Verbal Perseveration in Broca's Aphasics: A study on Tamil Speakers

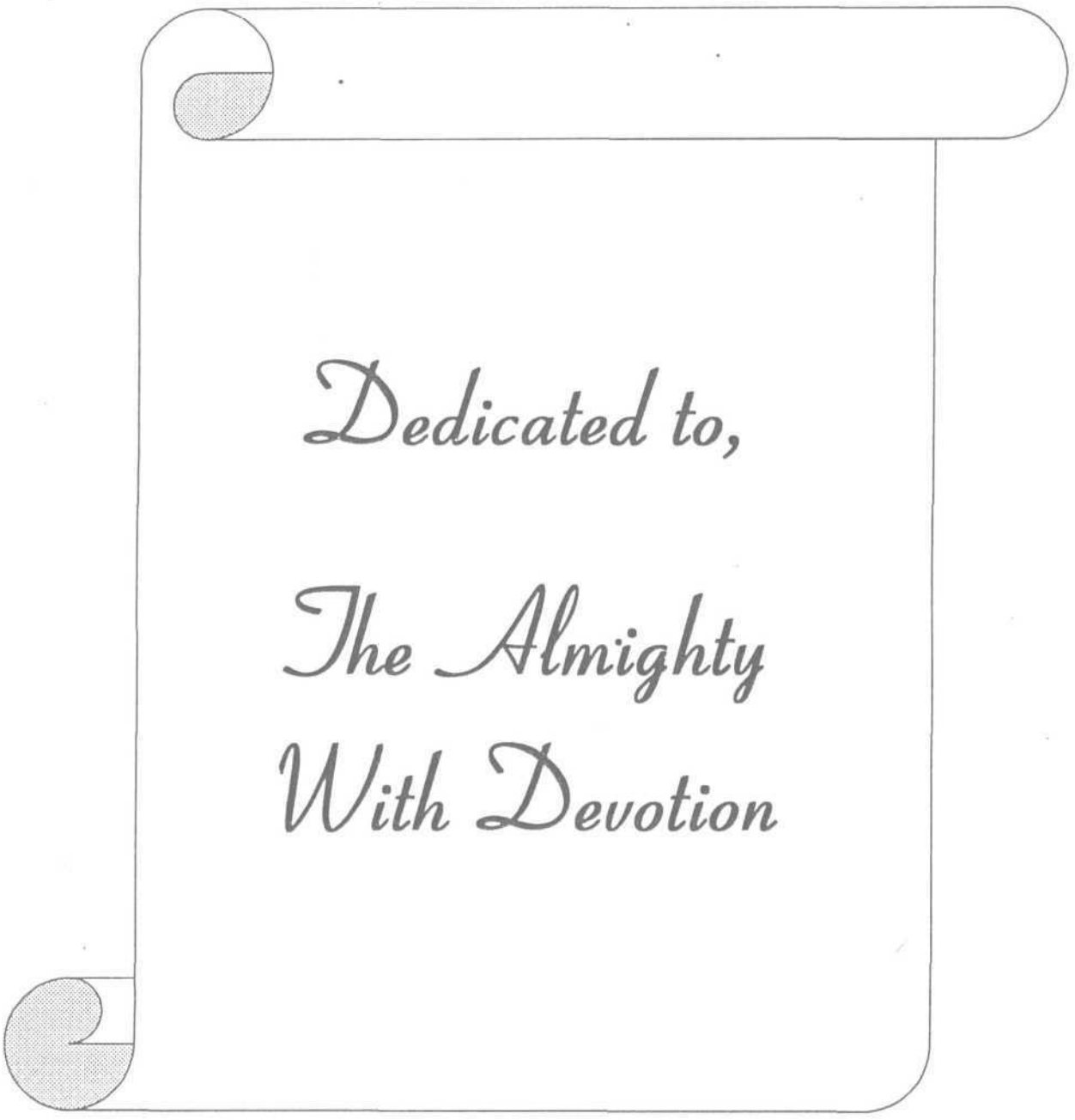
MUKUNTHAN .S

Register No. M2K13

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

ALL INDIA INSTITUTE OF SPEECH AND HEARING MANASAGANGOTHRI, MYSORE - 570 006.

May, 2002


Dedicated to,
The Almighty
With Devotion

CERTIFICATE

This is to certify that this dissertation entitled **"Verbal Perseveration in Broca's Aphasics: A study on Tamil Speakers"** is the bonafide work in partial fulfillment for the degree of Master of Science (Speech and Hearing) of the student with Register Number M2K13.

Mysore

May, 2002

Director
All India Institute of
Speech & Hearing
Mysore - 570 006.

CERTIFICATE

This is to certify that this dissertation entitled **"Verbal Perseveration in Broca's Aphasics: A study on Tamil Speakers"** has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier in any other university for the award of any diploma or degree.

Prema K.S

Guide

Mysore

May, 2002

Dr. Prema K.S
Lecturer in Language Pathology
Department of Speech Pathology,
A.I.I.S.H,
Mysore - 570 006.

DECLARATION

I hereby declare that this dissertation entitled **"Verbal Perseveration in Broca's Aphasics: A study on Tamil Speakers"** is the result of my own study under the guidance of **Dr. Prema K.S,** Lecturer in Language Pathology, Department of Speech Pathology, AIISH, Mysore, and has not been submitted earlier at any University for any other diploma or degree.

Mysore

May, 2002 Reg. No. M2K13

ACKNOWLEDGEMENTS

/ express my deepest gratitude and heartfelt thanks to Dr. Prema, K.S, Lecturer, Department of Speech Pathology, All India Institute of Speech and Hearing, for all her inspiration, encouragement, guidance, comments, patient listening and untiring effort in steering me through every aspect of this study.

I would like to thank Dr.M.Jayaram, Director, All India Institute of Speech and Hearing, Mysore for allowing me to conduct this study.

I am thankful to Dr.Shyamala Chengappa, HOD, Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore for permitting me to carry out the study. Ma 'am thanks for suggestions and encouragement you have given me.

I express my sincere thanks to Dr. Kalaiah, HOD, Department of Clinical Psychology, AIISH, Mysore for his constant advises and moral support.

I thank Mr. Vijaya Raghavan and Mrs.Radha Kalai Selvan, who helped me in providing subjects for this study.

I thank Ms.Swapna and Anitha for helping me with my analysis as judges.

I thank Dr.Lancy D'Souza for helping me with my statistics.

I take this opportunity to thank all the subjects who co-operated with me, without whom this study would not have been possible.

Amma & Appa...I've no words to express gratitude for your silent blessings and all the love you 've showered on me, for keeping faith in me, for unending support

and encouragement.... all 1 can say is that I'm blessed with the BEST PARENTS IN THE WORLD. . . . Love you lots.

My dearest ***Dharini,*** *you are God's most special blessing to me and I am lucky person to have a sister like you.*

Chander, Kali, *and* ***others*** *- The thought of you people increases my strength, confidence. You are always special people in my life.*

To my dear seniors - ***Muthu, J.K., Ananthan, Prakash, Hia,*** *your constant support and sincere advises have helped me a lot. Thanks for it.*

Tyagi *- Thanks for patiently listening to my troubles, complaints and offering me advises and suggestions when I needed them most. Proud to have a friend like you.*

Siddharth, Vatson, Prasanna *- Thanks for the fun and happy moments I had in your company.*

. To my juniors ***Ranga, Gopi, Radha, Chaya, Ambedkar*** *and* ***Sundaravel*** *- Its nice to have friends and well wishers like you. Thanks for sharing both my joys and sorrows.*

To my ***classmates*** *- thanks for your support and encouragement. Will miss you* ***all***

Anjana *- You have made me a stronger person in more ways than you will ever realise. The pains you have taken and concern you have showed me means a lot to me.*

Divya - Thanks is an insufficient word for all your prayers, support, belief you have in me. Without you, I would"nt have crossed the many hurdles that I have crossed until today. You are really special for me.

To Pandey, Batru *and* ***Mahadeva - Annas*** *for their care and for providing me good food during my stay.*

I thank ***Graphics*** *for giving this project a final shape.*

To the ***almighty*** *for giving me strength in carrying out all my endeavours so far.*

TABLE OF CONTENTS

INTRODUCTION

Historically the studies on aphasics was in the interest of neurologists the Neuropsychiatrists, Linguists and the Neurolinguists as the studies on speech and language characteristics of aphasics have always been a window into the brain-language relationship. These studies have also helped to trace the underpinnings of neural structures as well as functions. Breakdown of language in aphasics in the area of comprehension, fluency, naming are but a few characteristics that guide one to understand the brain functions.

The second half of the 19th century has, however seen a spurt of growth in the quantum of studies on aphasics, which can be attributed to the participation of Speech-Language Pathologists (SLP')- SLP's have widened the scope of study of aphasia by investigating into the specific parameters of speech and language, one such parameter being the perseveratory phenomenon of aphasics (Wernicke, 1874; Lichtheim, 1885, Neisser, 1894).

Perseveration consists of inappropriate and unintentional recurrence or continuation of a previous response in the absence of the appropriate exciting stimulus. It has been widely studied in demented and focally brain - damaged patients.

The phenomenon of perseveration is said to be the result of impaired mobility, state of fatiguability or state of disinhibition of the nervous system. Wepman (1972) describes perseveration as a shutter principle.

The term perseveration was first formulated by Neisser (1894) to indicate persistent repetition or continuation of an activity once started. It has also been defined as inappropriate occunence or continuation of an activity once started (Sandson and Albert, 1982). Eisenson (1973a) describes perseveration as any morbid tendency to

maintain a mental set or to report an act not appropriate to the situation to which a response is required.

Clinicians are concerned about the appearance of perseverative responses in brain-injured adult due to its contaminating effect on test results, its influence on clinical examination and because it is an obstacle to therapy.

Motoric perseveration is noticed in the aging population of which, most predominant one is the verbal perseveration. Verbal perseveration has been extensively studied in normal geriatric individuals (Kriedler and Fradis, 1968; Hudson, 1968; Goldstein, 1916; Gastesek, 1981; and Chandralekha, 2001) and also in aphasics (Kriedler and Fradis, 1968; Wepman, 1972, Eisenson, 1973b; Rochford, 1974; Buckingham et al, 1979; Mell, 1983).

Perseveration in Aphasics

It is generally agreed that verbal perseveration is a common symptom of individuals with brain damage and that it occurs at various levels of phonological, syntactic and semantic levels.

All authors agree that perseveration occurs very frequently in aphasics (Allison and Hurwitz, 1967; Helmick and Berg, 1976; Yamadori, 1981; Shindler, Caplan and Hier, 1984; Santo Piero and Rigrodsky, 1986; Ludgren et al, 1994) and Sandson and Albert (1986) go as far to assure that (recurrent) perseveration plays a special role in aphasics, perhaps being an integral part of the language disorder itself.

Despite the common acceptance of perseveration as a pathognomic sign of disturbed brain functioning and the recognition of its influence on the performance of clients with neurogenic disorders of speech and language, there is a noticeable lack of objective data concerning the nature and occurrence of perseverative behaviour in selected categories of brain injury.

Types of Perseveration

Majority of the investigations have identified three types of verbal perseveration - stuck-in-set, recurrent and continuous types. The reports of these investigations are interesting to note as verbal perseveration has been a window into the language behaviour of the aging population vis-a-vis individual with brain damage. Different types of verbal perseveratory behaviours were most evident in patients with temporal lobe, frontal lobe and left thalamic lesions (Luria, 1965; Pick, 1905 and Milner, 1964, 1971, 1982, Hudson, 1969).

Various tasks such as Picture Naming (PN), Describing the Function (DF), Defining Words (DW), Description of Picture (DP) and Answering Questions (AQ) have been employed by investigators to tap perseveration. Sandson and Albert (1984) proposed that recurrent perseveration is related to posterior left-hemisphere damage, whereas stuck-in-set perseveration is related to frontal lobe damage. Again in 1986, they demonstrated that left posterior lesions producing aphasia also produce abundant perseveration, primarily, recurrent in type. Santo-piegro and Rigrodsky (1986) however found no support for the hypothesis that site of lesion may account for the amount or pattern that site of lesion account for the amount or pattern of perseveration, an aphasic exhibits.

Review of literature of Indian studies indicate only one study by Chandralekha (2001) which aimed to identify verbal perseveration of geriatric Tamil speakers. The findings of her study are:

- Perseveration is a phenomenon of geriatrics and that it increases with age.
- She also found continuous type of perseveralion as being more frequent than the recurrent or stuck-in-set type of perseveration in contrast to the western literature which emphasized on the occurrence of recurrent and stuck-in-set types of perseveration in normal geriatrics.

- In addition, subjective analysis of her results revealed that perseveration was equally evident on phonological, syntactic, and semantic aspects of language as reported in western studies on individuals with brain damage.

The above findings lead one to probe into the nature of perseveration in aphasics who are native speakers of Tamil language which would possibly throw more light into the above discrepancy. Such an exercise would help a SLP to incorporate suitable modifications in the assessment and treatment procedure.

Need for the study

A review of literature on verbal perseveration suggests that, it is an age related, task specific phenomenon and that it would be an useful indicator of localization of lesion in individuals with brain damage. Although the above parameters have been extensively explored in the western literature, Indian studies are very scanty. Investigations of peiseveratory behaviour would help a SLP to develop a simple and useful clinical tool for assessment and also plan for treatment of aphasia. Such a study would also help us to reflect on the consequences of brain damage and on the structural aspects of language.

Within the framework of the above perspectives, the objectives of the present study are:

1. To investigate into the nature and type of verbal perseveration in individuals with Broca's aphasia (experimental group) who are native speakers of Tamil.
2. To investigate the same in normal geriatrics (control group).
3. To compare the nature of verbal peiseveratory behaviour of aphasics with that of normal geriatrics individuals.
4. To identify the potential tasks that would help a clinician to elicit verbal perseveratory behaviour in aphasics.

REVIEW OF LITERATURE

Speech is a complex act incorporating parameters of voice, articulation and fluency. Within each of the above parameters, many components contribute that either impede or facilitate effective speech production. Perseveration is one such component that impedes the fluency parameter, thus leading to impaired speech production.

In general perseveration has been inteipreted as a consequence of some sort of memory disorder, such as breakdown in the retrieval process (Santo-Piero, and Rigrodsky, 1986), post-activation of memory traces that are normally inhibited (Sandson and Albert, 1987) or lingering motor memory traces (Lundgren, Helm-Estabrooks, Magnusdottir et al, 1994).

Pcrscvcration in Normals

Aging is a dynamic series of biologic, social and psychological changes. Often these changes are subtle and may be manifested in the elderly adult as minor frustrations or as severe handicaps (Garteschi, 1981). One such behaviour often noticed is verbal perseveration in the aging population.

Occurrence of perseveratory errors in the speech of normals (specially geriatrics) and in individuals with brain damage has kindled the interests of aphasiologists to get more insight into brain-language relationship. Intensive as well as extensive investigations have revealed different types of perseveration in normals as well as in individuals with different brain lesions.

Perseveratory phenomenon is seen in normal persons when they are fatigued; they tend to perseverate under conditions which demand more rapid and more frequent change than what they can achieve. Epileptic persons increase twice the frequency of perseveration after seizures.

In general, perseveration may be recorded as a manifestation of inadequacy or for coping with a situation on a part of the performer (Eisenson, 1973a).

Perseveration may be thought of as disturbance of volition. Perseveration becomes manifest when the usual potentials for a given perfonnance task are somehow blocked or diverted in some way by an inhibiting event or idea or completely overcome by an interfering act or idea (Eisenson, 1973b).

Normal speech errors (slip of the tongue) consists mainly of anticipations, perseverations and metathesis (Dressier, 1988).

Goldstein (1916) holds a general view with regard to perseveration which is well supported among psychologists; namely, that the patient perseverates because he cannot make quick changes in attitude, which necessitates the shift from one performance to another.

Kriedler and Fradis (1968) observed that failure of a patient to evoke a proper response for instance, to repeat a word as directed may be a result of one or more factors. One of these is impaired mobility of nervous processes, the patient fixing himself upon or becoming 'intoxicated' with a stimulus of previous reaction because he has lost his capacity to pass with normal readiness to another reaction. Another factor is 'state of fatiguability', the whole verbal system being in a state of inhibition.

Hudson (1968) analyses 'intentional' perseveration. This term, comes from Liepinami, who regarded it as an idcational disorder in which there is an impasse in the area of sensory preparation of movement with the result that new stimuli excite a previous idea and the movement caused thereby. Hudson concludes that 'intentional perseveration may be due to impairment of an inhibitory system which causes an increase in facilitatory activity and involuntary recall of recently established memory.

Intentional perseveration, according to Hudson, (1968) is observed when some new performance is intended but is not realized. Hudson's findings are based on data collected from experimental testings where there was a constant changing of stimulus items presented to the subject. The subject was consequently required to switch from one response to another when intending to produce the proper answer to the stimuli. A large part of the data is derived from confrontation naming.

Early investigations have believed that perseveration was caused by abnormal physiology, abnormally facilitated and persistent after effects of ideation, memory or motor performance. Perseveration is due to repeating previously correct and reinforced responses and is controlled by irrelevant stimulus patterns. Both these types are consistent with established principles of behaviour and neither requires any abnormal physiology. There are probably a number of processes by which perseveration is produced (Leichester, Sidman, Stoddast, Mohur, 1971).

Types of Perseveration

Three types of perseveration have been described in the literature after detailed studies with brain damage.

1. Stuck-in-set perseveration
2. Recurrent perseveration
3. Continuous perseveration

1. Stuck in set perseveration is the inappropriate maintenance of a framework of response after introduction of new tasks (Sandson and Albert, 1984). Eg. Generative naming task where an individuals continues to name vegetables after being asked to name fruits. The individuals may be aware of a change in task demands but either does not recognize the intended response has been already produced or is unable to formulate a new category of response. Other terms are

tonic perseveration (Liepmann, 1905), cortical perseveration (Luria, 1965) and impairment of switching (Freeman and Gatheralle, 1966).

2. Recurrent perseveration is the inappropriate occurrence of part or all of a previous response, which occurs because of a different intervening stimulus, response or both. Eg : A subject names 'brown' then 'pink' correctly but repeats 'brown' when shown blue on a confrontation naming task. Other forms include intentional (Liepman, 1905), Repetitious (Buckingham, 1985) and ideational perseveration (Bayles et al, 1985).

3. Continuous perseveration is defined as the inappropriate or continuation of a response beyond the point of completion and without interruption by any intervening event (Sandson and Albert, 1984). Eg: A patient with lesions in frontal lobes and basal ganglia had no difficulty switching from the activity to the next of carrying out conditioned responses to verbal instructions. But when asked to "draw a circle, however she made multiple circle and was unable to stop. Other terms are clonic (Liepman, 1965); efferent motor (Buckingham, 1985) and compulsive repetition (Freeman and Gatherok, 1966).

Helmick and Berg (1978) observed 30 brain injured patients, 18 aphasics, 12 non aphasics, 12 right hemisphere mixed etiology and 10 controls. The tasks given were naming and reversing series, writing sentences and a letter, drawing designs from verbal memory, constructing designs, naming and describing the function of sighted objects, describing a picture, defining words and answering simple question. The findings were that brain damaged perseverated on 10% of all trials. There was significantly more perseveration in language disturbed than in non-language disturbed subjects. 66% of all perseverations were of repetitious variety, 34% were continuous. Perseveration was seen most often on the least automatic tasks. Perseveration was more common on recurring series, writing sentences and drawing designs from memory and less common on answering questions, defining words and description of picture.

Their reports indicate that perseverative responses occur more often in brain injured than in normal subjects. Two types of perseveration, repetitious and continuous were noted in the responses of the brain injured with higher incidence of repetitious type occurring.

Although several types of perseveration have been described, the most common with aphasia is the recurrent variety. Recurrent perseveration is defined as the inappropriate repetition of a previously emitted response following an intervening stimuli. According to Sandson and Albert (1984), of all linguistic tasks we undertake with aphasic patients, task of confrontation naming is most likely to elicit recurrent perseverative responses, particularly from patients with posterior lesions.

Albert and Sandson (1986) studied the effect of selected task, stimulus and subject variables on perseveration in aphasics. They reported that aphasics produce significantly more perseveration than normals and right hemisphere damaged individuals, in confrontation naming and drawing task. The perseveration observed were mostly of recurrent type. There was no significant difference among the 3 groups on word list generation and design generation task.

Troster, Salmon, Mc Collough and Butters (1989) using ratios of perseveration to responses, reported that 20 older normal individual had significantly more recurrent perseveration on the verbal fluency section of the dementia rating scale than 20 younger normal individuals.

The latest study was done in this area by Ramage, Bayles, Helm-Estabrooks and Cruz (1999) to determine the frequency of perseveration in normal individuals by type and in relation to task. Because some evidence exists that perseveration may increase with normal aging, they also studied the possibility of age effect and finally the possible role of gender in the fiequency of perseveration was also considered. Their results demonstrated that 4% of all responses were perseverative. The average rate of

perseveration of a single task was 1%. 56 of the 60 subjects (93%) perseverated atleast once. No statistically significant effects were seen for gender and age effects. Significantly higher rate of perseveration was found in modified Wisconsin card Bosting task (MWCST) of all types of perseveration, the 'stuck-in-set' variety was accounted for 73% and was found only in the MWCST. Instance of recurrent perseveration was observed on all tasks and accounted for 24% of the total, while continuous type was uncommon. Frequency of perseveration was found to be quite low and hence higher frequency rates should raise suspicion of the presence of neuropathology or brain dysfunction.

Tasks to elicit Perseveration

Allison and Hurwitz (1967) used tests involving chiefly nonlinguistic activities such as searching for objects, simple drawings and simple constructions, tests of gesture and pantomime; tests of simple spoken commands; repeating and reversing the order of series; naming sighted objects; naming from memory; writing; reading; spontaneous speech. Results showed perseveration was 'common' in response to simple commands, in reversing automatic series, in naming sighted objects and in spontaneous conversation. Perseveration was 'uncommon' in naming from memory, reading and writing. Perseveration was more 'common' in patients with the least spontaneous speech.

Albert and Sandson (1986) studied the effect of selected task, stimulus and subject variables on perseveration in aphasics. They reported that aphasics produce significantly more perseveration than normal and right hemisphere damaged individuals in confrontation naming and drawing task.

Very few aphasics perseverated the position of a drawing. This type of response was observed in six severely impaired aphasics, but results were not

considered for analysis, since testing was not completed due to the perseveratory tendency (Dressier, 1988).

Emery and Helm-Estabrooks (1980) conducted a study to determine the extent to which confrontation naming performance is influenced by perseverative behaviour. Results showed all the 30 subjects demonstrated perseverative behaviour on the visual confrontation naming subtest.

Perseveration in Patients with Aphasia

Since perseveration has been largely noticed in individuals with frontal lobe lesion, otherwise known as Broca's aphasia, majority of the studies have focussed towards description of perseveration in these individuals.

Kriendler and Fradis (1963) describes perseveration as one of the most frequently noted aphasic defects. Perseveration is not only seen in reactive speech, but also occurs in spontaneous speech. It occurs both at the phonological, and at the semantic level and also it seems to be at the syntactic level, frequent stereotyped productions have been reported in some kinds of aphasic speech (Buckingham, Whitaker and Whitaker, 1975).

Wepman (1972) describes perseverative behaviour of an aphasic on a naming task as due to switching off of attention. He suggests that stimuli received while the patient is working and a verbal formulation to other stimuli are inhibited and that the patient continues to respond with whatever item was appropriate when his attention 'shutter' was open. The shutter like behaviour of the patient, in Wepman's opinion, is probably involuntary, he can only handle incoming stimuli at his own new reduced speed. The shutter principle which Wepman puts forth to explain perseveration and delayed responses is defined as time after stimulus. There is a period of involuntary inhibition when the mind is shut off. Wepman feels this construct may be of extreme

importance to the clinician who must recognize the patients need for time to internalize and associate to the stimulus and to formulate and practice to acceptable responses.

Perseveration was also regarded as fluency related, albeit not without reservations (Kerschensteiner et al, 1972) but these were problematic categories because they could not be uttered either fluently or not, for eg: Bleser and Poeck (1983) report both fluent and non fluent production in highly perseverative patients, where speech comprised a single consonant - vowel syllable.

Eisenson (1973b) gives the example of an aphasic patient who, when asked to say the sentence, 'persistence is essential to success' said 'Mestense is instans to sensation', note the repetitive nature of the error sounds, such as the |st| and |ns| clusters.

Eisensons (1973b) makes the cogent observation that perseveration tends to increase when any of following conditions exist:

(i) The aphasic patient is confronted with difficult new contexts.

(ii) The patient is experiencing fatigue

(iii) Situations change rapidly

(iv) The patient is in a state of anxiety and feels the need to say something, despite his ability at the moment to say what is required. Eisenson goes on to say that perseveration may indicate the demands being made by the clinician are excessive. In this case, the patient is unable to respond appropriately and the unconscious repetition of a previous act is a natural consequence. The clinician should alter the pace or change the activity to reduce perseveration.

Rochford (1974) gives some intriguing examples of perseveration at the semantic level. He asked a patient with jargon aphasia to name nineteen outline drawing of objects and found that the patient was sometimes able to give the right

name but at the wrong time. Having failed to name 'skull', 3 times later J|he called a scare crow a 'skull-bound'.

Theoretically, one could have expected, for eg : predominance of fragmentary movements in patients with Broca's aphasia or of augmentation of movements in Wernicke's aphasia and of perseveration of movements in global aphasia (Porch and Kerchensteiner, 1975).

Buckingham and Keitesz (1976) have described 3 patients with whom neologistic utterances often seem to result not so much from phonemic distortion of target words but from perseveration and recombinations of various phonemic units, which had already been uttered.

Buckingham et al (1978) studied jargon aphasics and reported that the neologisms contain more alliteration and assonance than would be expected by chance. They, again in 1981, studied 2 aphasic patients with posterior parietal lesions. Analysis of large samples of spontaneous and elicited speech with emphasis on delayed repetitions were done. The words were the linguistic unit most often perseverated. The perseverated response was not always appropriate initially. The perseveration was sometimes a slightly altered version of a previous response sometimes a phonological, lexical or semantic blend and sometimes a neologism. The perseveration frequently had a glottal sound as if it had been cut off.

Yamadori (1981) studied 38 aphasic patients, 24 anterior, 14 posterior, 4 with mixed etiology. The tasks were repetition of meaningful and non meaningful stimuli varying in length. Perseveration was observed in 33 patients out of 38. Perseveration did not correlate with severity, duration of type of aphasia.

Shindler et al (1983) studied 20 aphasic patients (6 Wernicke's, 8 anomic and 6 Broca's). The tasks were visual confrontation naming, word associations: WAIS vocabulary subtest. 83% of Wernicke's, 50% of Broca's and 38% of anomic aphasias made atleast one perseverative error. Perseveration correlated positively with naming.

Johansen - Horbach et al (1985) used BLISS symbol with 4 globally aphasic patients who had previously received atleast 6 months of traditional treatment. Individual sessions were conducted twice a week for 2 months. The goals were for the patient to acquire a basic lexicon of BLISS symbols, to produce and understand simple BLISS sentences and to use BLISS to communicate in home environment. Although, all 4 patients, reportedly acquired a symbol lexicon, one patient with extensive left hemisphere brain damage, including the thalamus, was discontinued because of extreme perseveration. In the other three, perseveration was milder with the symbols than with natural language.

The frequency and persistence of Preservative responses seems to be related to the severity of the patients brain damage. Perseverative behaviours are seen after unilateral damage in either hemispheres, after generalized damage caused by traumatic injuries and in the middle to later stages of dementia. The neurophysiologic causes of perseveration are not known, although it is likely that perseveration may arise from a number of neurologic of cognitive anomalies (Brookshire, 1992).

Relationship between type of aphasia, lesion and perseveration

Investigators have attempted to relate the type of perseveration to the lesion localization. An extensive body of clinical research has corroborated that insula is frequently involved in the major aphasic syndromes (Ardila, 1999).

Author	Year
Broca's Aphasia	
Alexander et al	1989
Ardila et al	1989
Henderson	1985
Kertesz	1991
Kertesz et al	1979
Levine and Sweet	1983
Mazzochi and Vignolo	1979
Mohr	1976
Mohr et al	1978
Murdoch	1988
Murdoch et al	1986
Signoret et al	1984

Conduction aphasia

Ardila et al	1989
Damasio and Damasio	1980, 1983
Goldstein	1911
Lichtheim	1885
Mazzochi and Vignolo	1979
Murdoch et al	1986

Wernicke's aphasia

Phonemic imperception	
Ardila et al	1989
Benson	1979
Gazzaniga et al	1973
Kertesz	1981,1983
Liepmann and Storck	1902
Mazzochi and Vignolo	1979
Yaqub et al	1988

These studies suggest a possible role for insula in language processing and indicate that damage to the insula may frequently be a source of aphasia. Both the older autopsy based studies and more recent brain imaging con'elations suggest that anterior insula damage is often present in cases of moderate to severe Broca's aphasia, middle insula damage is frequently conelated with repetition deficits (conduction aphasia) and posterior insula damage occurs with the word deafness of Wernicke's aphasia.

The role of insula in speech and language processing has long been noted by several authors (Wernicke, 1874; Freud, 1891; Luria, 1970; Benson 1979, Benson and Ardila, 1996), who reported that both the asymmetry and location at the epicenter of human language suggests that insula may be active in language.

Pick (1905) suggested that the accelerated speech of the sensory aphasia as one factor leading to perseveration and the lack of inhibition in word choice as another. On the question of localization, he noted lesions had usually been found on the left side in right handed patients. While perseveration was often marked with lesions of the temporal lobe, he did not believe that it appeared only with these.

Milner (1964, 1971, 1982) studied patients with unilateral frontal and temporal lesions for control of intractable seizures. They were administered Wisconsin Card Sort

Test, visually guided stylus mazes and delayed comparison. The findings were as follows. The patients with both right and left frontal lesions were impaired on the WCST. Many patients were aware of their deficits, but unable to alter their response strategy. Patients with right frontal lesions were significantly worse than in other groups at learning to follow a stylus maze with auditory feedback. They repeatedly broke the rules and made the same errors after even when corrected. Right frontal patients were also significantly worse in a test delayed comparison.

Luria (1965) observed cases of frontal lobe lesions with varying etiologies, given motor tasks with and without verbal instructions. Two distinct types of motor perseveration were observed.

Luria (1966) discusses the phenomenon and the neurodynamics of perseveration. In experimental situations he observes that perseveration represents difficulties associated with inertia of a previously formed dynamic structure that continue to manifest during the performance of intellectual operations. Luria believes that perseverations is associated with lesion of the frontal lobes, especially when there is evidence of disturbance of complex hierarchic programs of behaviour and for subordinating the further course of the processes to those preliminarily created programs.

Lesions involving the orbital frontal cortex and the interior convexity have consistently resulted in increased activity levels and an abnormal tendency to repeat previous responses in a repetitive, perseverative fashion even when the context is no longer appropriate or rewarded and/or the response is punished and the individual realizes that his/her responses are incorrect (Butter, 1969, Butter et al, 1963, Mishkin and Irensen, 1970; Mishkin, 1964). The capacity to shift responses is attenuated. Thus once a behaviour is completed particularly if it is repeatedly performed, the pattern

continues to be involuntarily executed such that the ability to change to a different pattern of activity is disrupted.

Goldberg and Tucker (1979), based on an extensive review of the literature on a task of drawing graphical sequences of geometric forms and letters proposed that a single neurocognitive mechanism, called pathological inertia - operating at different levels is responsible for all types of perseveration.

Yarnell (1981) studied the language functions of 3 life long right handed patients who became aphasic after a right hemisphere infarction. They found that the language functions in the rehabilitative, subacute phase of their illness were characterized by fluent, literal paraphasic output, dyslexia and dysgraphia. Conversation and the combination of language abilities enabled them to reach a functional communication stage. With this, they were unable to determine why these 3 patients had crossed dextral aphasia resulting from right sided infarcts.

The consequences upon language of thalamic haemorrhages and infarction have been reviewed by Jonas (1982) and by Crosson (1984). Both authors stress the absence of deficits of language comprehension and repetition in the vast majority of cases. Speech production of patients with left thalamic lesions is characterised by paraphasia, or even jargon, perseveration, anomia and in a smaller number of cases, lack of spontaneity of speech.

Gorelick et al (1984) suggested deficits in lexical access (anomia, semantic paraphasia) separate from deficits in vigilance (leading to neologisms, intrusions, fluctuation performance, jargon, perseverations) in patients with thalamic lesions.

Bayles, Tomoeda, Kaszniak, Stern and Eagans (1985) studied the patterns of perserveration and fiequency of canier phrases in the verbal descriptive discourse of

dementia patients. Their results indicate that dementic patients perseverate more frequently than normals and the severity of dementia is associated with increase in perseveration. They also noted that discontinous perseveration was more common than continuous perseveration.

Goldberg (1986) was reluctant to postulate specific association between types of perseveration and neuro anatomical locus.

Relationship of perseveration with linguistic components

Halper n (1965) studied the effect of stimulus variables on verbal perseveration in brain damaged individuals. The responses analysed were printed words which varied in abstractness, number of letters, frequency and grammatical category (noun, verb, adjective). He presented the stimuli visually, auditorily and simultaneously (visually and auditorily). He found that perseveration due to abstractness of lexical items was only significant in visual modality, length of the word was significant in all modalities. Grammatical category and word fiequency were not significant for any modality of presentation.

Chenery, Ingram and Murdoch, (1990) investigated the status of semantic information on aphasia by comparing the performance of aphasic and non-aphasic subjects on two tasks; an automatic semantic facilitation task and a volitional task of relatedness judgement. They found that both aphasic and non aphasic groups evidenced a semantic facilitation affect, in an on-line task of semantic processing. However, these aphasics with severe comprehension and naming disturbances demonstrated considerable difficulty in judging the relatedness between a pictured object and members of that object's semantic field, the severity of impairment being greater for those pictures that the low comprehension aphasics were unable to name. They explained their pattern of results by supporting the structural integrity of the store of semantic information in aphasia and in particular in low comprehension aphasia;

information that is retrieved and manipulated in judgement - mediated tasks with considerable difficulty.

Papagno and Basso (1996) studied the perseveratory behaviour of 2 aphasic patients who had a head trauma on verbal and non verbal tasks to elicit perseveration. They reported that perseveration was not semantically related to target, which they said may occur since a semantically unrelated stimuli may trigger semantically unrelated perseveration.

Martin, Roach, Brecher and Lowery (1998) studied the factors that influence the occurrence of perseveration and non perseverative word substitution errors produced by 3 aphasic subjects. They showed that a target error similarity (i.e.,) semantic and / or phonological, influence the occurrence of both perseverative and non perseverative errors within a subjects error profile.

They also reported an interaction between target-error similarity and processing factors may induce perseveration.

They discussed this on the basis of 2 accounts.

1. Perseveration results from a failure to inhibit a prior response.
2. Perseveration results from a summation of residual priming activation of a prior response and spreading activation from the representation of the current target word.

Kohn and Melnold (2000) examined the effect of morphological complexity on 2 fluent and 2 non fluent aphasic speakers. They were asked to repeat a variety of moiphologically complex words on comparison of overall performance levels between moiphologically simple and complex words, only 3 subjects exhibited more difficulty repeating the moiphologically complex targets. But when comparing repetition accurately between different types of morphologically complex words, all 4 subjects

showed same patterns, suggesting that, while morphological complexity has different effect on these 2 stages, the relative effects of different morphological structures are constant. They could also distinguish fluent from non fluent aphasic subjects based on the pattern of affix errors associated with agrammatic and paragrammatic speech.

Indian Studies on Perseveration

Indian studies on 'Perseveration' is very minimal. Only one study has been reported in Indian language.

Chandralekha (2001) studied verbal perseveration in 24 normal geriatrics (12 males; 12 females) aged between 60 to 80 years. They were divided into 4 groups. Five tasks were chosen to elicit perseveration and she found that the continuous type of perseveration was seen in her subjects on all the tasks and that recurrent perseveration sets in with increasing age. She also reported a sex difference in the perseveratory characteristics.

In general, there are different tasks to elicit perseveration in brain damaged patients or normals. Helmick and Berg (1976) had listed out nine tasks which can be used to elicit perseveration which are as follows:

1. Design construction
2. Naming and reversing a series
3. Naming and describing the function of sighted objects
4. Answering questions
5. Defining words
6. Describing a picture
7. Writing sentences and a letter
8. Drawing designs from memory
9. Drawing geometric shapes and writing names following verbal instructions.

As the present study is focussed on verbal perseveration, only the speech tasks were taken and the motoric tasks were eliminated.

A review of literature indicated that no one set of items had been used consistently to measure perseveration in the brain injured or normals. The tasks used in this study, therefore, were a compilation of those tasks used in previous studies on which most subjects had manifested perseverative responses.

Need for the study

The review of literature suggests that perseveration as a phenomenon has been studied in clinical population. Literature with respect to Indian studies on verbal perseveration in broca's aphasics is very scanty except for one study by Chandralekha, who studied perseveration in normal geriatric individuals.

Study of perseveratory characteristics in the above group would help a SLP to screen or evaluate geriatric population for their speech and language deficits, if any.

Objectives of the study

1. The main objective of the present study was to look for perseveratory utterances, if any, in broca's aphasics and their normal controls who are native speakers of Tamil, a south Indian language.

2. The study also aimed to check for
    a. Type of perseveration, if any, in the above population and
    b. The potential task that elicit perseveration.

3. Similarities and differences between these groups.

METHODOLOGY

The objective of the present study was to investigate the perseveratory characteristics in the speech of Broca's aphasics and normal geriatrics.

A. SUBJECTS

Two groups of subjects (Group A ; Group B) in the age range 60-80 years ,who were native speakers of Tamil were selected for the study. Group A consisted 5 males with Broca's aphasia due to cerebro-vascular accident (CVA). Group B consisted of 5 normal geriatric males as control group.

Table: 1 Subjects

GROUP	AGE RANGE	MALES	TOTAL
A	60-80 (Broca's aphasics)	5	5
B	60-80 (Normal)	5	5

The following criteria were used in the selection of subjects for the present study:

GROUP A (experimental group)

Literate 'Broca's aphasic' (5 males) with a minimum of primary education in the age range of 60-80 years diagnosed by a neurologist and a speech-language pathologist, were selected as subjects. To confirm the diagnosis Western Aphasia Battery (WAB) was administered. Care was taken to select subjects whose verbal expression was in simple sentences. Post morbid period at the time of testing was between 3 to 6 months.

GROUP B (Control Group)

Normal geriatric adults (5 males) in the same age range, with a minimum of primary education were used as control group. Those with conected vision were also considered. Care was taken to select subjects who had no history of alcohol or drug abuse and dysfluency, even at an younger age. It was ensured that there was no significant history of head injury, degenerative disease and/or psychological and psychiatric problem.

B. TEST MATERIALS

Emery and Helm-Estabrooks (1989); Albert and Sandson (1986); Helmick and Berg (1976) and Ramage et al (1999) state that the tasks which are sensitive in eliciting perseveration are

1. Picture Naming
2. Description of Function
3. Defining Words
4. Description of Picture
5. Answering Questions

For each of these 5 tasks, about 39 items were selected for the study. The items were selected keeping the widely adopted tests such as Peabody Picture Vocabulary Test (PPVT), Binet Kamath Test (BKT), and Weschler's Adult Intelligence Scale (WA1S) as reference. Coloured cards(4/7 inches) were used for presenting the picture stimulus or words. (Appendix 1 to 4).

Table 2: Table showing the tasks and the number of stimuli

Sl.No.	Tasks	No. of Stimulus
1	Picture Naming	10
2	Description of Function	10
3	Defining Words	10
4	Describing the Picture	4
5	Answering Questions	5

1. Picture Naming

This task was adopted from PPVT (Dunn, 1965). It consists of 10 pictures. Subjects were required to name the pictures, presented one at a time.

2. Describing the Function

Same pictures used for the above task, were used for this task. It consists often pictures and the subjects were instructed to describe the pictures which were presented one at a time.

3. Defining Words

Ten words from WAIS(Weschler, D., 1955) were taken and the subjects were asked to define the words. The words were presented verbally and repeated when the subjects did not perceive the word.

4. Describing the Picture

Adopted from Binet-Kamath test (Kamath, V.V., 1963), it consists of four pictures depicting various real life scenes. The subjects had to describe the pictures.

5. Answering Questions

A short story from a school text of fifth grade was recited to the subjects. They were then asked five questions related to the story.

C. TEST ENVIRONMENT

The subjects were seated in a quiet room. They were seated comfortably with no distractors. All the tests were administered on an individual basis in their respective residence.

D. PROCEDURE

The test stimuli were presented through pictorial mode. However, it was supplemented through gestural and written modes whenever the subjects failed to understand for three times successively.

E. RECORDING and TRANSCRIPTION

The responses of each of the above mentioned tasks were audiorecorded. Verbatim transcription of the sample was done using broad phonetic transcription. This was analysed for the presence or absence and nature of perseveration.

F. ANALYSIS OF THE TRANSCRIBED SAMPLE BY SLP'S

3 SLP's with post graduate training in speech and hearing, including the investigator analyzed the transcribed samples for the type and frequency of perseveration.

G. SCORING

The analyzed data from the judges for both the groups (Group A and Group B) were tabulated on a scoring sheet.

The number of utterances expressed by the subjects on each individual task as reported by one judge (say Jl) was calculated. The total number utterances were then obtained by combining all the number of utterances expressed by one group on one particular task. The same was done for the other group. The total number of utterances were calculated in the same way for the other two judges (J2 and J3).Similarly, total number of perseverations was calculated.

This was then converted to percentage for each task by the following formulae:

$$\frac{\text{Total number of perseveration}}{\text{Total number of utterances}} \times 100$$

The percentage scores were then obtained to determine the severity of perseveration and to make comparisons among subjects who differ in their number of responses.

The data was then subjected to statistical analysis to check for:

1. Differences between experimental and control groups.
2. Potential tasks to elicit perseveration.
3. Relation between task and type of perseveration.
4. Inter judge reliability.
5. To compare with existing data on perseveration in normal geriatrics who are native speakers of Tamil.

RESULTS AND DISCUSSION

The aim of the study was to investigate the nature of perseveration in the speech of Broca's aphasics (experimental group) and normal (control) group who are native speakers of Tamil. The study also looked for the similarities and differences in perseveratory characteristics between the experimental and control group. The study also looked for the type of perseveration and the potential tasks to elicit the same.

In order to discuss the above issues, geriatric Broca's aphasics and normal geriatrics (experimental and control group respectively) in the age range of 60-80 years were selected.

They were tested on the following tasks, selected for the study

- Picture Naming (PN)
- Describing the Function (DF)
- Defining Words (DW)
- Description of Picture (DP)
- Answering Questions (AQ)

The responses of the subjects were audio recorded. It was given to 3 Judges, including the investigator, for analysis of perseveration. The judges were briefed about the various types of perseveratory utterances, if any, for each task. The total number and type of perseverations identified were tabulated (see tables 3 to 9). The data was subjected to statistical analysis.

I. Performance of individuals with Broca's Aphasia

Table - 3: Mean of perseverations w.r.t task Vs. type across judges

Tasks	J_1			J_2			J_3		
	C	R	S	C	R	S	C	R	S
PN	0.06	0.13	-	0.06	0.15	0.01	0.06	0.12	-
DF	0.07	0.08	0.05	0.08	0.08	0.05	0.07	0.08	0.05
DW	0.07	0.10	0.07	0.07	0.10	0.07	0.07	0.10	0.08
DP	0.02	0.12	0.02	0.02	0.12	0.02	0.02	0.12	0.02
AQ	0.05	0.08	0.04	0.10	0.08	0.05	0.05	0.08	0.05

Number of perseverations for each type of perseveration across tasks as judged by Jl, J2, J3 were tabulated. The scores were compiled for each type of perseveration with respect to task. The scores given by each judge were divided by the total number of utterances calculated on the basis of word as a minimal unit of measurement. The same is depicted in Table 3.

From Table-3, it can be observed that there is an occurrence of all types of perseveratory utterance on all tasks except for picture naming where there is an absence of stuck-in-set perseveration as judged by J_1 and J3. The recurrent type of perseveration was seen more compared to the other types on all the tasks.

la. Performance with respect to tasks

A comparison of perseveratory utterances across all the tasks further revealed that Description of Picture and Picture Naming elicited more perseveration followed by Defining Words and Describing the Function and Answering Questions that elicited the least.

The result of this present study on individuals with Broca's aphasia is in support of Helmick and Berg's study (1976).

Helmick and Berg (1976) have reported that the tasks which elicited fewest number of perseveratory utterances were Defining Words and Answering Questions.

lb. Performance with respect to type of perseveration

Literature with respect to type of perseveration have shown that recurrent variety is more common in aphasics.

Albert and Sandson (1986) have reported that recurrent perseveration was seen more in their aphasic subjects and continuous type was seen in RHD subjects. The findings of the present study also indicates that recurrent perseveration was more significant than the other types of perseveration.

Analysis of variance (ANOVA)

In order to check for the differences that existed between the tasks and types in the experimental group are real, ANOVA was carried out. ANOVA revealed a significant difference in 2 tasks (Description of Picture and Picture Naming) and there was a significant difference in variance for perseveratory utterances in these 2 tasks.

The results of ANOVA were further subjected to Duncan's post-hoc analysis as shown in table - 4. Broca's aphasics showed more of "recurrent perseveration" and the tasks PN and DP elicited more of recurrent perseveration (Table-4).

Table-4 shows a significant difference between PN and DP in the experimental group for recurrent perseveration. The significant difference observed on these tasks across the three types of perseveration highlights the importance of the nature of these tasks in eliciting perseveration. The results suggest that Picture Naming and Describing of Picture (DP) could be important components in tests for perseveration for **Broca's Aphasics.**

Table - 4: Duncan's post-hoc analysis

		N	Subset for alpha = 0.05	
	PERS		1	2
PN	S	15	.20	-
	C	15	.80	-
	R	15	-	1.93

		N	Subset for alpha = 0.05	
	PERS		1	2
DP	S	15	1.07	-
	C	15	1.33	-
	R	15	-	6.00

II. Performance of Normal Geriatrics

Table - 5: Mean of perseverations w.r.t task Vs. type across judges

Tasks	J_1			J_2			J_3		
	C	R	**S**	**C**	R	**S**	**C**	R	**S**
PN	0.01	0.01	0.03	0.01	0.01	0.03	0.01	0.02	0.04
DF	0.03	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00
DW	0.02	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00
DP	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
AQ	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00

Number of perseverations for each type of perseveration across tasks as judged by Jl, J2, J3 were tabulated. The scores were compiled for each type of perseveration with respect to task. The scores given by each judge were divided by the total number

of utterances calculated on the basis of word as a minimal unit of measurement. The same is depicted in Table 5.

It can be seen from Table-5, that there is a total absence of recurrent and stuck in set type of perseveration in all tasks except picture naming.

Continuous type of perseveration was seen across all the tasks but the frequency was more on Describing the Function.

II a. Performance with respect to task

A comparison of perseveratory utterances across the tasks, revealed that Picture Naming elicited all the types of perseveration including stuck in set type which was not evident on other tasks. But across the tasks which elicited perseveratory utterances, describing the function elicited more perseveration closely followed by Defining Words, Answering Questions, Description of Picture and Picture Naming elicited the least perseveratory utterances.

These results are in consensus with Indian study by Chandralekha (20G1) which reported that 'Defining Words' was a significant task in eliciting perseveration in normal geriatrics. In the present study except Picture Naming tasks, which did not show a statistically significant difference in Duncan's post hoc analysis all other tasks (Table-6) were statistically significant in eliciting perseveration in normal individuals.

II b. Performance **with** respect to type

Literature with respect to type of perseveration in normals is very scarce. However, a study by Chandralekha (2001), revealed that continuous type of perseveration was more common in all geriatric normal individuals. In the present study, continuous type of perseveration was seen for normal control. The results of this study on normal controls are in favour of Chandralekha's study.

ANOVA

To check the difference that existed between task and type in control group are real, ANOVA was carried out. It revealed a significant difference on all tasks, except Picture Naming.

These results were further subjected to Duncan's post-hoc analysis to confirm the significance (Table-6).

A significant difference was seen among the control group for continuous type of perseveration (See Table 6). This significant difference seen on these tasks across the type of perseveration highlights the importance of the nature of the tasks that could be adopted to elicit perseveration in **normal geriatrics.**

The results suggest that all the tasks except picture naming (PN) are important components tasks for eliciting perseveration in normal geriatrics.

Table - 6: Duncan's Post-hoc analysis

		N	Subset for alpha = 0.05	
	PERS		1	2
DF	S	15	0.40	
	R	15	1.00	
	C	15		3.80

		N	Subset for alpha = 0.05	
	PERS		1	2
DP	S	15	0.00	
	R	15	0.67	
	C	15		1.73

		N	Subset for alpha = 0.05	
	PERS		1	2
DW	S	**15**	0	
	R	15	0	
	C	15		0.87

		N	Subset for alpha =0.05	
	PERS		1	2
AQ	S	15	0	
	R	15	0	
	C	15		0.87

III. Similarities and differences between individuals with Broca's aphasia (Exp. Group) and normal (control) group

The type of perseveration between normals and individuals with Broca's aphasia on different tasks revealed the following similarities and differences.

Ilia. Similarities between groups

On statistical analysis, using ANOVA and Duncan's post-hoc analysis (See Table 7 & 8) across individual tasks between 2 groups, Picture Naming and Description of Picture were found to elicit more perseveration in both the groups. This was further supported qualitatively when mean percentage was calculated between the groups with respect to task and type of perseveration. (Table 9).

Table - 7: Mean of perseverations

Task	Type of perseveration	Mean	
		Broca's aphasics	Normal
PN	C	0.80	0.20
	S	0.20	0.40
	R	1.93	0.20
DF	C	4.00	3.80
	S	2.67	0.40
	R	4.20	1.00
DW	C	4.80	3.67
	S	3.87	0.20
	R	5.07	0.73
DP	C	1.07	1.73
	S	1.33	0.00
	R	6.00	0.67
AQ	C	2.42	0.87
	S	1.50	0.00
	R	2.67	0.00

Table - 8 : Duncan's Post hoc analysis

		N	Subset for alpha = 0.05	
	PERS		1	2
PN	S	30	-30	
	C	30	.50	.50
	R	30		1.07

		N	Subset for alpha = 0.05	
	PERS		1	2
DP	S	30	0.67	
	c	30	1.40	
	R	30		3.33

b. Differences between the groups

The differences observed between the 2 groups with respect to types of perseveration and tasks which elicited perseveration are delineated.

The experimental group exhibited all the 3 types of perseveration (Stuck in set, Recurrent & Continuous) across all the tasks. However, 'Recurrent' perseveration was more frequent among the experimental group. In the control group 'continuous' perseveration was frequently observed, across all the tasks and stuck-in-set and recurrent perseveration were totally absent in all the tasks except PN.

Subjecting the scores of both the groups to ANOVA, the results revealed that the differences in perseveratoiy responses elicited by DF,DW, AQ in both the groups were not statistically significant. However, generally normals showed lower perseveratoiy errors than broca's aphasics. (Table-8).

Allison and Hurwitz (1967), Emery and Helm-Estabrooks (1980), Albert and Sandson (1980) have reported that aphasic's produce more perseveration than normals and individuals with right-hemisphere damage on naming, visual confrontation and drawing tasks.

A similar study by Helmick and Berg (1970) indicates that 'Recurrent' type of perseveration was seen more frequently in their brain damaged and normal subjects. In the present study, though recurrent type of perseveration was seen in broca's aphasia, which is in support of Helmick and Berg's study, the normals differed in terms of the type. While normals in Helmick and Berg's study exhibited recurrent perseverations more frequently, in the present study, the continuous type was the predominant one. A study on normal geriatrics by Chandralekha (2001) also reported the frequent occurrence of continous type of utterance. The present study is in agreement with Chandralekha's study.

A qualitative analysis of mean percentage between the groups with respect to task and type of perseveration indicated that 'recurrent' perseveration is more common in Broca's aphasics and 'continous' perseveration is more common in normal controls (Table 9).

The difference observed between the present study and Chandralekha's (2001) on normal geriatrics with the Western study is speculated to be due to the differences in the structure of language used in both the studies. However, further studies are needed to either confirm or refute this proposition.

IV. Inter judge reliability

High agreement was seen among the judges, across all the tasks. (Table 3 & 5). But, some of the responses by the subjects were not considered as a perseveratory utterance in some instance, especially in experimental group by the investigator because the investigator knew the context involved when the utterance was made.

However, because of lack of knowledge of the contextual situation in which such an utterance was made, the other judges scored it as a perseveratory utterance. These observation indicate that context plays a role in the decision of perservation$_n$

V. Qualitative analysis of perseveratory features

In addition to statistical analysis of the data, the responses of the speech sample were qualitatively analyzed.

(i) Mean percentage was calculated between Broca's aphasics and normal controls with respect to task and type of perseveration. The mean percentage revealed that 'recurrent' type of perseveration was more common in Broca's aphasics and 'continuous' type of perseveration was more common in normal controls. Also, the tasks which elicited most perseveration in Broca's aphasics were Picture Naming and Description of Picture while in normals it was Describing the Function (Table 9).

Table - 9: Mean percentage of perseverations for task Vs. type Vs. group

Groups	Type of perseveration	Mean	
		Broca's aphasics	Normal
PN	C	6.15	1.69
	R	14.87	1.69
	S	1.53	0.38
DF	C	8.02	3.53
	R	8.42	0.93
	S	5.34	0.37
DW	C	8.91	2.65
	R	9.40	0.53
	S	7.17	0.14
DP	C	2.48	1.99
	R	13.95	0.76
	S	3.10	0.00
AQ	C	8.68	1.99
	R	9.58	0.00
	S	5.38	0.00

Figure. 1

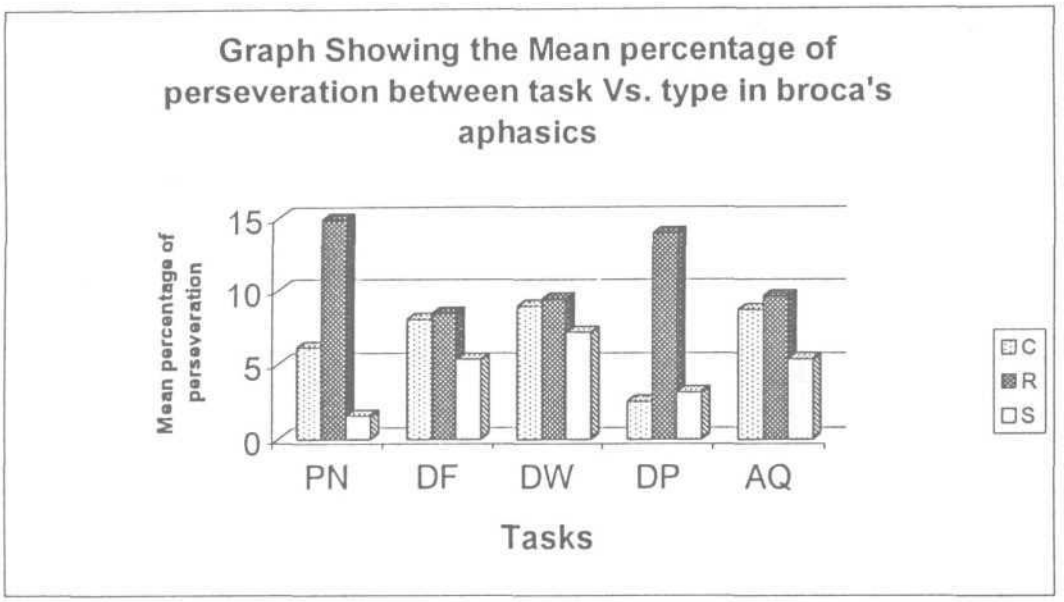
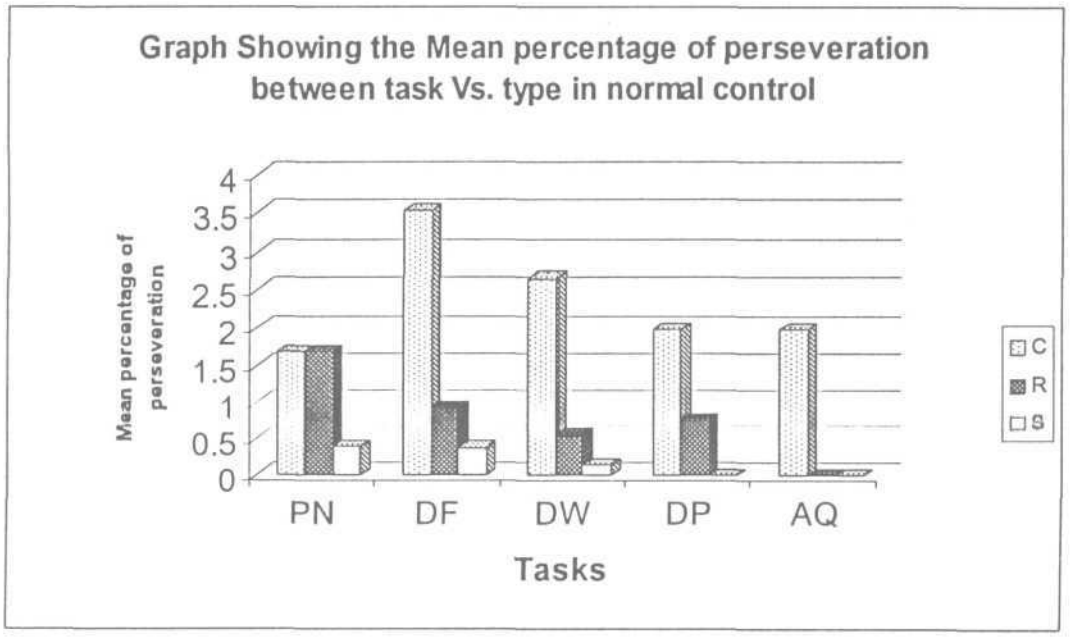


Figure. 2



(ii) The subjects (especially normal controls), occasionally borrowed words from English & appeared to show synonym substitutions. However, it was not considered as a perseveratory utterance in the present study by all the 3 judges. E.g. Pai -

(iii) Reports of perseveration on individuals with brain damage have been consistent in their finding regarding the occurrence of perseveration on almost all components of language i.e., at phonological, semantic and syntactic levels (Buckingham, Whitaker and Whitaker, 1975) and also that whole word perseveration is a common phenomenon in aphasics (Buckingham, 1978).

The subjects in the present study also perseverated on almost all the above components.

Syntactic - E.g. Mela portukku, Mela portukku

Semantic - E.g. Vandu kotrudu, virichi kotrudu

Phonologic - E.g. a: appu

Whole word: E.g. ba: lu, ba: lu

(iv) Studies on the localization of perseveration have reported that recurrent perseveration is commonly seen in lesions involving the frontal cortex and the interior convexity (Butter, 1969: Butter et al., 1963; Mishkin & Irensen, 1970; Jones & Mishkin, 1972; Kolf et al., 1974; Mishkin, 1964; Luria, 1980).

The findings of the present study on individuals with Broca's aphasia (experimental group), show a trend of recurrent perseveration, suggesting that the lesions could be in frontal cortex and interior convexity. This, however, was not corroborated by CT scan findings in the present study.

Also studies by (Pick, 1905; Milner, 1964; 1971; 1982; Luria, 1965, 1966; Hudson, 1969; Gorelick et al., 1984) have reported that continuous perseverations are associated with thalamic lesions.

In the present study, continuous type of perseveration was seen in normal geriatrics. Does this observation lead us to state that degenerative phenomenon in geriatrics begins at the sub cortical level which is phylogenetically older substrate of human brain? Do we draw a paiallel between the other symptoms seen in aged such as tremor, laxity, slow pace etc that are associated with degenerative changes in subcortical areas? Further studies to investigate this, would throw more light on the parallelism between speech and motor behaviour.

Analysis of the results, in general, revealed the following:

1. Perseveration is a phenomenon of broca's aphasics and normals.
2. The recurrent type of perseveration was seen in broca's aphasics while continuous type was seen in normal geriatrics.
3. Tasks such as Picture Naming(PN) and Describing the Function(DF) elicited more perseveration in broca's aphasics and Describing the Function(DF), Description of Picture(DP), Defining Words(DW) and Answering Questions(AQ) elicited more perseveration in normal geriatrics. This emphasizes the importance of these tasks in the speech test for eliciting perseveration in these groups.
4. Subjective analysis of the results revealed the following:
   a. Broca's aphasics persevered on all components of language (phonology, syntax and semantics).
   b. The bilingual geriatrics appeared to borrow synonymous words from second language. This needs to be taken into consideration while defining perseveration.
   c. The continuous type of perseveration that is largely seen in geriatrics leads one to speculate whether degeneration begins in subcortical area as studies on individuals with brain damage have confirmed that continuous type is always associated with thalamic lesions (Hudson, 1969).
   d. Picture naming could be considered as potential task to differentiate Broca's aphasics from normal geriatrics.

SUMMARY AND CONCLUSION

The present study aimed to investigate the nature of perseveration in geriatric Broca's aphasics (experimental group) and normal (control group), who are native speakers of Tamil, in relation to type and task. The study also aimed to investigate the similarities and differences between the groups with respect to type of perseveration and task to elicit perseveration.

In order to investigate the above issues, geriatric Broca's aphasics (experimental group) and age matched normal subjects (control group) were selected in the age range of 60-80 years. Five tasks were chosen to elicit perseveration, as recommended by Helmick and Berg(1976). They were: Picture Naming, Describing the Function, Defining Words, Description of Picture, Answering Questions

The responses were audiorecorded. Three judges, including the investigator analyzed the data for perseveration. The data was further analyzed statistically by using techniques such as mean, ANOVA, Duncan's post-hoc and percentage of perseveration.

The findings were:

1. Perseveration is a phenomenon of broca's aphasics and normals.
2. The recurrent type of perseveration was seen in Broca's aphasics while continuous type was seen in normal geriatrics.
3. Tasks such as Picture Naming(PN) and Describing the Function(DF) elicited more perseveration in Broca's aphasics and Describing the Function(DF), Description of Picture(DP), Defining Words(DW) and Answering Questions(AQ) elicited more perseveration in normal geriatrics. This emphasizes the importance of these tasks in the speech test for eliciting perseveration in these groups.
4. Picture naming could be considered as potential task to differentiate Broca's aphasics from normal geriatrics.

5. Subjective analysis of the results revealed the following:
   a. Broca's aphasics persevered on all components of language (phonology, syntax and semantics).
   b. The bilingual geriatrics appealed to borrow synonymous words from second language. This needs to be taken into consideration while defining perseveration.
   c. The continuous type of perseveration that is largely seen in geriatrics leads one to speculate whether degeneration begins in subcortical area as studies on individuals with brain damage have confirmed that continuous type is always associated with thalamic lesions(Hudson,1969).

IMPLICATIONS OF THE STUDY

1. The present study helps in developing tasks for screening geriatric Broca's aphasic population.
2. Performance of geriatric Broca's aphasics in this study would be helpful to screen for changes in speech behaviour, specifically perseveration.

LIMITATIONS OF THE STUDY

1. The study employed only five tasks and motoric tasks such as drawing, copying was not included.
2. Video recording of the performance would have given additional information of perseveratory characteristics.

REFERENCES

Allison, R and Hurwitz, L. (1967). Cited in T. Sandson and M.L. Albert (1984). Varieties of perseveration, Neuropsycholgia, 22 (6), 715-732.

Anderson, A.J., Gilmore, T., and Roper, M, (1999). Conduction aphasia and Arcuate fasciculus: A reexamination of Wernicke - Gashwind model. Brain and Language, 70, 1-12.

Ardila, A. (1999). The role of insula in language. Aphasiology, 13(1), 79-87.

Baum, S.R and Pell, M.D. (1997). Production of affective and lingustic Prosody by brain-damaged patients. Aphasiology, 11 (2), 177-198.

Bayles, K.A., Temoeda, C.K., Kasznigk, A.W., Stern, L.Z. and Eagans, K.K. (1985). Verbal Pessevesation of Dementia patients, Brain & Language, 25, 102-116.

Blesser, R. and Poeck, K. (1985). Cited in C.W. Wallesch and C. Papagno. Subcortical aphasia. In F. Clifford Rose, R. Whurr and M.A. Wyke. (1993). (Ed.). Aphasia. London: Whurr Publishers.

Brookshire, R.H. (1992). An introduction to Neurogenic communication disorders: Minnesota: Mosby Year Book.

Buckingham, H.W. (1985). Perseveration in aphasia. In S. Newman and R. Epstein (Eds.) Current perspectives in dysphasia. Edinburgh; Churchill: Livingstone. Cited in Ramage, A., Bayles, K., Helm-Estabrooks., Nancy and Cruz, R. (1999). Frequency of perseveration in normal subjects. Brain and Language, 66, 333-340.

Buckingham, H.W., Whitaker, H.A., and Whitaker H.A. (1979). Cited in A.G. Davis. (1983). A survey of adult aphasia, England Cliffs: Prentice - Hall, Inc.

Butter, CM. (1969). Cited in R. Joseph. (1996). Neuropsychiatry, neuropschology and clinical neuroscience. Baltimore: Williams and Wilkins.

Butter, C M, Mishkin. M., Rosvold, H.L.K, (1963). Cited in R. Joseph. (1996). Neuropsychiatry, neuropschology and clinical neuroscience. Baltimore: Williams and Wilkins.

Chandralekha, C. (2001). Verbal perseveration in normal geriatrics: A study on Tamil speakers. Unpublished Master's Dissertation, University of Mysore.

Doyle, P.J., McMeil, R., Spencer, K.A., Goda, A.J., Cohsell, K and Lustig, A.P. (1998). The effects of concurrent picture presentations on retelling of usually presented stories by adults with aphasia. Aphasiology, 12 (718), 561 - 574.

Dressier, W.V. (1988). A linguistic classification of phonological paraphasias. In W.V. Dressier and J.A. Stark. Linguistic analysis of aphasic language. New York: Spriger - Verlag.

Eisenson, J (1973a). Adult Aphasia: Assessment and Treatment. New Jersey: Prentice Hall, Inc.

Eisenson, J. (1973b). Cited in J.D. Noll, Diagnosis of speech and language disorders associated with acquired neuropathologies: General considerations and aphasia. In I.J. Meitus and B. Weinberg. (1983). (Ed.). Diagnosis in speech language pathology. Unites States of America: Allyn and Bacon.

Emery, P.A and Helm-Esterbrooks, M. (1989). The role of presentation in Aphasic confrontation naming performance. In T.E. Prescott. Clinical-aphasiology. London: A College-Hill Publication.

Freeman, T and Gethesole, C.E (1966). Cited in Ramage, A., Bayles, K., Helm-Esterbrooks, M. and Cruz, R. (1999). Frequency of preservation in normal subjects. Brain & Language, 66, 329-340.

Friedesci, A. (1995). The time course of syntactic activation during Language processing. Brain & Language, 50, 259-281.

Garstecki, D.C. (1981). Aural rehabilitation of the aging adult. In D.S. Beasley and G.A. Davis. Communication processes and disorders, New York: Grunne and Stratton.

Goldstein, K. (1916). Cited in T. Weisenburg and K.E. Mc Bride. (1964). Aphasies: A clinical and Psychological study, New York: Hafner publishing company.

H.A. Whitaker (1979). (C.d.) Studies in Neurolinguistics. London: Academic Press.

Halpesn (1965). Cited in Sandson and Albert.

Helmick, J., and Berg, E. (1976). Perseveration in Brain-injured adults. Journal of Communication Disorders, 9, 571-582.

Hudson, A. (1968). Cited in II.W. Buckingham, H.W. Whitaker and H.A. Whitaker. On Linguistic Pessevesation In H.Whitaker &

Johansen-Horbach, H., Cegla, B., Mager, V., Schempp, B. and Wallesch, C.W.(1985). Cited in C.W. Wallesch and C. Papagno. Subcortical aphasia. In F. Clifford Rose, R. Whurr and M.A. Wyke. (1993). (Ed.). Aphasia. London: Whurr Publishers.

Kerchensteiner, ML, Poeck, K. and Bruner, E. (1972). Cited in C.W. Wallesch and C. Papagno. Subcortical aphasia. In F. Clifford Rose, R. Whurr and M.A. Wyke. (1993). (lid). Aphasia. London: Whurr Publishers.

Kohn, S.E and Melvold, J. (2000). Effects of Morphological complexity on phonological output deficits in fluent & non fluent aphasia. Brain & Language, 73,323-346.

Kolk, H. (1995). A time fused approach to agrammatic production. Brain & Language, 50, 282-303.

Kridler, A., and Fradis, A., (1968). Cited in J. Eisenson. (1973). Adult aphasia: Assessment and Treatment. New Jersey: Prentice Hall, Inc.

Kridler, A., and Fradis, A., (1968). Cited in Lesser, B. (1989). Linguistic investigations of aphasia, Wiltstire: Antony Rowe Ltd.

Leichester, T., Sidman, M, Stoddart, L.T., and Mohr, J.P. (1971). Cited in H.W. Buckingham, H.W. Whitaker., and H.A. Whitaker. On linguistic perseveration. In H.W. Whitaker., and H.A. Whitaker. (1979). (Ed.). Studies in Neurolinguistics. London: Academic Press.

Liepmann, H.L. (1905). Die perseveration: uber shrugendes lendelns, bei gehimkranker. Berlin, Karter. Cited in Ramage, A., Bayles, K., Helm-Estabrooks., Nancy and Cruz, R. (1999). Frequency of perseveration in normal subjects. Brain and Language, 66, 333-340.

Ludgren, K., Helm - Estabrooks, N., Magnusdottir, S., and Emery, P. (1994). Exploring mechanisms underlying recunent perseveration, An aphasic naming study. Brain and Language, 47, 370-373.

Luria, A.R. (1966). Cited in Eisenson, J. (1973a). Adult Aphasia: Assessment and treatment. New Jersey: Prentice - Hall, Inc.

Luria, A.R.(1965). Cited in J. Sandson and M.L. Albert. (1984). Varities of pesseuesation. Meusopsycholgia, 22 (6), 715-732.

Mastin, M., Poach, A., Brecfier, A and Lowesy, J. (1998). Lexical retrieval Mechanisms underlying whole-ward preservation errors in anomic aphasia. Aphasiology, 12 (415), 319-333.

Matees, C. (1978). Cited in T. Sandson & M.L. Albert.

Milner, B. (1964). Cited in J. Sandson and M.L. Albert (1984). Varieties of perseveration, Neuropsycholgia, 22 (6), 715-732.

Milner, B. (1964). Cited in J. Sandson and M.L. Albert (1984). Varieties of perseveration. Neuropsycholgia, 22 (6), 715-732.

Milner, B. (1971). Cited in J. Sandson and M.L. Albert (1984). Varieties of perseveration. Neuropsycholgia, 22 (6), 715-732.

Milner, B. and Petrida, M. (1982). Cited in J. Sandson and M.L. Albert (1984). Varieties of perseveration. Neuropsycholgia, 22 (6), 715-732.

Papgno, C and Basso, A. (1996). Persevesation in Two aphasic patients. Cortex, 32, 67-82.

Pick (1905). Cited in T. Weisenberg and K.E. McBride (1964). Aphasia: A Clinical and Psychological Study. New York: Hafnes Publishing Company.

Poeck, K. and Kerchensteiner. (1975). Cited in C.W. Wallesch and C. Papagno. Subcortical aphasia. In F. Clifford Rose, R. Whurr and M.A. Wyke. (1993). (Ed.). Aphasia. London: Whurr Publishers.

Ramage, A., Bayles, K., Helm-Estabrooks., Nancy and Cruz, R. (1999). Frequency of perseveration in normal subjects. Brain and Language, 66, 333-340.

Rochford, G. (1974). Cited in Lesser, B. (1989). Linguistic investigations of aphasia, Wiltstire: Antony Rowe Ltd.

Sandson, J and Albert, M.L (1984). Varieties of persevesation. Neuropsycholgia, 22 (6), 715-732.

Santo-Piegro, M.J., and Rigrodsky, S. (1986). In J. Villki. (1989). Differential diagnosis in verbal retrieval to anterior posterior left hemisphere lesions. Brain & Language, 36, 543-554.

Shindler, A., Hier, D. and Caplan, L. (1983). Cited in Troster, A.J., Salmon, D.P., Mc Cullough, D. and Butters, N. (1989). A comparison of category fluency deficits associated with Alzheimers and Huntingon's disease. Brain and Language, 37, 500-513.

Taylor, K.I., Brngges, P., Weniges, D and Regard, M. (1999). Quantitative Hemispheric Differences in Semantic Category Matching. Brain and Language, 70, 119-131.

Troster, A.J., Salmon, D.P., Mc Cullough, D. and Butters, N. (1989). A comparison of category fluency deficits associated with Alzheimers and Huntingon's disease. Brain and Language, 37, 500-513.

Vilkki. (1989). Differential diagnosis in verbal retrieval to anterior posterior left hemisphere lesions. Brain & Language, 36, 543-554.

Yamadori, A. (1981). Cited in J. Sandson and M.L. Albert (1984). Varieties of perseveration. Neuropsycholgia, 22 (6), 715-732.

APPENDIX - I

PICTURE NAMING (PN) AND DISCRIBING THE FUCTION (DF)

1. மேஜை

mædzai

2. கத்தி

katti

3. குதிரை

kudirai

4. பந்து

பந்து

5. மணி

mani

6. மின்விசிறி

minvisiri

7. இலை

ilai

8. ஏணி

ɛni

9. பாம்பு

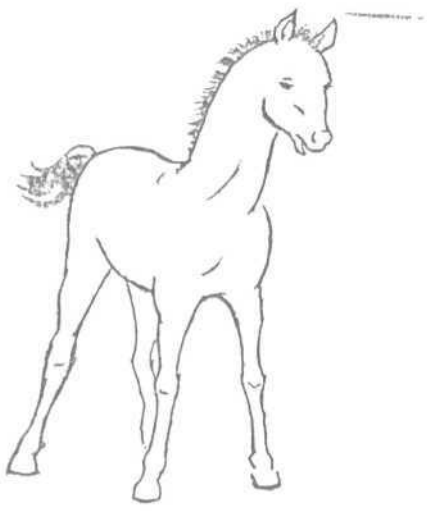
Pa:mbu

10. குழந்தை சாப்பிடுதல்

kuzhandai Sa:piduda l.

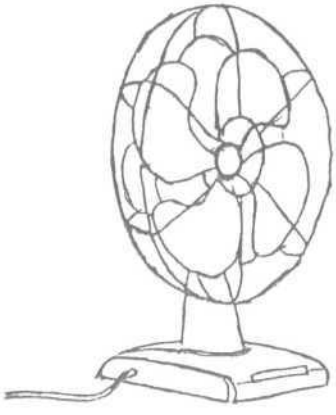
1

2

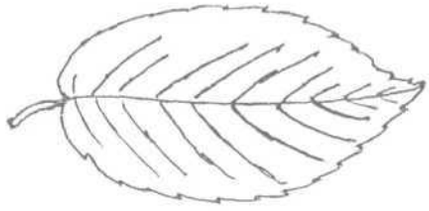


(4)

(5)

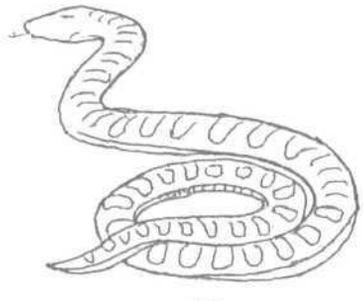


(6)



(7)

(8)



(9)

(10)

DESCRIPTION OF PICTURE (D P)

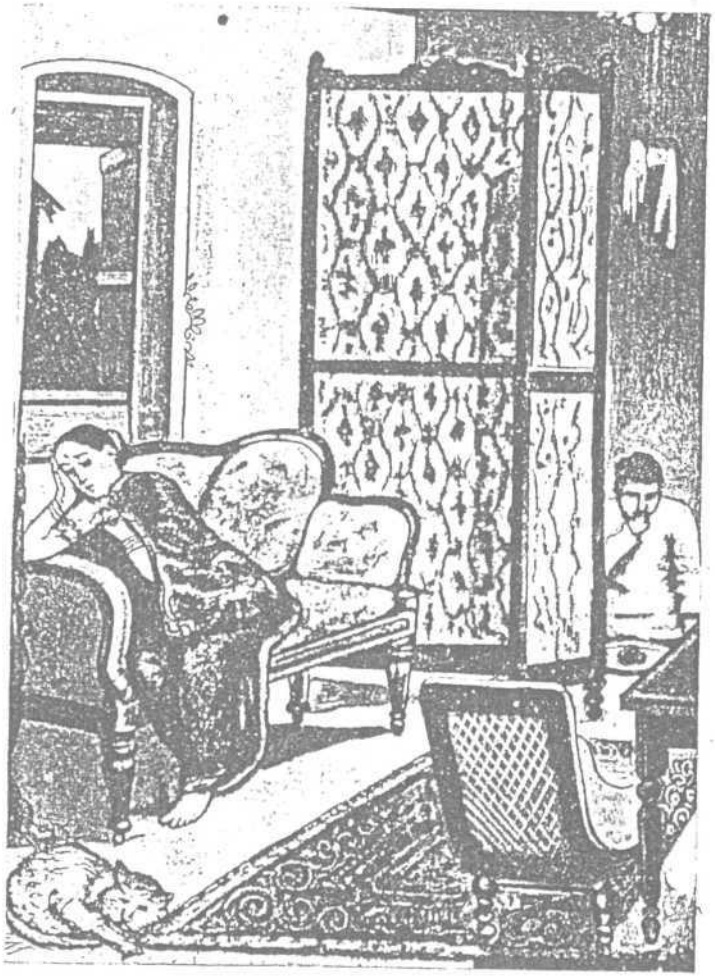
कार्ड १

कार्ड २

ಕಾರ್ಡ್ ೨ (೭)

कार्ड ३

ಕಾರ್ಡ್ ೩ (3)



ಕಾಡ ೪ ಕಾಡುF ೪ (A)

ANSWERING QUESTIONS (A Q)

1. யானையின் பெயர் என்ன ?

ja:naijin Pejar jenna ?

2. அப்பு ஏன் அழுதது ?

appu jen azhudhadhu ?

3. அப்புவின் கவலையை போக்க விலங்குகள் என்ன செய்தன ?

appuvin kavalaijai Po:kka vilanggugal jenna seidhana ?

4. நிறம் மாறின அப்புவை குழந்தைகளுக்கு ஏன் பிடிக்கவில்லை?

niram ma:rina appuvai kuzhandhaigalukku jen pidikkavillai ?

5. நிறம் மாறின அப்பு ஏன் குளத்தில் இறங்கியது ?

niram ma:rina appu jen kulathil irangjadhu ?

APPENDIX - V .

SCORING SHEET

S.No	PN			DF			DW			DP			AQ		
	C	R	S	C	R	S	C	R	S	C	R	S	C	R	S
1															
2.															
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10															