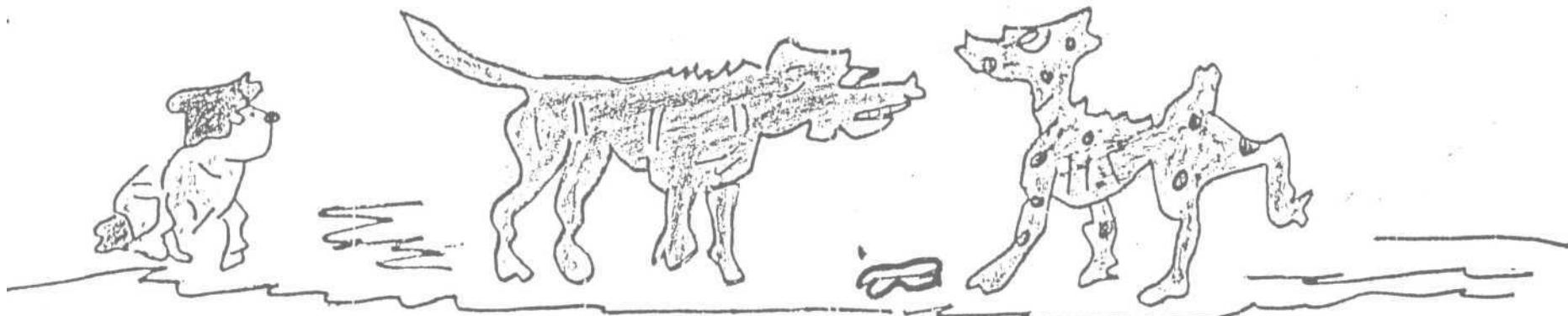


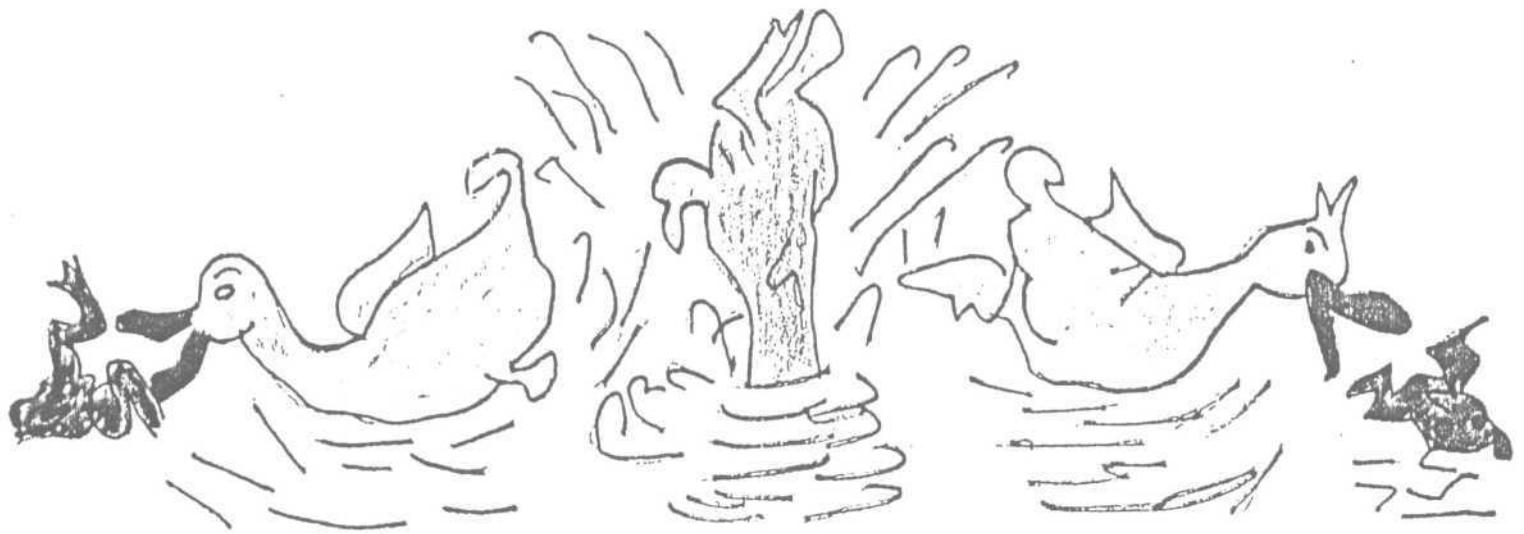
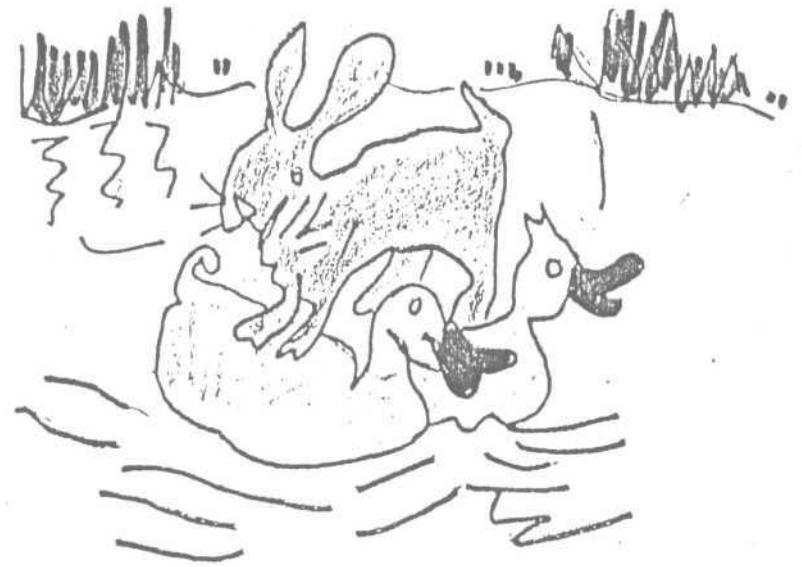
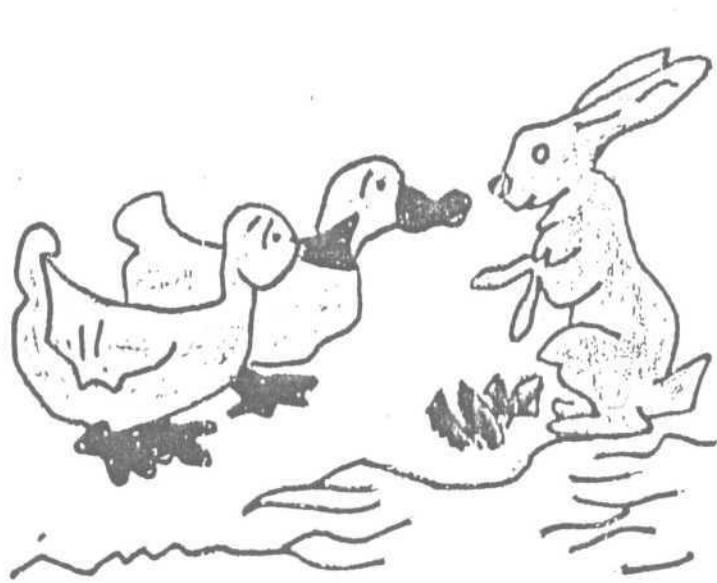
AGE GROUP 4-5 YEARS

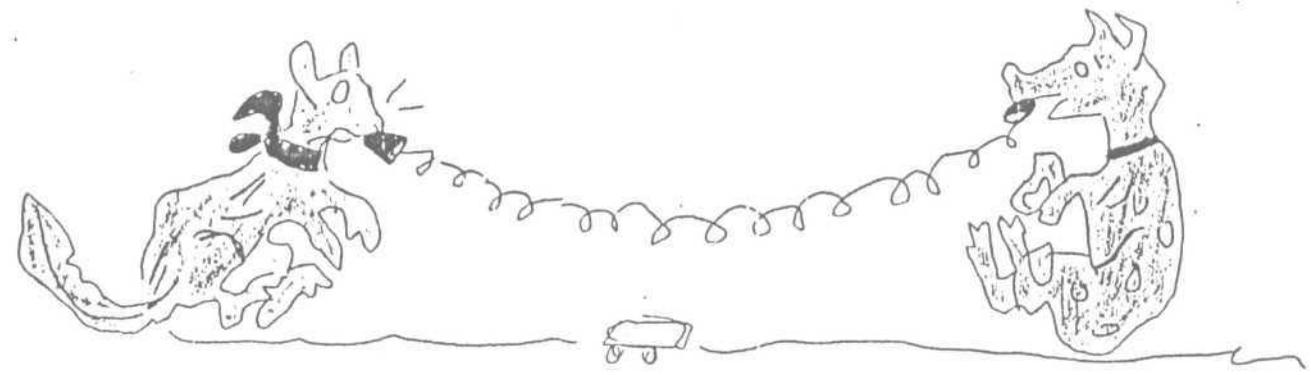
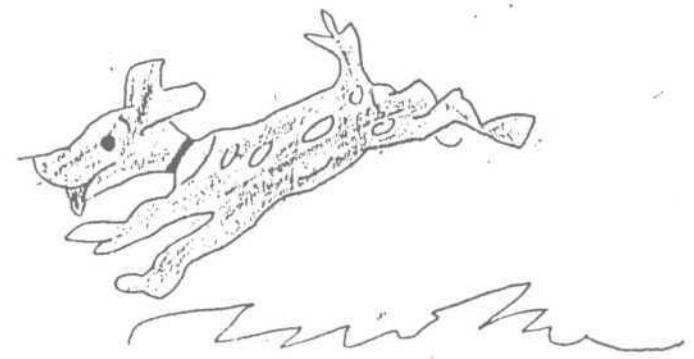
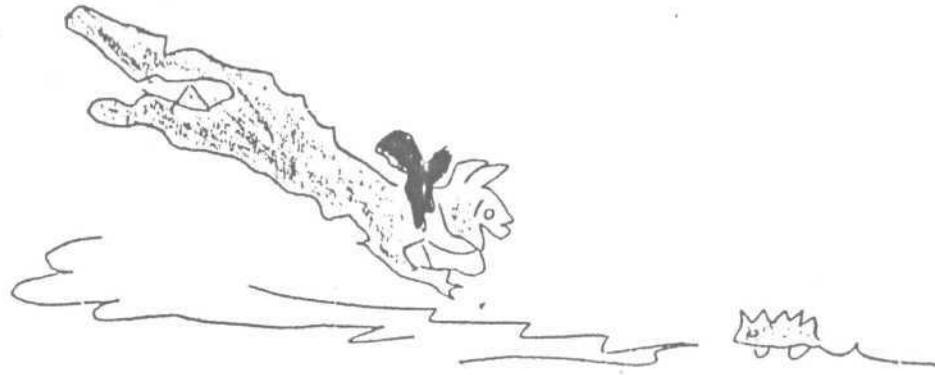


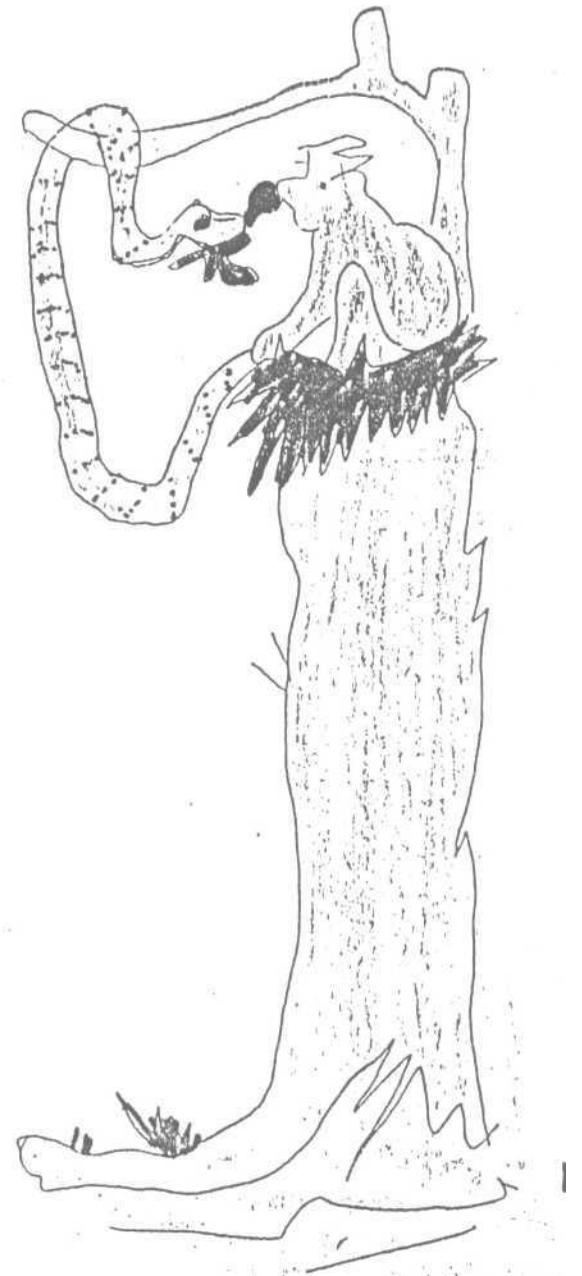
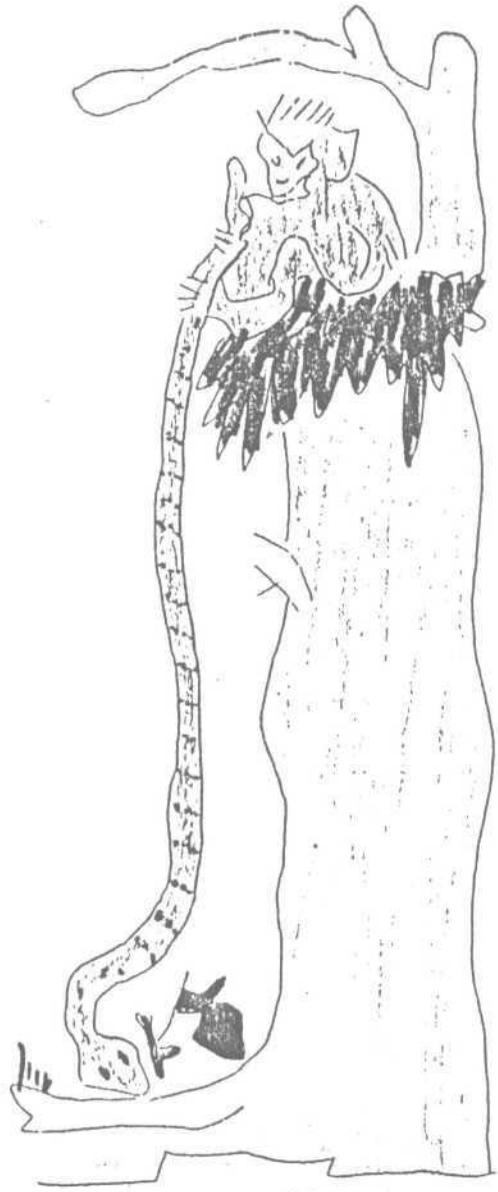
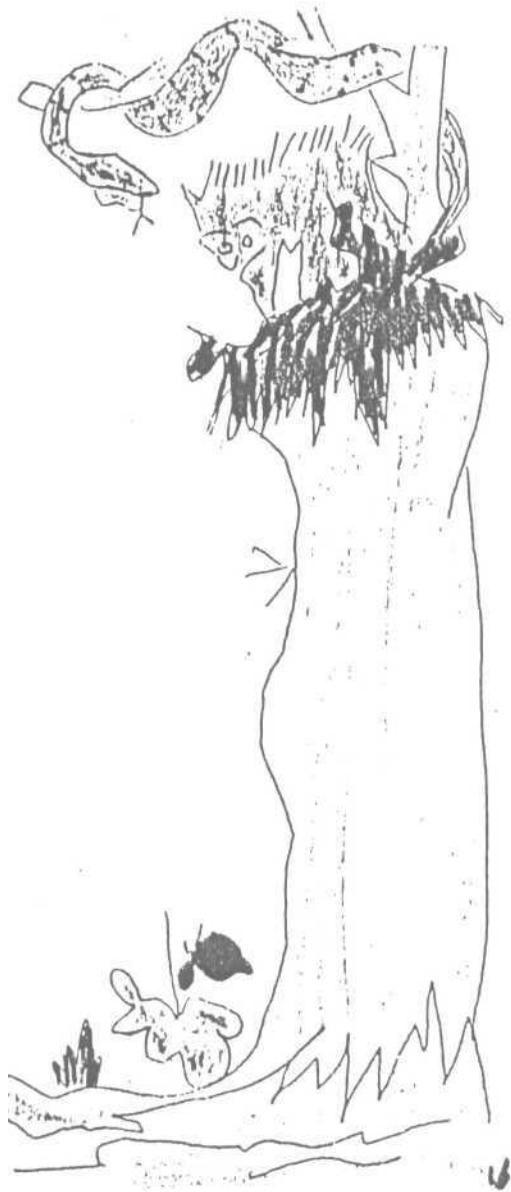
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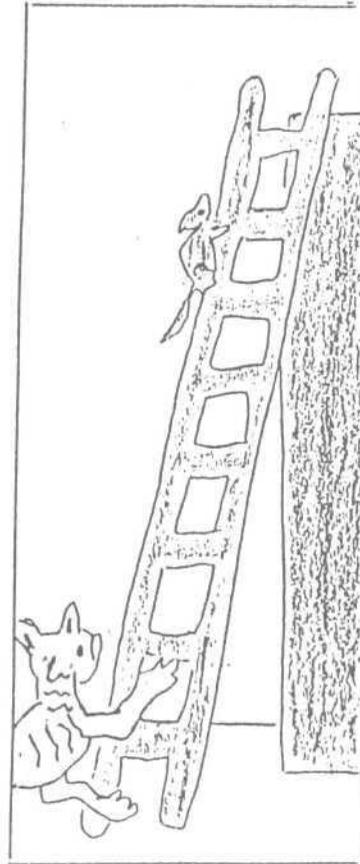
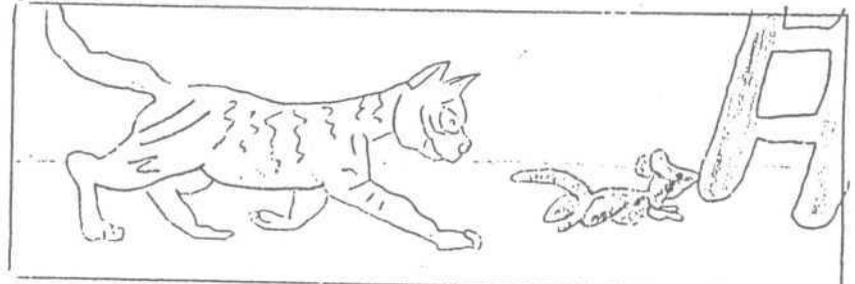
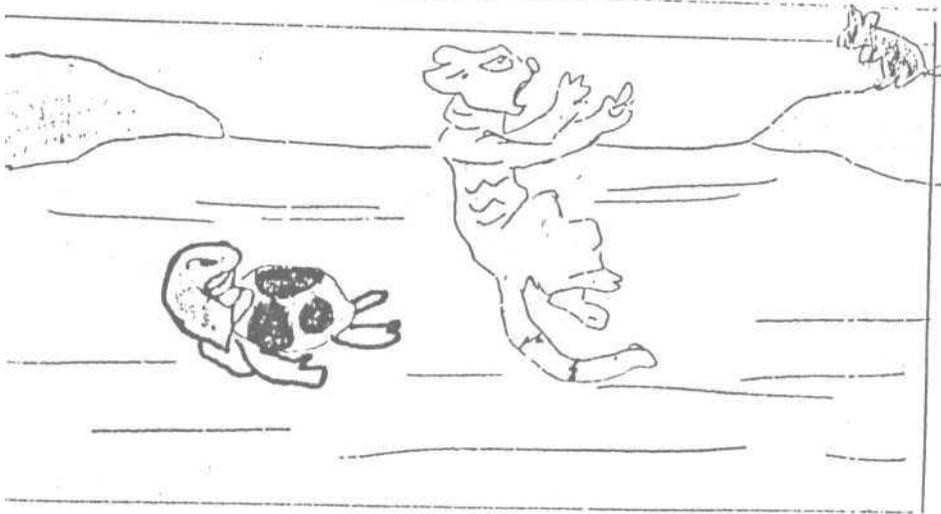
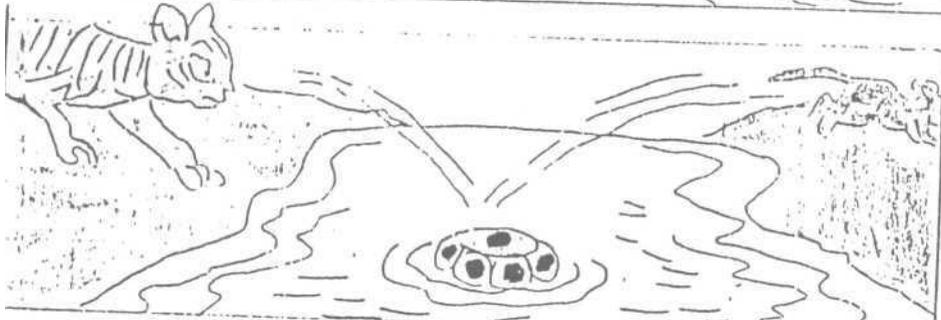
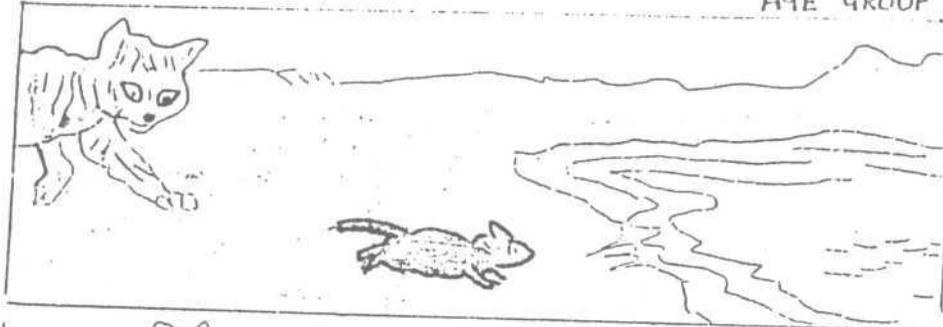


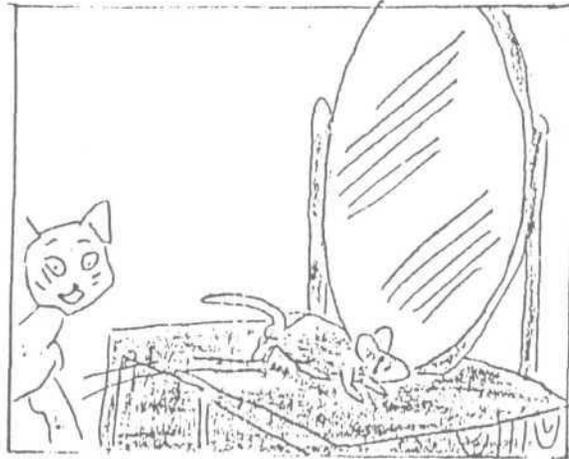
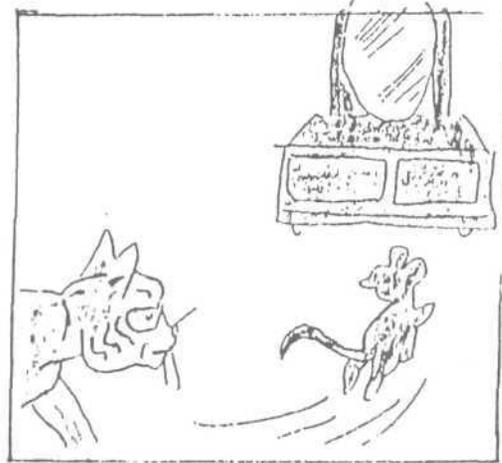
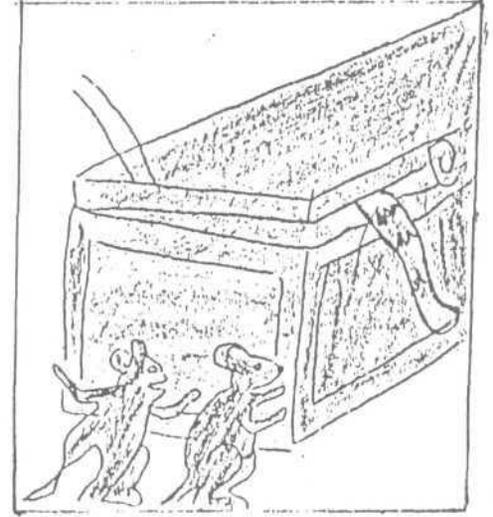
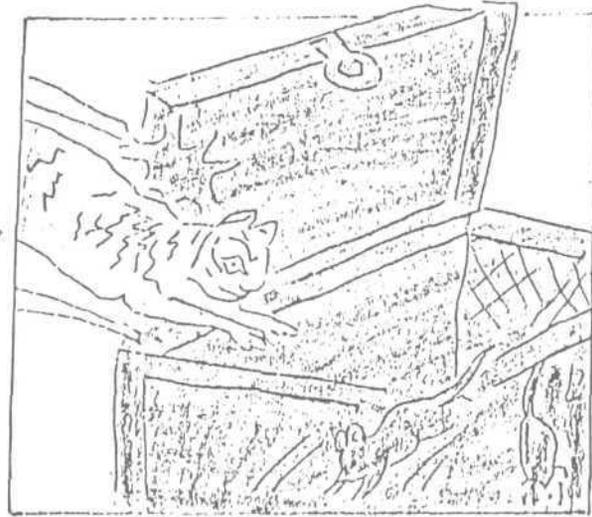
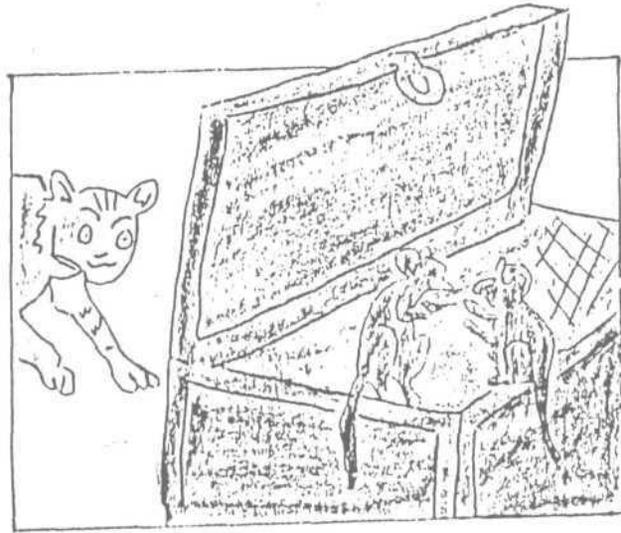


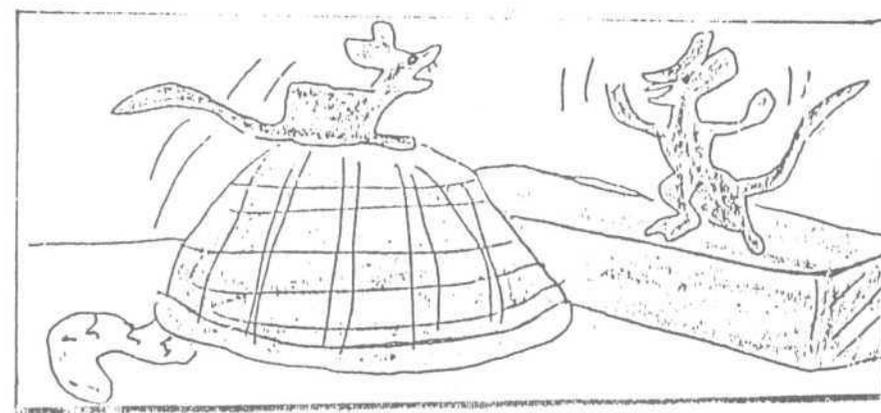
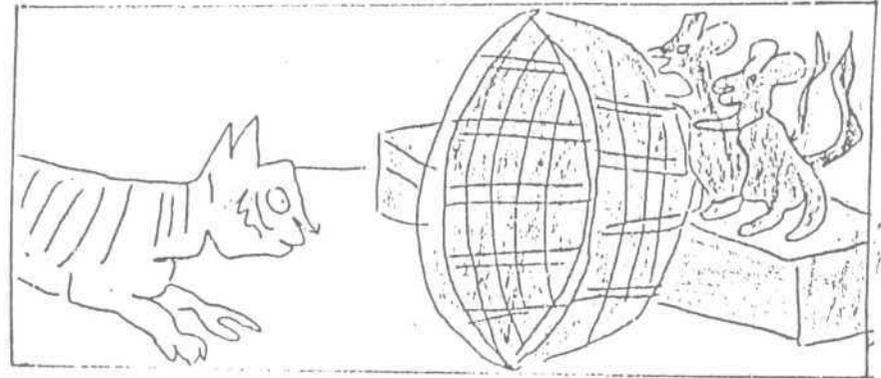
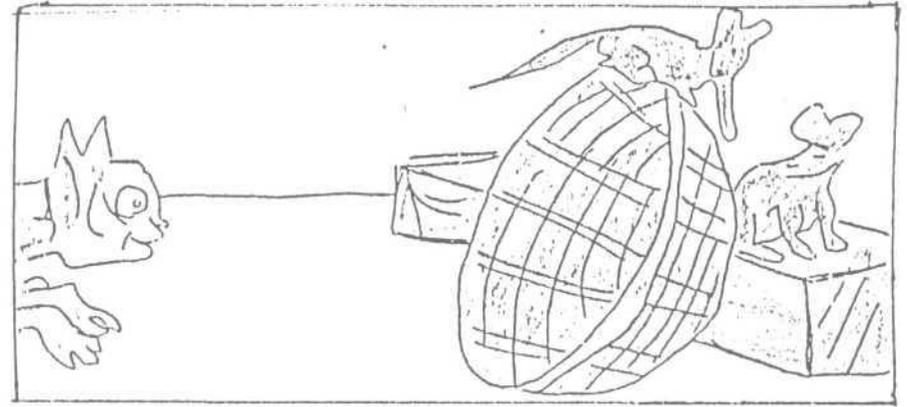
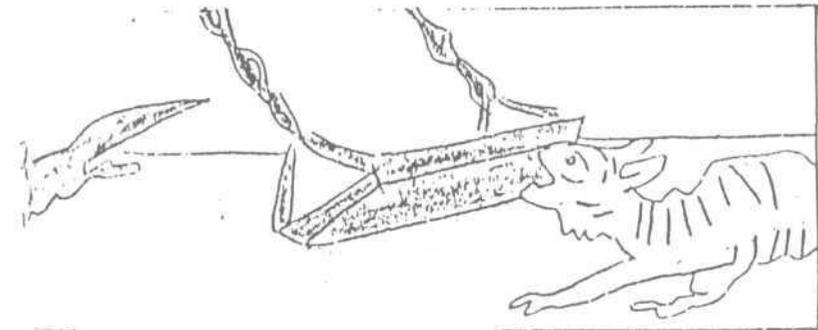
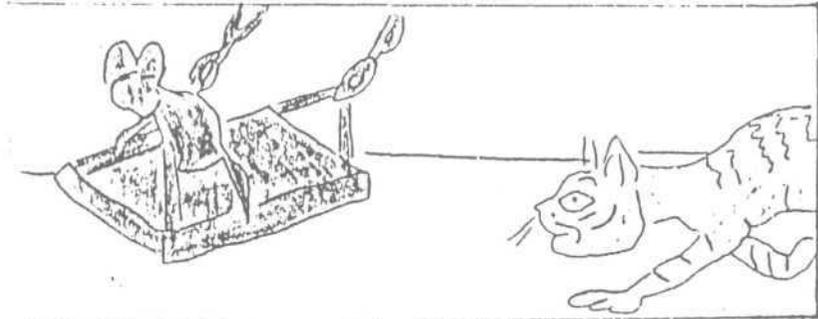
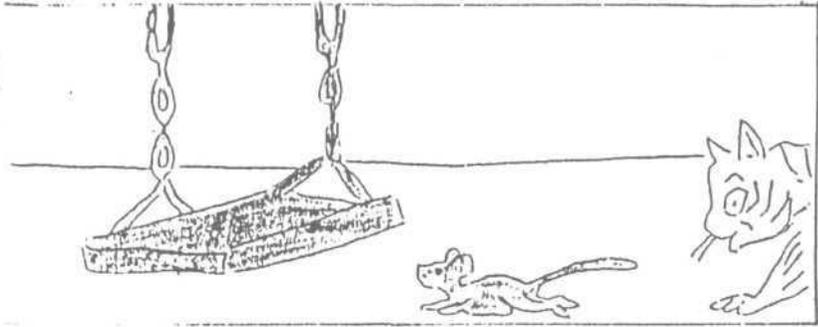




AGE GROUP 5-6 YEARS







AGE GROUP 6-7 YEARS

