INTERACTION OF SIMULTANEOUS LANGUAGE PROCESSING AND SPEECH MOTOR ACT IN YOUNG STUTTERERS

Nanda kumar (v)

REGISTER No.M9206

A DISSERTATION SUBMITTED AS PART FULFILLMENT OF M.SC. (SPEECH AND HEARING) TO THE UNIVERSITY OF MYSORE

ALL INDIA INSTITUTE OF SPEECH AND HEARING, MYSORE - 570006

1994

To

MY GUIDE

Savithri ma'm

CERTIFICATE

This is to certify that the dissertation entitled : *INTERACTION OF SIMULTANEOUS LANGUAGE PROCESSING AND SPEECH MOT0R ACT IN YOUNG STUTTERERS* is the bonafide work in part fulfilment for the deqree of Master of Science (Speech and Hearinq), of the student with Register No.M9206.

Director,
All India Institute of
Speech and Hearing
Mysore 570 OO6.

CERTIFICATE

This is to certify that this dissertation entitled

INTERACTION OF SIMULTANEOUS LANGUAGE PROCESSING AND SPEECH MOTOR ACT IN YOUNG STUTTERERS

has been prepared under my supervision and guidance.

Savithri. S.R. April 1994
Guide

Dr. SAVITHRI S.R.
Lecturer
Dept. of Speech Sciences
All India Institute of
Speech and Hearing
Mysore 570 006.

DECLARATION

This dissertation entitled INTERACTION OF SIMULTANEOUS LANGUAGE PROCESSION AND SPEECH MOTOR ACT IN YOUNG STUTTERERS is the result of my own study under the guidance of Dr. SAVITRI S.R. , Lecturer, Department of Speech Sciences, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any university for any other Diploma or Degree.

Mysore – 6
Date : Reg. No.M9206

ACKNOWLEDGEMENTS

I would like to express my deep sense of gratitude to my guide and teacher, Dr. Savithri S.R., Lecturer, Department of Speech Sciences, A11 India Institute of Speech and Hearinq, Mysore 570 006, for her remarkable patience and for her constant concern, encouraqement, invaluable guidance and support rendered to me at every diftiult aspect and Tacet of this study. Thank you ma'am for seeing me through .

I thank Dr. (Hiss) S. Nikam, Director, A11 India Institute of Speech and Hearinq, Mysore, for having given me the permission and opportunity to undertake this dissertation.

It would have been impossible to finish the investiqation without the active co-operation of my subjects who participated in the study with extreme patience.

My sincere thanks to Venkatesh Sir for beinq there with the generous heart, to help, whenever I needed.

Achen, Amma, Habuettan and Sindhumol - Thanks for everying - for loving, listening, caring, understanding, supporting and — reassuring.

Deepa for beinq with me through out this study. Without you I would have had tough time.

Sureshji - Thanks for all the help.

Sunitha — "You are someone who's more wonderful than words could ever say". Thanks for everything dear sister.

Asha - for your love and support. "As a friend you leave little to be desired".

Thanks a lot all my classmates especially Sunil, Pani, Rasitha, Suma and Jyothi to be for being constant companion throughout my AI1SH life, and for being a support all the ways.

Neethu - Thanks for everything.

Salaj, Priya and Vineta - 1 will never forget those yesterdays of fun joy, laughter and togetherness.

Kiran, viji, Rukku - Thank you for all vour help. You will always have a special place in my heart. Need 1 say more ...

Arun, B.D., Monu, Aju, Manu, Venn, Kannan - for makinq the year more memorable and wonderful.

Last but not the least, I thank Rajalakshmi AKka for her moral support and also changinq the illegible looking material to a beutiful script in a short span of time.

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INTRODUCTION

"Stuttering is no simple speech impediment. . it is a mysterious question and a puzzle. the pieces or which lie scattered on the tables of speech patholoqy, psychiatry, neurophysioioqy, genetics and many other discipline. Linguistics could be one such important discipline in which to look for the essential pieces of the puzzle that are still missing" (Van Riper, 1982).

Many definitions of stuttering have been offered in the past, some by stutterers and some by non-stutterers. Host of the definitions have been primarily descriptive in nature. They have included mention of abnormal amounts of hesitations, repetitions and prolongations of sounds, syllables and words, and have described accompanying bodily movements which were obvious to the listener. Other attempts at definitions have ignored the observable behaviour and concentrated on underlying physiological dysfunctions or psychological disturbances which were felt to be the real problem, with the speech disruption merely symptomatic of these basic difficulties.

Wingate (1964) defines stuttering as a

(i) (a) disruption in the fluency of verbal expression, which is (b) characterized by involuntary, audible or silent repetitions in the utterance of short speech elements, namely: sounds, syllables and words of one syllable. These disruptions (c) usually occur frequently or are masked in character and (d) are not 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 infreguently (f) indications or report of the presence of an emotional state, ranging from a general condition of "excitement" or "tension" to more specific emotions or a negative nature such as fear, embarrassment, irritation, or the like (g) the immediate source of stuttering is some incoordination expressed in the peripheral speech mechanism and the ultimate cause is presently unknown and may be complex or compound.

Stuttering has plagued humanity for centuries, and undoubtedly the theories for stuttering has plagued the Speech pathologist for almost the same length of time. But still there is no accepted definition or description of stuttering, a single theory to explain causation or rationalize therapy, or even consistent agreement in many replications of similar (Ham, 1986).

Several investigators have vigorously examined the possible cause of stuttering and it has been reported that there are many factors which play a significant role in the development of stuttering. These have been reviewed in detail by Van Riper, 1982; Andrews, Craig, Feyer, Hoddinot, Homie and Nelson, 1983; Bloodstein, 1985. They include -

(a) Emotional states such as anxiety and fear (Wischner, 1952; Johnson, 1955; Brutten and Shoemaker, 1967; Sheehan, 1970; lckes and Pierce, 1973; Martin and Venables, 1980; Zimmerman, 1980; Bloodstein, 1981; Van Riper, 1982);

(b) Communicative stress including parental and other listeners attitudes and perception (Johnson, 1942; Hegde, 1982; Meyers and Freeman, 1985; Martin and Horoldson, 1988);

(c) Learning in various forms, for example acquiring beliefs about communicative skills or classical conditioning of negative emotions in response to speech related stimuli (Wischner, 1952);

(d) Genetically transmitted *or* acquired deficit in sensory motor skills (Cox, 1984);

(e) Perinatal, medical, developmental and language histories (Blood and Seider, 1981; Bloodstein, 1981; Andrews, Craig, Feyer, Hoddinot, Howie and Nelson, 1983);

(f) Cultural factors (Johnson, 1942; Snidecor, 1947; Steward, 1959; Bloodstein, 1981; Van Riper, 1982); and

(g) Organic factors (Shwartz, 1975k).

The idea that stutterers can even be classified according to types, has been expressed by numerous investigators during the past 20 years, and now the approaches to sub—grouping focus either on motoric or linguistic factors.

Peters and Starkweather (1990) hypothesized that there *are* sub-groups of stutterers such that one group develop the disorder primarily out of a motor deficit, while another group develops it primarily out of a linguistic deficit. According to them, combinations of such deficits *are* also possible, and it could be that an imbalance between linguistic and motoric development could be related to stuttering.

They have postulated three hypotheses based upon this idea. These *are* -

1. There may be sub-groups of stuttering with regard to the relationship of language to stuttering.

S. The language and speech motor processes may interfere with one another during the act of talking, at least in children who *are* beginning to stutter.

3. Competence and performance have differential effects on fluency.

The present study was planned to test the hypothesis that language and speech motor processes may interfere with one another during the act of talking. Specifically, stuttering children in the age range of 9-12 years would be tested for the interference of language and speech motor processes.

CHAPTER II

REVIEW OF LITERATURE

"Approaches to stuttering, whether for theory construction or therapy, have tended in the last few years to focus either on motoric or linguistic factors. It is quite clear at the descriptive level that stutterers, young and old, produce speech in a way that is motorically aberrant, but this fact does not lead very obviously in any therapeutic direction. On the other hand, the literature on stuttering and language, although less well developed, has nonetheless given rise to several important therapeutic ideas" (Peters and Starkweather, 1990).

The primary purpose of this review is to summarize the available research on linguistic and motor aspects of stuttering and to assess the theoretical positions which have been helped to explore the relationship between motoric and linguistic function in stuttering.

I. Stuttering as motor disorder:

a) Stuttering as a defect in prosodic and syllabic contextual programming (MacKay, 1970).

MacKay (1970) proposed a model of normal speech production at phonetic level which could explain the

stuttering blocks. His model consists of four components, a Buffer display, individual phoneme level; contextual integration and motor units.

The Buffer display consists of phonemes which are arranged serially but at abstract level. This Buffer system feeds in the information into the individual phoneme level thus activating the phonemes involved partially. But the activation is not in a serial order. The Buffer system also modifies the phonemes according to the contextual constraints after which the information from these levels *ar&* fed into the motor where the contextually variant phonemes a*re* coded. This model also involves a scanner which scans the motor variants in the motor units in a unidirectional manner and at a voluntarily determined rate. When a partially activated motor variant is passed by the scanner, it gets an additional boost of excitation, thus reaching the threshold at which a series of motor commands are sent to the speech musculature. The author states that it is in the scanning level that the disruption occurs.

The authors account for the repetition in stuttering. For eg. in a word khak ' where initial phoneme */k/* is stressed and following phoneme /k/ is unstressed, when the first unit is act'ivated by the scanner, the other

simultaneously is inhibited. This is followed by the excitation of the second unit and the inhibition of the first unit and the cycle continues for a period until damping occurs. When two excitation peaks of either the first and second phoneme /k/ reaches the threshold, that phoneme is repeated and thus stuttering' occurs.

MacKay (1970) and MacKay and Soderberg (1970) suqqest that contextual programming model can also account for pathological stuttering in three ways.

1. The preactivated levels for stressed and unstressed units *are* normal but the motor unit threshold is lowered, thus resulting in stuttering.
2. There is greater hyperexcitabi1ity but motor threshold is normal thus leading to stuttering.
3. There is greater preactivation for stressed unit, but normal threshold and normal excitation.

b) Stuttering as a defect in coartICU1atory timing.

Van Riper (1971) represented stuttering as a defect in the coarticulatory timing. He opines that stutterinq is primarily because of breakdown at the level of syllable itself. He hypothesizes that the motor stability necessary for maintaining the integrity of the syllable is somehow lacking in stutterers, which could be due to over—dependency on the auditory feedback rather than on the tactile,

kinesthetic and proprioceptive feedback. The stutterers are unable to time or integrate long motor seguences which requires higher order integration. Thus, they produce sequences with inappropriate coartICUlation.

Van Riper also takes into account the physiological difficulties such as defective breathing, voicing and articulation which could lead to the speech deficiencies. Thus, stuttering is a result of deficiencies in (1) motor stability for syllables, (2) ability to integrate a larqe number of discrete events in *correct* temporal order and (3) speech related respiration, phonation and articulation.

As the result of the above deficiencies there is fracturing of syllables thus leading to improper coarticu1ation between sounds. The stuttering behaviours which result *are* syllable repetition, sound prolongation, silent articulatory postures and phonatory arrests. Though Van Riper's model considers syllable as an important locus of stuttering, he also reports of increase in stuttering for other linguistic factors such as wardo length, word position, information load and initial sound.

This model seems to be highly possib1e/va1uab1e especially if one tries to explain some of the problems which

stutterers have like maintaining rhythmic repetition of various speech and non—speech tasks to a defect in timing. However, recent research on coarticulation suggests that coarticu1ation is not lacking during stuttering but it is different from normal pattern. Thus coarticulatory timing is broad enough to explain a variety of errors patterns in stuttering.

c) Stuttering as a defect in airflow and vocalization (Adams, 1974) .

Adams (1971, 1975 b) considers stuttering as a respiratory and phonatory disorder and view the articulatory irregularity as a secondary coping mechanism. He says that in stuttering there is a breakdown of timing, smooth initiation and maintenance of exhalation and voicing. When such a breakdown occurs, the speaker either repeats the same articulatory gestures or prolong it, thus resulting in stuttering.

Since speech occurs during exhalation, the model explains stuttering in terms of the combined effects of insufficient transglottic air pressure and glottal resistance, insufficient transglottal air pressure may be due to decreased subglottal air pressure or increased

supraglotta1 air pressure. Adams states that reduced subglottal air pressure may be due to one or all of the following respiratory irregularities like - (1) active and passive forces of inhalation and exhalation occurring simultaneously, (2) mistiming or exhalation interrupted by inspiration, (3) shallow breathing, (4) asynchronous or antogonistic movements at thorax and abdomen, and (5) respiratory tremors or diaphragmatic flutter.

Increased supraglottal air is due to coping strategies in upper articulators. That is constructions by tongue or lips, increase the supraglottal air pressure above the level of subglottal air pressure and cause cessation of phonation. Excessive glottal resistance is due to excessive stiffness within the vocal folds or adducted vocal folds prior to phonation. This model accounts for the wide variety of breathing abnormalities observed in stutterers.

d) Stuttering as a learned excitatory response to a laryngeal abductor reflex (Schwartz, 1976).

According to Schwartz "the core of the stuttering block is the "tendency", under conditions of psychological stress,

for the loss of supramedu11ar, inhibition controls upon the posterior cricoarytenoid muscle in the presence of subglottal air pressure associated with speech" (Schwartz, 1975 b).

Schwartz explains this model, based on the presence of "airway dilation reflex" (ADR) in stutterers due to the impaired inhibitory action of higher CMS speech centers on the medullary center which mediates the reflex. This breakdown occurs mainly under periods of psychological stress. During this time phonation becomes impossible due to the abnormal abduction of glottis and the contraction of the posterior cricoarytenoid muscle. The response to this reflexive glottal abduction is what comprises stuttering. In order to overcome this abductory pattern of glottis, he may exhibit other secondaries like tensing the lips, tongue or jaw.

Schwartz model does not predict any general motor coordination deficits in stutterers. Most respiratory and articulatory irregularities *are* seen as learned excitatory behaviours in order to cope up with the abnormal abduction of glottis. This model does not account for the linguistic findings of stuttering, and the specific sounds and words associated with stuttering *are* determined by an individual stutterer's history of failure.

d) Stuttering as Tension and fragmentation (Bloodstem. 1975).

According to Bloodstem (1975) tension and fragmentation are the two underlying structures or stuttering. Eventhough, it is not manifested overtly, we can observe the sequelae as repetitions, prolongations. hard attacks, and silent pauses. Child shows these anticipatory struggle reactions/excessive compensatory effectors when he believes that speaking is difficult. due to any external pressure. And later on these struggle reactions become learned responses to situations, words, or listeners in which a history of past difficulty is present.

II. Stuttering as language disorders.

a) Stuttering as a defect in prosodic transition to stressed syllable (Wingate, 1969).

Wingate (l969) described stuttering as a "phonetic transition defect" ie. it occurs while generating the appropriate transitions from one sound to the next. He also explains stuttering as a "prosodic defect" manifested as "an intermittent disorder of actualizing stress increase" (Wingate, 1976). Combining terms in his early and later formulations, wingate's view of stuttering might be termed a defect in prosodic transition to stressed syllables.

Stuttering occurs when there is any inappropriate prosodic transition from one sound to the next, durinq the syllable production. He also explains that stuttering occurs more on the production of the vowel in each syllable, when the syllable is stressed. It can be related to persisting linguistic and motor problems, which makes him unabie to actualize the vowels of stressed syllable. Stuttering symptoms observed due to this are audible or silent repetition of one syllable or less and prolongations of segments of one syllable or less in length.

In order to explain the fact that stuttering mostly occurs on the initial syllable of words, Wingate (1976) cited evidence that about BOX of most frequently used English words have primary stress on the first syllable. The predominance of stuttering on consonants versus vowels is also viewed as an artifact of the frequency of sound in the language Winqate (1976) states that the factors of initial word position and consonant - vowel effects are artifacts of (1) the frequency of occurrence of stressed syllables in the initial word position and (3) the frequency with which English words begin with consonants.

Wingate's prosodic transition model of stuttering is consistent with most of the data on voice onset and voicing

irregularities of stutterers, and also with the articulatory data on stutterers. Fine motor abilities, temporal speech characteristics, and respiratory abilities, are not considered within the model.

b) Stuttering as a disorder in language systems and processing (Hamre, 1976).

According to Hamre (1976) stuttering is a problem of speech programming and production. This also indicates that stuttering is a problem at two levels, a linguistic level termed "language systems" and a psychophysiological level termed "language processing".

Because of the phonological problem involving segments and prosody, stutterers show impairment in using both context-sensitive rules and context-free rules. Here, "context-sensitive" is intended to indicate that the rules contain inter-dependencies among the variables, as in the case of later occurring sounds influencing the production of earlier sounds. "Context—Free" rules contain no inter-dependencies among the variables, and here stutterer may stutter on words beginning with any particular sound, but, by itself.

He also states that, if stuttering increases in severity, it begins to influence, or be influenced by,

variables at other levels. For example, an usually severe instance of stuttering may affect the speaker's ability to generate appropriate syntax and/or his ability to perceive sensory stimuli. It also predicts that the most significant linguistic problems in stuttering will be found in the areact phonology rather than morphoiogy or syntax.

Numerous other studies also explain stuttering as a language disorder. Stockes and Usprich (1976) studied learning aspects of stuttering and reported that stuttering children stuttered more frequently and had increase in disfluencies as the level of language demand increased.

Ratner and Sih (1987) studied the effects of utterance length and task complexity in normal and stuttering children. Both groups showed fluency breakdown as they imitated sentences with gradual increase in syntactic complexity and length. Ratner and Sih proposed that nonfluencies occur when children are pressed to produce utterance beyond their linguistic capacity.

Kathryn (1989) evaluated receptive and expressive languages equivalency scores for 16 5-9 year stutterers to determine if differences exist between these skills of young stutterers. The finding that young stutterers were not delayed in their receptive learning skills were delayed in

their expressive learning skills, was interpreted as support for the hypothesis that learning deficits observed in stuttering children result from their attempts to specify verbal responses as a means of coping with their stuttering.

The most recent explanation based upon the learning aspects for the etiology of stuttering has been the demand and capacity model by Adams (1990). According to Adams, fluency breaks down when environment and self imposed demands exceed the speakers cognitive, linguistic, motoric and or emotional capacities for responding. The idea for organizing the data into two major categories - demands for fluency and capacities for fluency - developed as the solution to a puzzling combination of facts about the role of language in the development of stuttering.

According to Adams (1990) this demands for learning performance strain the child's learning capacity, but more importantly they also strain the child's motor capacity in two different ways. First, language and motor performance occur at the same time during speech production, so central nervous system processing for learning may detract from motor performance (Kinesbourne, 1971).

Second, the longer words and sentences that are inherent in more complex learning require a more complex motor plan (Peters, Hulstinjn and Starkweather, (1989) and are also executed more quickly than the words and sentences of simples learning (Omster, 1984). So asking for more complex learning ability, as in learning therapy, or* at the high end of learning ability, as with the superior child, is motorically as well as linguistically demanding. In both cases the descripancy between the demand and the capacity for performance is similar and may cause disfluency in speech.

Converging evidence supports that stuttering is associated with deficits in the planning and execution of speech. And the evidence also suggests that the onset, development and occurrence of stuttering may be related to demands that learning places on speech motor planning and execution.

111. Linguistic determinants of stuttering.

Systematic research into linguistic aspects of stuttering began at the University of lowa in the 1980's following a pilot study conducted on 13 stutters in 1926 (Bryngelson, 1955). This research was conducted primarily by Brown and included investigators designed to identify those speech and language characteristics which could account for

the locus of stuttering within the speech sequence. brown concluded that most stutterings were associated with linguistic variables which were "conspicuous, prominent or meaningful", to the speaker (Brown, 1945).

Since then several investigators have concentrated their work on linguistic aspects of stuttering which are summarized in Table-1.

Linguistic Determinants	Results	Investigators
a) Position	More on initial than on final or medial.	Johnson and Brown (1935) Hahts (1942), Hejna (1955), Taylor (1966), Blodstein (1974).
b) Manner	More on conso-nants than on vowels.	Johnson and Brown (1935) Hejna (1955), Trotter (1956), Taylor (1966), Umqate (1973, 1976, 1977).
c) Grammati-cality	More on content words than on functional words.	Brown (1937, 1945), Hahn (1948), Hejna (1955), Oxtoby (1958), Blackenship (1964), Soderberg (1967), Uingate (1967), Gardener (1968).
d) Parts of Speech	More on pronouns & conjunctions.	Haynes and Hood (1978).
e) word length	More on long words than on short words	Silverman and Milliams (1967), Brown (1945).

Table-1: Linguistic determinants of stuttering

IV. Stuttering as a disorder caused due to interaction of motoric and language processing.

In the last few years, approaches to stuttering have tended to focus either on motoric or linguistic factors. Peters and Starkweather (1990) have explored the relationship between motoric and linguistic factors in young stutterers in order to derive suggestions for developing new research hypothesis. Three hypotheses have been put—forth by Peters and Starkweather which attempt to account for the various findings regarding motoric and linguistic variables.

(i) There are sub-groups ot stutterers such that one develops primarily out of a linguistic deficit while another develops it primarily of a motoric deficit. Combinations of such deficits are of course also possible, and it could be that an imbalance between linguistic and motoric development could be related to stuttering.

(ii) The second hypothesis is that language and speech motor processes may interfere with one another durinq the act of talking, at least in children who are beginning to stutter. This interference hypothesis is based on research in non-stutterers which suggests that simultaneous performance of language formulation and motor programming may result in a deterioration in one

or both areas .....isbourne and Hicks, 1978;. Such a hypothesis is suggestive for a number of reasons, one of which is the explanation it offers tor the location of stuttering behaviour in sentences. The locations that have the most power in eliciting stutterinq are those that are both linguistically and motorically demanding. For example, the beginninq of a sentence or clause where movement is both fast and accurate and where formulation activity is more likely to occur is the most probable location tor stuttering. Also a longer sentence is more likely to be stuttered than a shorter one (Bloodstein and Gantwoyk, 1967; Jayaram, 1984) and longer sentences might be expected to be syntactically more complex and therefore to require more formulation effort as well as more effort of motor programming.

(iii) "Competence and performance have differentiated effects on fluency. Higher levels of language competence could hinder fluency by creating a larger lexicon and a greater available pool of syntactic forms from which to choose words and formulate sentences" (Peters and Starkweather 199O). Higher levels of performance skill, however, such as word finding and sentence construction, can only improve fluency by increasing the rate at which language performance is executed. In

this way, child with increased linguistic knowledge may have increased risk of stuttering because he or she knows how to construct, while the child whose language is delayed, although he or she is not hindered by a large vocabulary or syntactic variation, might find it difficult to find words even from a small lession or to construct even some sentences and perform motor activity at the same time (Peters ans Starkweather, 1990).

The present study was planned to test the hypothesis that language and speech motor process may interfere with one another during the act of speaking. Specifically, stuttering children in the age range of 9 year to 12 year would be tested for the interference of language and speech motor process.

CHAPTER III

METHODOLOGY

15 child stutterers (five each in the aqe range of 9-10 10-11 and 11-1E years) and 15 normal children (five each of 9-10, 10-11, and 11-15 years) served as subjects. The child stutterers had normal inteiligence as assessed by a psychologist and were diagnosed to have stuttering and had normal language level as assessed by a speech-language pathologist (using Banksons Languaqe Screening Test). They did not have any history of misarticulation or any other speech and hearing problems.

The normal children were matched for aqe and sex for stuttering children. Table-11 depicts the subject details.

Age range in years	Stuttering children			Normal children		
	Male	Female	Total	Male	Female	Total
9 - 10	3	2	5	3	2	5
10 - 11	3	2	5	3	2	5
11 - 12	2	3	5	2	3	5

Table-11: Subject details.

Material:

Three tasks;- interference between language and speech motor task, interference between language and non-speech motor task, interference between cognitive and non-

speech motor task :- were selected. For task 1 and task 11, sixteen picturable meaningful kannada words which were appropriate to the age of the children were selected based on a pilot study done on normal children in the same age group.

These sixteen words were categorized under:

a) four nouns b) four adjectives c) four transitive verbs d) four intransitive verbs.

Fable-111 provides the material.

Nouns	Adjectives	transitive verbs	Intransitive verbs
1. Naustache*	white	writing	dancing
2. Knife	yellow*	brushing	running
3. Vessel	red	reading*	coughing
4. Leg	brown	washing	crying*

Table-111: Material for task 1 and 11. (*) key words.

The four words (* key words) as uttered by an adult normal female were audio recorded in a cassette with an inter stimulus interval of 5 seconds in kannada, which formed the material. Four sets of pictures were made, each set consisting of one noun, one adjective, one intransitive verb and one transitive verb.

For task III a. puzzle was used which the child had to arrange, depending on the model given (Fig.l).

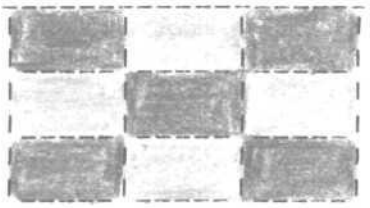

Fig.1. Puzzle for task III.

Method:

The subjects were tested individually. They were seated comfortably in a quiet place and the audio material was presented through the headphones. The subjects were instructed to listen to the words through the headphones and were to point out to the appropriate picture representing the word in the set of four pictures placed in front of them. while doing this they were instructed to simultaneously and continuously say "papa papa . . . . " for task 1. In task 11 the same method was followed but here the subjects had to simultaneously and continuously tap his/her right foot.

In task III the subject was provided with a puzzle and he was instructed to complete the puzzle by referring to the model. while doing so he was to simultaneously and continuously tap his/her right foot.

Scoring:

These responses were recorded on a response sheet (Pippendix-1) by the experimenter and a scoring system was adopted. A score of 1' was given if the subject was able to perform the test and a score of 'o' was given when the subject was unable to perform the task tunable to point to appropriate picture or unable to tap foot correctly or unable to repeat" papa...." continuously or interrupting the task by either stopping, repeating initial syllables or pr -longing it).

The total score on each task was computed for each subject and wilcoxin matched pair test was administered to find out the significance of the difference between tasks and between normals and stutterers.

CHAPTER-IV

RESULTS AND DISCUSSION

I. Performance of the subjects on all the three tasks:

In general the difference in the performance of stuttering vs. normal children was significant only for Task—I(Fig—2). On Task-11, while stuttering children obtained scores below 56%, where normal children scored above 96%. Totally eleven normal children scored 100%. and four had 87.5%. Among the stutterers one scored 757., five scored 62.5% and nine scored 50%.

On Task-11, thirteen normal children had 100% scores and two scored 87.5%. and among the stuttering children, twelve scored 100%, one scored 87.5% and two scored 75%. But the difference were not statistically significant. On lask-III, the performance was similar in both normal and stuttering children. In both the groups, thirteen scored 1OO% and two scored 50%.

II. Comparison of stuttering children on Task-I vs. Task-11 vs. Task—III across age groups:

The results of wilcoxin matched pair test indicate significant difference (at 0.03 level) between the scores of Task-1 and Task-11 of stuttering children. Fig.3 shows the

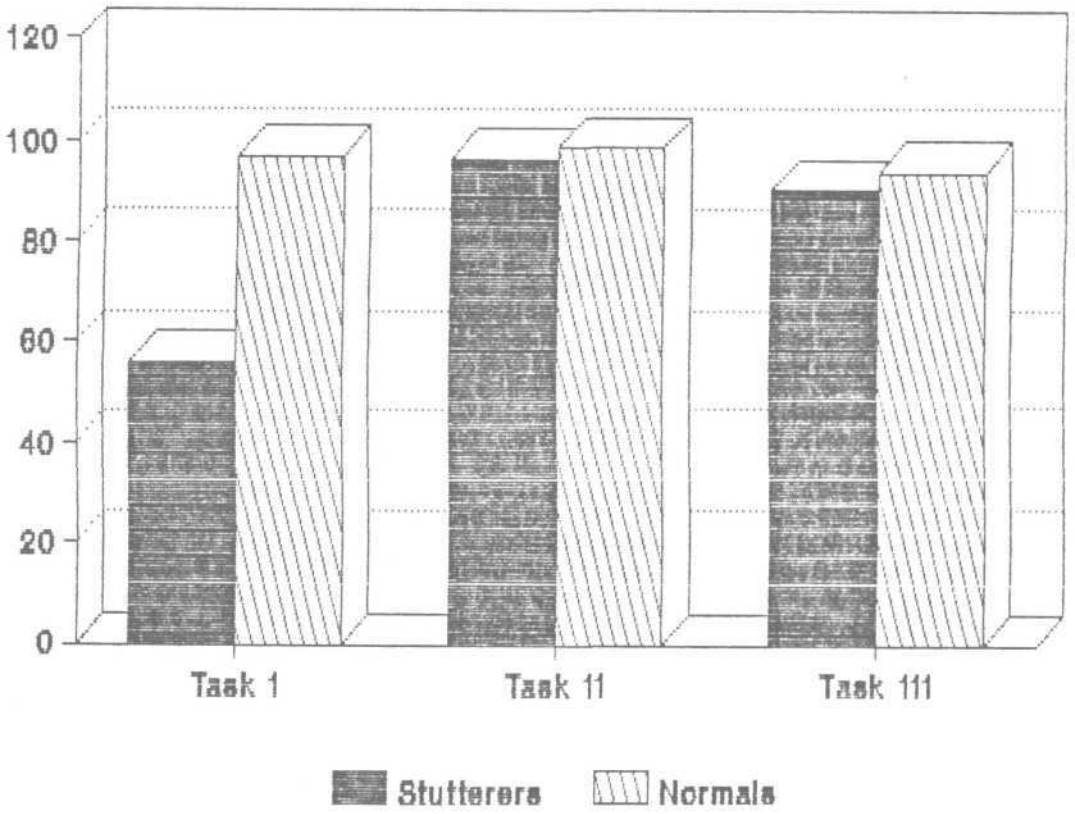

Fig.2: Inter Task Comparison between stuttering and normal children

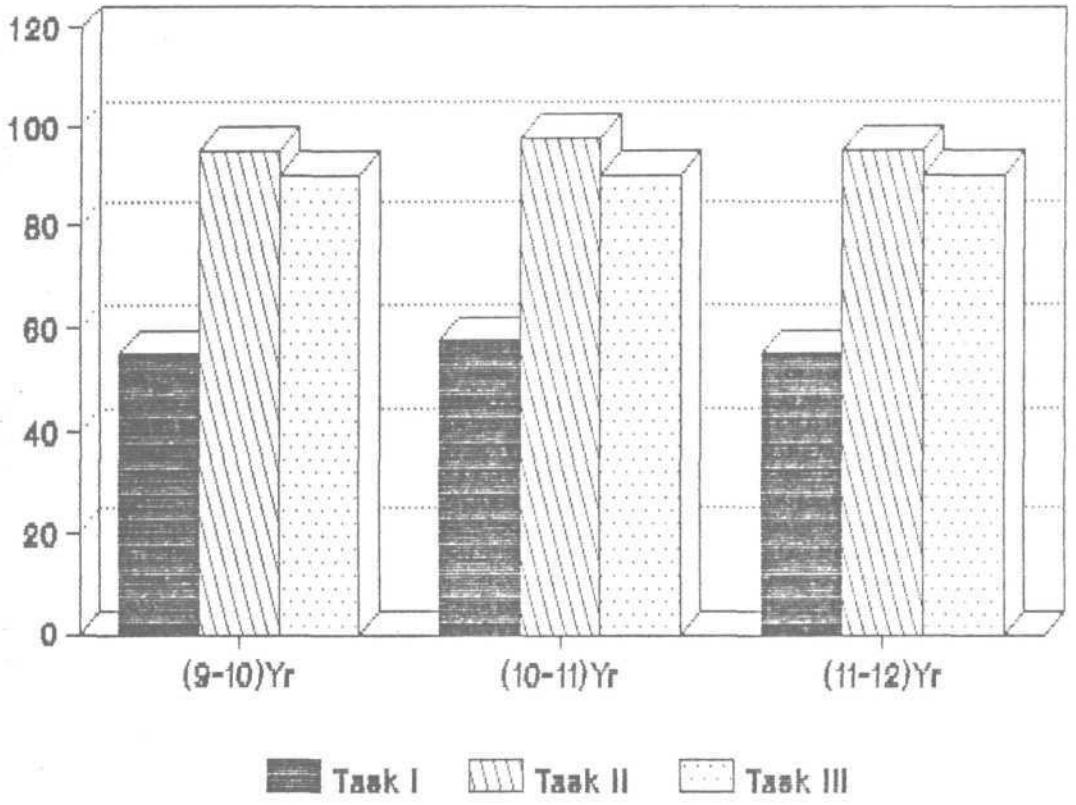

Fig.3.

Fig. 3: Comparison of stuttering group across age group on different tasks.

percentage scores of stuttering children across the age groups on al1 the tasks. Generally, the performance of stuttering children was better on Task-11, followed by Task-III and Task-I. On Task-I subjects in the age range of l0-1l years performed better than the other two age qroups. However, there was not much difference in the performance of stuttering subjects across the three age groups.

III. Performance of male and female subjects:

Fig.4 shows the percent scores of females and males. Though there was no significant difference, males performed better than females across the tasks. The S' (category separation score) between males and females was high for Task-III and Task-II but low for Task-I. The S' scores were 1.1, 5.5 and 8 for Task-I, Task-II, and Task-III respectively.

IV. Performance on various tests of the tasks:

Performance of stuttering subjects were poorer than that of normals on all the tasks except for the language tasks, where they scored 100%. On speech motor test stuttering children showed poor performance by scoring only 11.6% while the normal children scored 93.3%. On motor task stuttering

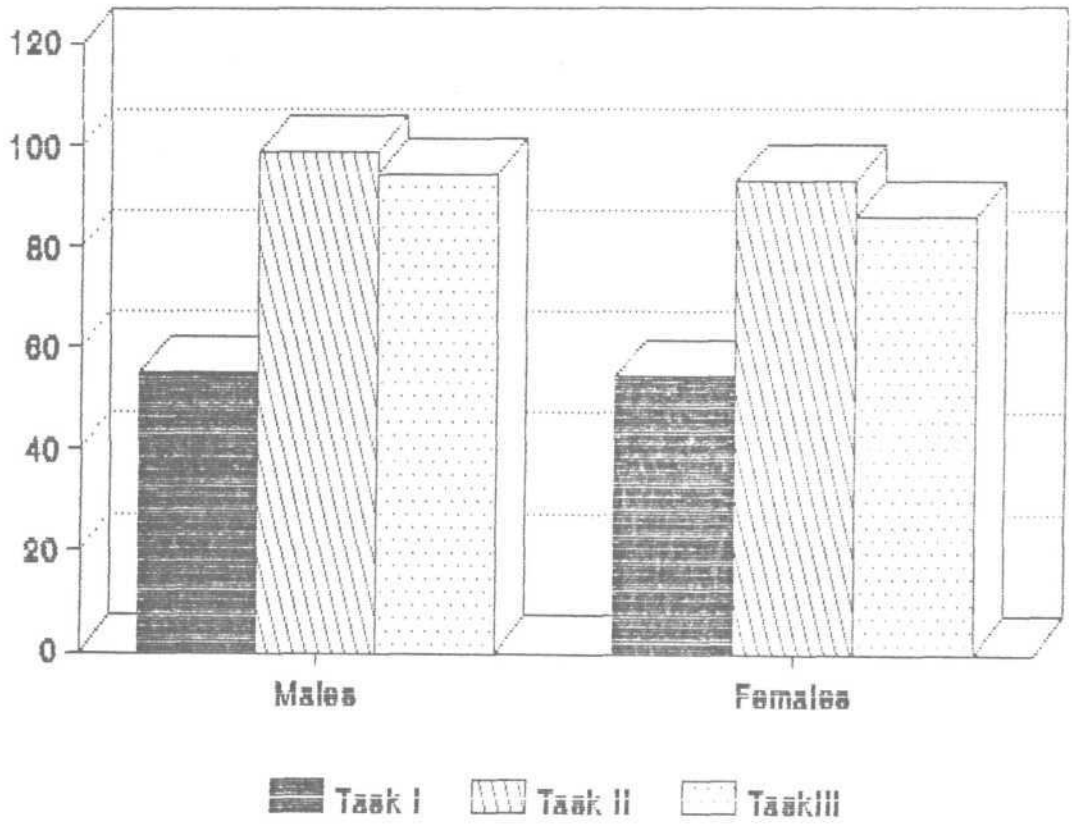

Fig.4.

Fig.4: Performance of males and females across the task

children scored 88.3% where as normal children's scored 96.6%. The same trend was seen in their performance in cognitive task where stuttering children scored 80% where as normal children scored 86.6% (Fig.5)..

Discussion:

The results reveal several points of interest. First of all stutterer's performance was poor on Task-I and there were no significant differences between the scores of stuttering and normal children on Task II and task III. while the percent scores of stutterers on Task-1 was 55.8, and in normals was 96.8. These suggest that stutterers have difficulty performing speech motor and lanquage tasks simultaneously and thus there is an interference between speech motor and language tasks in stutterers. Pilso, no interference was found between non-speech motor and language and----------and cognitive tasks. The results of this study support the hypothesis of Starkweather that, "language and speech motor processes may interfere with one another during the act of talking at least in children who are beginning to stutter (Peters and Starkweather, 1990)

Second, males performed better than females. This might be because the number of males were more than that of females in the present study. Hence the average scares might be better for males.

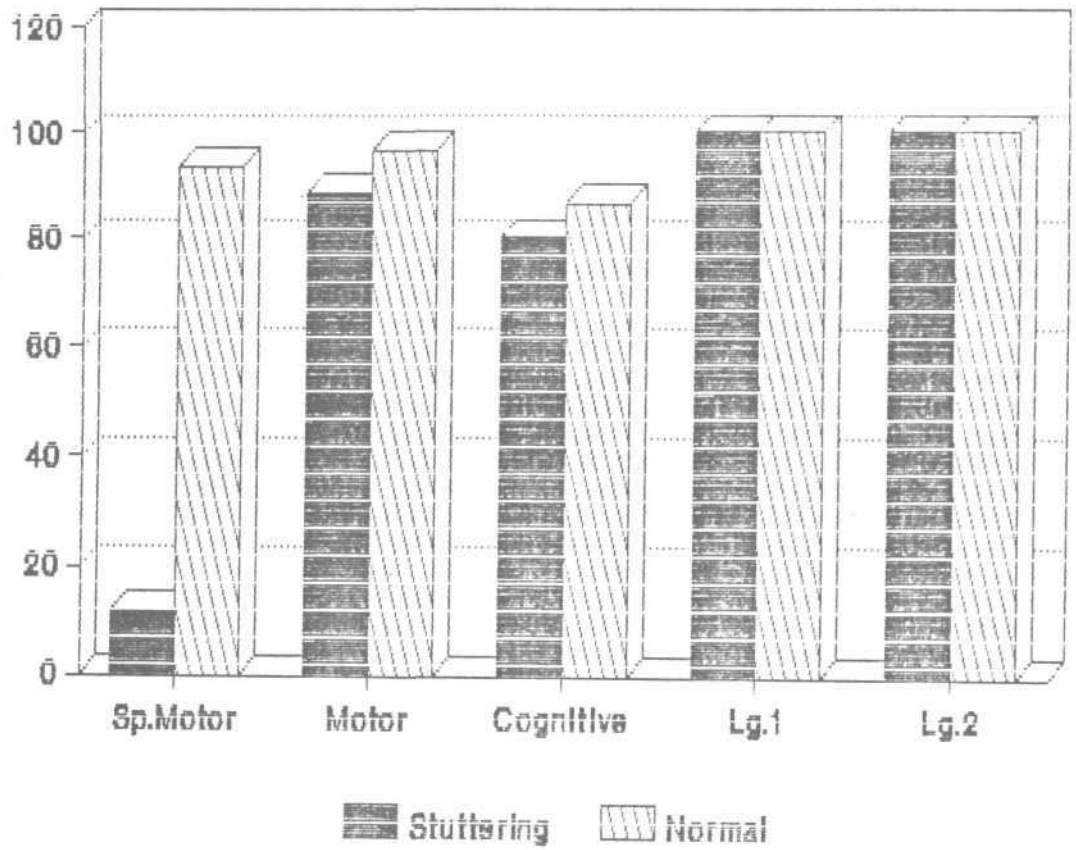

Fig.5: Performance of various tests of the tasks between normal and stuttering children.

Third, it appears that the performance of stutterers improved on Task—I as the age progresses. when the results of this study was compared with that of Deepa (1994), it was found that there was an increase in the score of stuttering children on Task-I. This could be attributed to physiological maturation. Fig.6 shows the performance of normal and stuttering children from 6-13 years on Task—I. (Fig.6: next page).

Also, the scores on speech motor task and lanquage task (Task I) indicate that while the children obtained very low scores on speech motor tasks, it was not so on language task. This was observed among ail the stuttering children in the present study. This finding indicates that the possibility of occurrence of the sub-groups of stutterers with motoric deficit may be more than the other sub-groups. It would be possible to use these tasks as a test to find out interference between speech motor and language tasks in stutterers. While the test can retain Task-I and Task-II, Task-III can be deleted as the performance of stutterers on the cognitive task was similar to that of normals.

The test could be administered to stuttering children to find out the interference along with purely language tasks and purely speech motor tasks. If found poor on language

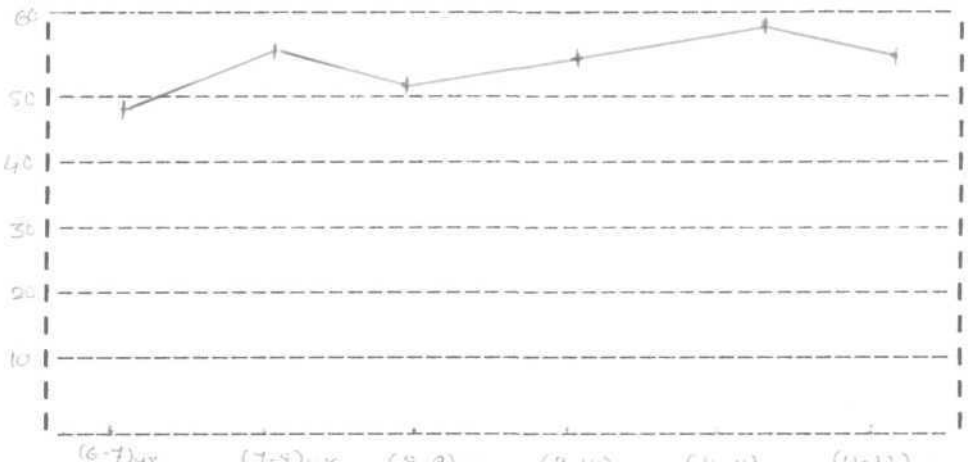

Fig.6: Performance of stuttering and normal children in the age range of (6-l2) years.

task, language could be improved and it found poor on speech motor task, speech motor task could be worked on.

As the time available for the study was *very* short, only fifteen stuttering children were tested. It would be interesting to learn as to how the various sub-qroups of stutterers would perform on this task.

CHAPTER V

SUMMARY AND CONCLUSIONS

' This investigation was aimed at studying the hypothesis that "Language and speech motor processes may interfere with one another during the act of talking at least in children who are beginning to stutter" (Peters and Starkweather, 1990). Fifteen child stutterers and fifteen normal children in the age range of 6-9 years were investigated on three tasks specifically designed to test the following:

(i) Language and speech motor process interference,
(ii) Language and non-speech motor process interference,
(iii) Non—speech motor and cognitive process interference.

For Task—I, the stimulus word was presented through headphones, and the subjects were reguired to point to the appropriate picture from a set of four presented before them. While listening for the stimulus word and painting to the appropriate picture, the subjects had to continuously say papa'. For Task—II, the pointing response remained the same but instead of saying papa', the subjects had to continuously tap their right feet. For Task-III, the subjects had to solve a puzzle while continuously tapping their feet.

The subjects were given a score of 1 ' if they could point to the right picture and 0' indicated failure. The subjects scored '1' if they said papa' continuously and 'O' if there was any repetition prolongation etc. while saying 'papa'. Task-II was scored similarly. For Task-III, completion of puzzle earned the subjects a score of 1 and failure '0'. For foot-tapping, any stoppage earned a score of 0' and continuity '1'.

The results were analyzed using wilcoxin matched pair test. Also the percent scores obtained by subjects on each task was calculated. The results indicated that while there was significant interference of language and speech motor processes in stutterers, it was not so in normals. On comparing the present study with that of Deepa (1994) it was observed that the score in Task-I improved in stuttering children as age progressed.

Also, the scores on speech motor task and language task (Task-1) indicate that while the children obtained very less scores on speech motor tasks, it was not so on language task. This was observed among all the stuttering children in the present study. This finding indicates that the possibility of occurrence of the sub-group of stuttering with motoric deficit may be more than the other sub-groups.

The test could be administered to stuttering children to find out the interference along wit purely language tasks and purely speech motor tasks. If found poor on language task language could be improved and if found poor on speech motor task speech motor task could be worked on.

As the time available for the study was very short only 15 stuttering children were tested. It would be interesting to learn as to how the various sub-groups of stutterers would perform on this task.

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APPENDIX

NAME: AGE: SEX:

DIAGNOSIS: Id:

LANGUAGE LEVEL:

Sl. No.	Language Task	Speech Motor Task
1. 2. 3. 4.		
Sl. No.	Language Task	Non-Speech Motor Task
1. 2. 3. 4.		
Sl. No.	Cognitive Task	Non-Speech Motor Task
1. 2. 3. 4.		

Sample of Score Sheet use for data collection.