

Analysis of Verbal Perseveration in Subcortical Aphasics

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Abstract

Aim: The present study aims to profile and compare the nature and frequency of verbal perseveratory characteristics in the speech of subcortical aphasics and normal elderly population.

Materials and Method: A total of 60 participants of 2 groups (native Malayalam speakers) in the age range of 40 – 80 years were included in the current study. Group I included 30 subcortical aphasics of basal ganglia lesion. Control group (group II) consisted of normal 30 elderly populations. Items of the tasks were selected from three standardized tests. Ten black and white pictures selected from Peabody picture vocabulary test (PPVT) for picture naming task and for defining functional task, ten words from Weschler's adult intelligence scale - WAIS (Weschler 1955) were selected for word defining task, four pictures depicting real life scenes were selected from Binet- Kamat test (Kamat 1963) for picture description task. For answering the question task, a short Malayalam story was given. Participants were instructed to answer five questions related to the story followed by narration. The tasks were analyzed individually and score of '0' was given if perseverations were absent, a score of '1' was given if perseverations were present. The number of utterances expressed by the subjects on each individual task was calculated. The total number of utterances was then obtained by combining all the number of utterances expressed by one group on one particular task. Similarly, total number of perseverations was calculated. The obtained data were subjected to statistical analysis using SPSS software and independent t – test was done to compare scores obtained across group.

Results and Discussion: The results from the present study reveals, when frequency of occurrence of verbal perseveration errors across groups were compared there was a significant

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difference between subcortical aphasics and normals ($p < 0.05$). Results of the comparison of frequency of occurrence of verbal perseveration errors across group in each tasks showed a significant difference between groups. Group I exhibited more perseverative errors in picture naming task compared to normal. This could be probably due to picture naming tasks require activation of thalamus and basal ganglia. When three types of perseveration in each groups were analyzed, it was found that occurrence of recurrent type perseveration was more in subcortical aphasics. Stuck in set type perseveration were absent in both the groups. The current literature support the present findings recurrent perseveration is associated with damage to the left temporal and parietal regions and also to the people with aphasia following subcortical damage.

Key Words: Subcortical aphasia, Perseverative errors.

Introduction

Language is an important tool for communication. Most of the communication problems in adults are acquired which may be present after some kinds of brain damage, mental illness or dementia. Benson and Ardila (1996), defined that “aphasia is an impairment of language, affecting the production or comprehension of speech and the ability to read or write”. **Robin and Schienberg** (1990) claimed that subcortical lesions can also give rise to aphasic symptoms.

Nadeau et al, (1997) reported that subcortical aphasia can be caused by ischemic strokes, less often by intracerebral hemorrhages. Bradly, Daroff, Fenichel and Jankovic (2004) reported that there are mainly two major types of aphasic symptoms: aphasia with thalamic lesions, aphasia with lesions of subcortical white matter and basal ganglia. Left thalamic lesion resulting in aphasia is characterized by a relatively consistent clinical picture of a fluent expressive speech marked by verbal paraphasias and neologisms. Repetitions skills are spared and auditory and reading comprehension remains at relatively high levels. Other characteristics observed by researchers are reduced vocal volume, lack of spontaneity in oral expression, and word finding deficits with frequent perseveration.

Subcortical aphasia associated with basal ganglia lesions have been classified by anatomic sites. Lesion in specific anatomical site is associated with a particular set of speech and

language symptoms. According to Krishner (1995) the head of the caudate nucleus, anterior limb of internal capsule, and anterior putamen are the most generally noticed lesion sites causing aphasia. Damage to these areas leads to the anterior subcortical aphasic syndrome. It is characterized by dysarthria, paraphasias and decreased fluency but has a longer phrase length than in Broca's aphasia.

Following stroke or brain injury, aphasic patients commonly exhibit a range of errors in spontaneous speech and in tasks requiring a verbal response. Perseveration is one of the most captivating error types for language researchers. Buckingham & Christman (2004) reported that slowed decay rates from recent activation and weakened weight connections between levels would lead to perseveration of words as well as phonemes. Gotts, Rocchetta and Cipolotti (2002) defined perseveration as "the inappropriate repetition or continuation of a previous utterance or response when a different response is expected". In Halpern's (1965) view verbal perseveration as a "manifestation of the perseverating tendency generally described as an inappropriate repetition or reiteration of a previous verbal response". In aphasia, subcortical aphasia and normal elderly population perseveration can result in communication breakdown. This is due to changes in prefrontal cortex (shrinkage of the prefrontal cortex) and white matter which in turn could have contributed to the alterations in working memory, delayed memory and executive function.

Wepman (1972) believed that perseveration was the result of not taking enough time to consolidate and combine a response. He recommended that the mind acts like a camera shutter. Stimulation is possible only when the shutter is open. When the shutter is closed, processing of new information is impossible and thus accessing for a new response will result in perseveration. Subcortical aphasics show errors in tasks requiring a verbal response and in spontaneous speech. Gotts, Rocchetta and Cipolotti (2002) defined "perseveration as the inappropriate repetition or continuation of a previous utterance or response when a different response is expected". Albert and Sandson (1986) classified verbal perseverative errors into one of three major categories: continuous, stuck-in-set, or recurrent. Most researchers have stated that, between 50 and 90% of errors on verbal tasks made by patients with aphasia (regardless of type of aphasia) are perseverative.

Albert and Sandson (1986) reported that with respect to speech and language deficits, most forms of verbal perseverative errors could be classified into one of three major categories: continuous, stuck-in-set, or recurrent. According to Sandson and Albert (1984), “continuous” perseveration is defined as “the inappropriate prolongation or continuation of a response beyond the point of completion and without interruption by any intervening event.” “stuck-in- set” perseveration is “the inappropriate maintenance of a framework of response after introduction of a new task.” “Recurrent” perseveration is the “inappropriate occurrence of part, or all, of a previous response after a different intervening stimulus, response, or both.”

Table 1: Types of perseveration according to Sandson and Albert (1987)

Types of perseveration	Motoric description	Area of brain involved
Continuous	Abnormal repetition of a response token without cessation Stimulus: “name this picture” (of a dog) Response: “dog dog dog dog”	Damage to thalamus, arcuate fasciculus and deep nuclei of subcortical structures right hemisphere damage norepinephrine depletion
Stuck-in-set	Inappropriate maintenance of a response type even though task demands have changed Stimulus: “now point to the picture of the dog”	Left frontal lobe & mesolimbic frontal damage Dopamine depletion
Recurrent	Repetition of a previous response token to a subsequent stimulus within an established task set(has pointed to dog and book) Stimulus: “now point to the picture of the table” Response: points to the “dog”.	Posterior left hemisphere damage. Left temporal/ parietal damage Acetylcholine depletion

Dell, Burger and Svec (1997) based on the model of serial order and interactive spreading activation theory of language production postulated that verbal perseverations are due to some disruption of the activation of a present anticipated utterance. When the current targets vulnerably co- occurs with the persisting activation of past utterance result in perseveration.

Perseverative response is common in disorders of speech and language. Many research findings showed that, between 50 to 90% of errors on verbal tasks exhibited by patients with aphasia (regardless of type of aphasia) are perseverative. These errors are commonly seen in the

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speech of patients with senile dementia of the Alzheimer's type, schizophrenia, subcortical dementia and vocal tics of Tourette's syndrome and in patients with traumatic brain injury.

Literature suggests that verbal perseveration is an age related task specific phenomenon and that would be useful indicator of changes in the language characteristics of normal elderly population and individuals with brain damage. Garstecki (1981), reported that aging can lead to minor frustrations or as severe handicaps in the elderly. Verbal perseveration is one such behaviour frequently seen in the aging population. According to Goldstein (1916), the patients inability to make quick changes in attitude with a shift from one performance to another will result in perseverative behavior.

A study was done in twenty four Tamil speaking older individuals by Chandralekha and Prema (2001). Participants were divided into four groups across the age range of 60-80years. Five language tasks used were picture naming, picture description, defining words, defining function and question. The results revealed that remarkable verbal perseveration is seen in geriatrics (3.6% in 75-80 year old group) and that it increases with age in normal individuals. The type of perseveration which was most frequently observed was continuous compared to other types and this was equally present in phonological, semantic and syntactic aspects of language. There was no age and gender difference in the perseveratory characteristics.

Ramage et al (1999) conducted a study on 'frequency of perseveration in normal subjects'. The aim of the study was to document the extent of perseveration in normal young and older subjects 30 young normal individuals between the ages of 20 and 35 years and 30 older normal individuals between the ages of 60 and 75 years were given 4 tasks on which perseveration has been reported in brain damaged individuals. Perseverative responses were seen in 4% of all responses. There was no age or gender effects seen in frequency.

Emery and Helm-Estabrooks (1960) have done a study to determine the extent to which confrontation naming performance is influenced by perseverative behavior. Results revealed that all the 30 subjects exhibited perseverative behavior on the visual confrontation naming subtest. . Helmick and Berg (1976) suggested nine tasks for eliciting perseveration which were as follows, design construction, naming and reversing of a series, naming and describing the function of sited objects, answering questions, defining words, describing a picture, writing sentences and

the letter, drawing designs from memory, drawing geometrical shapes and writing names following verbal instructions. Gotts et al, (2002) reported that repeated presentation of stimuli increased perseverative responses. This could be due to the fact that, If an item is presented several times, its residual activity rests at a higher level, making it easier to respond to but also allowing it to override weekly activated targets.

Need for the Study

From the literature review it is clear that there is a lack of objective data concerning existence and frequency of verbal perseveration in subcortical aphasics in Indian context especially in individuals who are native speakers of Malayalam. The study of verbal perseveratory behaviors in the subcortical brain damaged individuals would help us to screen and evaluate the effects of subcortical lesion on language which will help in planning intervention programme.

Aim

The present study aimed to profile the frequency of verbal perseveratory characteristics in the speech of subcortical aphasics and normal elderly population. The present study also purports to compare the perseveratory characteristics of normal elderly population and individuals with subcortical aphasics using five tasks (picture naming, defining function, defining words, picture description and answering question).

Objectives

- 1) To find out and compare the total frequency of verbal perseveration in subcortical aphasics and normal elderly population.
- 2) Compare the frequency of verbal perseveration across group in each task.
- 3) Compare the total percentage frequency of three types of verbal perseveration between groups irrespective of tasks.

Method

Participants

A total of sixty participants (native Malayalam speakers) in the age range 40 – 80 years were included in the current study. They were basically categorized into two groups. Group I

included 30 individuals with subcortical aphasia with basal ganglia lesion. They were selected from various hospitals and speech and hearing clinics and were diagnosed by neurologist. Control group (group II) included 30 normal elderly populations. All the participants were physically fit to do the different tasks like picture naming, picture description, defining function, defining words and answering questions. They had no significant vision and hearing deficits.

Test materials

The nature of perseveration of both experimental group and control group were assessed using the following tasks: picture naming, description of function, defining words, describing the picture, answering questions. Items of the tasks were selected from three standardized tests such as Peabody picture vocabulary test (PPVT) (Dunn, 1965), Binet- Kamat test (BKT) (Kamat 1963), Weschler's adult intelligence scale (WAIS) (Weschler 1955).

The pictures used in this picture naming task were adopted from Peabody picture vocabulary test (PPVT). This task consists of 10 pictures. The participants were instructed to name the pictures, which were presented one at a time. The pictures used for picture naming task was also used in defining the function task. Participants were instructed to describe ten black and white pictures which were presented one at a time. The words used for defining words task were taken from Weschler's adult intelligence scale Wais. The participants were instructed to define words which were presented by instructor verbally one at a time. Total of 10 words were presented and repeated instructions were given whenever the participants failed to understand the word. Picture stimuli used for describing the picture task were taken from Binet-Kamat test. It consists of four pictures depicting various real life scenes. The subjects were instructed to describe those pictures in an elaborate way. For answering the question task, a short Malayalam story from a fifth grade text was used. First the clinician narrated the story to the subjects. A total of five questions related to the story were asked to them. The subjects were instructed to answer these questions.

In order to find out the efficacy of test material developed, a pilot study was done on five, normal Malayalam speakers of age range 40-80 years old and found that all the selected tasks were appropriate for all normal individuals.

Procedure

Formal informed consent was obtained from the family members of the participant's, prior to the testing. Medical records of the subjects were reviewed and detailed information about each subject was obtained after interviewing the subject and family members. An informal hearing screening task was done to monitor the presence of any peripheral loss.

The participants (group I & group II) were made to sit comfortably in a quiet room. Prior to the testing rapport was built with the participants and then the testing was initiated. Before administration of test materials (picture naming, defining function, defining words, picture description and answering question), the participants were suitably instructed and in addition, they were given a demonstration whenever required or possible. The tasks (picture naming, defining function, defining words, picture description and answering question) were administered in a systematic manner. General prompts and feedback were provided by the investigator to encourage the participants to respond appropriately. The stimulus was repeated when the subject failed to understand it in the first attempt. The duration of administering each participant varied.

The responses of all subjects in each task were audio recorded. Later these responses were transcribed verbatim using broad phonetic transcription. Investigator analyzed the transcribed samples for the type and frequency of perseveration. The tasks were analyzed individually. If perseverations were absent, a score of '0' was given, and if perseverations were present, a score of '1' was given for each perseveratory utterance. The analyzed data for the groups (group I & group II) were tabulated on a scoring sheet. The number of utterances expressed by the subjects on each individual task 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. 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 obtained data were tabulated across task and was subjected to statistical analysis. The statistical analysis was carried out using SPSS software. Mean and standard deviation were obtained for each group. Independent t test was done to compare scores obtained across group.

Results and Discussion

The data was tabulated and appropriate statistical evaluations were done for the five tasks and frequencies of errors were than compared. For each participant the raw score were converted to percentage scores for each task and type of error. These data were then subjected to statistical analysis using SPSS 17. Mean (M), and standard deviation (SD) scores were obtained. Variations in results were compared between groups, across error types, and across different tasks.

Quantitative analysis of perseverative errors:

Percentage of scores for different tasks was analyzed and the measures were subjected to quantitative statistical analysis.

1) Comparison of overall frequency of verbal perseveration in subcortical aphasics and normal elderly population

Two groups were compared for the overall frequency of perseverative errors. For each individual total percentage of errors were calculated by adding scores of all tasks. For all the variables mean and standard deviation were calculated. Table 1 provides the mean and standard deviation values for three groups.

Table 2: Mean and standard deviation (SD) of total verbal perseveration of subcortical aphasics and normal elderly population

Group (n=30)	Total error	Mean	SD
Subcortical Aphasics	39.40	8.4	1.15
Normals	0.52	0.09	0.12

The percentages of total errors were calculated. From the table 2 it is clear that subcortical aphasics group had greater perseveration than normal elderly population. This clearly portrays that while considering the total verbal perseveration irrespective of different type of perseveration and different task, the subcortical group (experimental group I) exhibited more verbal perseverations errors while the normal group exhibited the least.

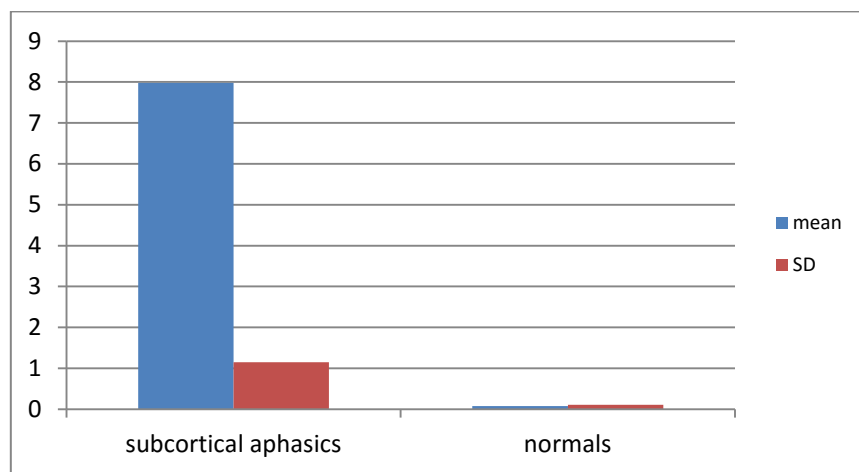


Figure 1: Graphical representation of mean and standard deviation of verbal perseveration between two groups

Mean scores obtained for subcortical aphasics (experimental group I) in the present study were supported by the findings of Vilkki (1989), who reported that verbal perseverations can occur in subcortical aphasia. According to her view verbal perseveration in subcortical aphasics could be due to interference in the subcortical pathway in close proximity with the caudate nucleus. This can lead to inappropriate dysinhibition of caudate nucleus, which in turn leads to increased inhibition of globus pallidus. Inappropriate disinhibition of globus pallidus can result in increased excitation of cortex which may lead to the release of poorly monitored language for

motor programming which will manifest as verbal perseverations in individuals with subcortical lesion. Results of the present study are in consonance with the findings of Fabro (1999). He reported that aphasia due to basal ganglia lesion develop symptoms such as reduce voice volume, foreign accent syndrome, verbal perseveration and agrammatism. Crossan (1992) also reported that non fluent language disturbances like perseverations can be seen in fronto – caudate lesions.

Mean score of normal elderly population is 0.09. Results of the present study reveal that normals had least perseveration when compared to other two groups. Raz et al (1998) suggested that verbal perseveration can be seen even in normal elderly population. This age related increases in verbal perseveration can be due to the shrinkage of the prefrontal cortex. Ramage, Bayles, Helm Estabrooks and Crus's (1999), also obtained similar findings, i.e., 4% of the total responses made by 60 normal subjects were perseverative.

Independent t- test was done to compare the significant difference between the experimental groups (group I) and control group (group II). There was a significant difference between total verbal perseveration between two groups ($p < 0.05$). Similar findings were observed by Ramage et.al. (1999), and they concluded that in normal aged individuals the frequency of perseveration was less (4%) and a significant difference existed between normal elderly individuals and individuals with brain damage in terms of verbal perseveration.

Hence the conclusion of the present study is that interference in the subcortical pathway may also leads to verbal perseveration. So the present study suggests that verbal perseveration is the predominant feature subcortical lesion also. Based on the above findings also can be stated that shrinkage of the prefrontal cortex may leads to verbal perseveration in normals.

2) Comparison of frequency of verbal perseveration across group in each task

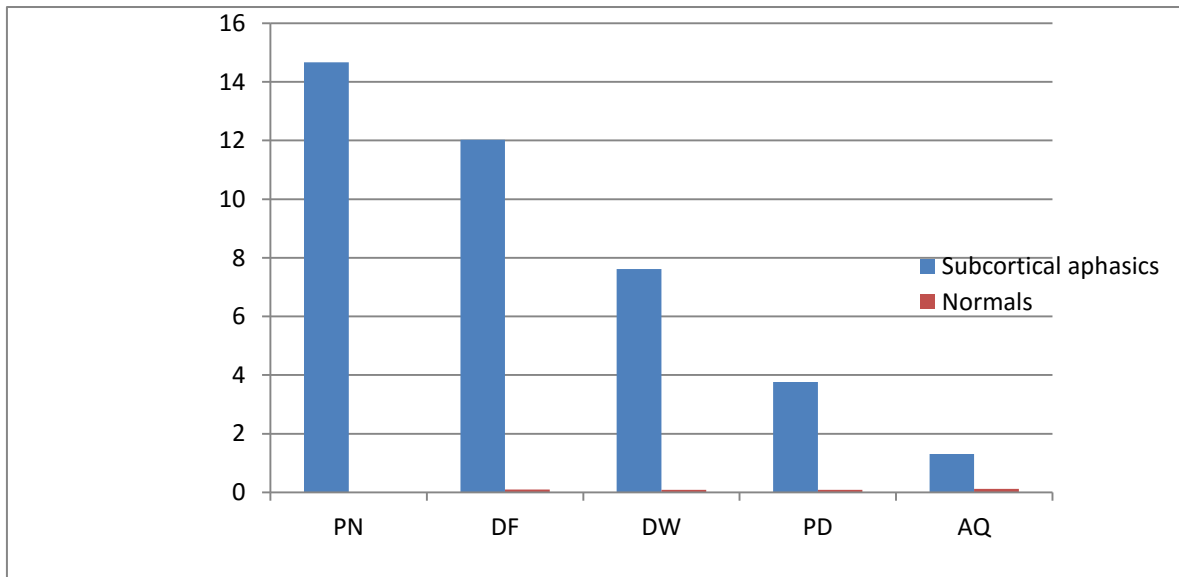
As verbal perseveration between two groups was found to be significantly different, the analysis was further done to find whether there was any significant difference between the groups in five tasks individually. The following tasks were considered for analysis; picture naming, defining function, defining words, picture description and answering question.

For each individual, frequency of errors was found out for each task. This was compared across the groups for each task. The mean and standard deviation of three groups for five tasks are given in table 3.

Table 3: Mean and standard deviation of frequency of errors for subcortical and normal groups in five tasks

Group	TASKS									
	Picture naming		Defining function		Defining words		Picture description		Answering questions	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Subcortical	14.67	7.54	12.03	3.12	7.62	1.74	3.76	0.62	1.37	0.23
Normals	0.00	0.00	0.10	0.33	0.10	0.33	0.11	0.33	0.11	0.33

Figure 2: Graphical representation of mean and standard deviation of frequency of errors for subcortical and normal groups in five tasks



PN- Picture naming, DF- Defining function, DW- Defining words, PD- Picture description, AQ- Answering questions

Table 2 shows that, in picture naming task, the mean of subcortical group was 14.67. Normal's had no verbal perseveration in this task. Levelt et al (2003) reported that the picture naming task involves different stages like (1) activation of conceptual information (e.g.: lexical semantics) which is localized to left midsegment of middle temporal gyrus. (2) Phonologic word

form retrieval (e.g.: phonologic output lexicon) which is responsible to the left posterior superior and middle temporal gyri (Wernicke's area) and left thalamus. (3) Phonologic encoding (e.g.: delineation of appropriate syllabification and stress) which is localized to the left posterior inferior frontal gyrus (broca's area) and the mid superior temporal gyrus. (4) Phonetic encoding and articulation which is localized to the primary motor and sensory areas bilaterally. So it can be concluded that verbal perseveration may be the result of weakened activation of a target stimulus at any level of these language processing stages.

In *picture naming task* subcortical group (experimental group II) exhibited more amount of verbal perseveration. This could be due to the changes in their neuroanatomical structures. According to Elghozi et al (1975) subcortical structures constantly regulate the activation of hemisphere. Hence lesion to subcortical structures can result in language difficulties like semantic paraphasia, verbal perseveration and reduction in verbal fluency. The present findings is in consistent with the findings of Brunner et al (1982), where they found a strong correlation between verbal perseveration in naming scores and extent of the subcortical lesions in individuals with basal ganglia lesion combined with cortical lesion. Price et al (1996) stated the verbal perseveration in language tasks like picture naming and word repetition showed activation of thalamus and basal ganglia.

Normal elderly population did not exhibit any verbal perseveration in picture naming task because picture naming requires less effort in this population. Bayles et al (2004) suggested that only two processes were involved in picture naming task – picture recognition and name retrieval. As the stimulus of the items remains visible they provide a perceptual additional cue for the lexicon retrieval from memory. These cues offer the increased activation in the semantic system and reduce the stress on working memory during the retrieval. In the current study, this could be the reason for absent verbal perseveration in picture naming task for normal elderly population.

In *defining function task*, subcortical aphasic group also exhibited some amount of verbal perseveration. Disruption in subcortical structures can damage the lexical semantic function. So results of the current study correlate with the findings of Nedeau (1997). Who reported that

disruption in the pulvinar and lateral posterior nuclei may impair selection of specific neuronal networks in the projection field of these nuclei that serve as the substrate for lexical–semantic function. Normal elderly population exhibited better performance in defining function task. Raz et al (1998) in their findings showed that frontal lobe play an important role in executive functioning; in addition, frontal brain structures are especially sensitive to the effects of age. So the decline in the defining function skills can be correlated with neuroanatomical changes in normal elderly population.

In *defining words task*, subcortical group presented some amount of perseveration. This could be due to the poor performance in linguistic expression of participants. Normals exhibited better performance in this task because as the age increases there will be a decrease in the cognitive abilities. Raz (2000) reported that cognitive changes can be due to changes in prefrontal cortex and white matter which intern could have contributed to the alterations in executive function, working memory, delayed memory etc. So in the current study also age related decline in memory tasks could be attributed to changes in these brain structures.

In *picture description task*, the mean score obtained for subcortical group was 3.76. Nadeau (1997) reported that spontaneous language disturbances can result from basal ganglia lesion. So the results of the present study can be attributed to the above findings. The mean score obtained for normal individuals in picture naming task could be due to the tendency of normal elderly population to use repeated utterances when encouraged to speak more.

In *answering question task*, subcortical aphasic group had very less verbal perseveration in answering question task compared to other tasks. This is because of their limited linguistic expression, much verbal perseveration could not be observed. Findings of the present study are consistent with the reports of Crossan (1992). He reported that basal ganglia lesions may lead to reduction of spontaneous speech. Normal elderly population obtained a mean value of 0.68 in answering question task because as age increases there is a decline in the memory skills. Head et al (2009) reported that age related increase in perseveration is completely accounted for by declines in processing speed and temporal processing, deficits in working memory mediated by decreased prefrontal cortical volume, and the indirect influence of prefrontally-mediated declines

in inhibition via working memory. This indicates that verbal perseverative errors in normal elderly population for answering question task can be correlated with the memory deficits.

Independent t test was done to compare the significant difference between the experimental groups (group I and II). Results of the test are shown in the table 3

Table 3: Results of independent t test

Task	Sig (p)
Picture naming	0.000
Defining function	0.002
Defining words	0.002
Picture description	0.006
Answering question	0.012

From the table 3 it is clear that there was a significant difference between both the groups ($p < 0.05$) for all the tasks. This implied that these tasks were good predictor of perseveration .to find which group was significant different from each other.

3) Comparison of total percentage of three types of perseveration between groups irrespective of tasks

The groups were compared for overall verbal perseveration. This was computed by summing up the individual types of perseveration present in all tasks between three groups. Then mean and standard deviation of this was tabulated in the table 4 below.

Table 4: Comparison of total percentage of three types of perseveration between groups irrespective of tasks

	Subcortical Aphasics			Normals		
	N	Mean	SD	N	Mean	SD
C	30	9.50	0.42	30	0.31	0.51
R	30	29.90	0.56	30	0.11	0.34
S	30	0.00	1.23	30	0.00	0.00

**C-continuous perseveration, R-recurrent perseveration, S- stuck in set perseveration

From the above given table it can be seen that the mean value of continuous perseveration in subcortical aphasics and normal groups were 9.50 and 0.31 respectively. For recurrent perseveration subcortical group had a mean of 29.90 and normal group had a mean of 0.11. Stuck in set type of perseveration were absent in both groups.

Group I exhibited recurrent perseveration followed by continuous type of perseveration. However stuck in set type of perseveration was absent in subcortical group. Sandson and Albert (1984), in their findings suggested that continuous perseveration is present in persons with damage to basal ganglia. According to Moses, Nickels & Sheard (2004) recurrent perseveration is associated with damage to the left temporal and parietal regions and also to the people with aphasia following subcortical damage. So the results of the present study are in agreement with the above mentioned studies.

The mean percentage of control group (normals) revealed that continuous perseveration was more in this group followed by recurrent type of perseveration. But there was no stuck in set type of perseveration is observed in this group. There were reports of significant percentage of continuous type of perseveration compared to other type of verbal perseveration in normal elderly Tamil speaking population in the study by the Chandralekha and Prema (2001) and Mukundhan and Prema (2003). Preethi and Goswami (2008) identified continuous and recurrent type errors in normal Malayalam speaking elderly population. Hence the result of the present study is in agreement with the above studies.

Independent t test was done to compare the significant difference between the group I & II results of the test are shown below

Table 5: Result of Independent t test of three types of errors between subcortical and normal groups.

Type of errors	Sig (p)
C	0.000
R	0.001
S	0.240

C-continuous perseveration, R-recurrent perseveration, S- stuck in set perseveration

From the above table it is clear that there was a significant difference between the groups in continuous and recurrent type perseveration. But there was no significant difference between the groups in stuck in set type perseveration.

So it can be concluded that verbal perseveration, especially continuous, recurrent and stuck in set perseveration appears to be the coexisting symptom of aphasia. Subcortical aphasics showed more recurrent perseveration followed by continuous perseveration. There was a total absence of stuck in set perseveration in subcortical and normal elderly population.

Albert and Sandson (1986) suggested that verbal perseveration has been associated with abnormalities of language function in a variety of neurological states. Verbal perseveration influences language in aphasia and normal aging and it is an integral part of language dysfunction. Damage to the subcortical region produces aphasia which is milder and less long lasting than cortical aphasias. So it can be concluded that frequency of occurrence of verbal perseverations observed in the subcortical aphasics is less.

Summary and Conclusion

The present study was aimed to investigate the frequency and nature of verbal perseveration in the speech of individuals with subcortical aphasia and normal elderly population. The objective of the study included, to find the presence of verbal perseveration in subcortical and normal elderly population, quantitatively analyze the frequency of verbal perseveration in subcortical and normal elderly population, to compare and analyze the task wise perseverations obtained across group, and compare and analyze the type of perseveration obtained.

Previous studies revealed that perseveration is a clinical manifestation in persons with brain damage. Most studies done in normal aging population have concluded that verbal perseverations are present in lesser frequencies as compared to the pathological conditions. Thus, frequency of verbal perseverations was found to be as significant measure to differentiate between normal elders and brain damaged populations. Verbal perseverations have been categorized into three main types. They are continuous, recurrent, and stuck in set. These types vary in their manifestation, site of lesion, mechanism exhibited and type of brain damage. Perseverations were studied in aphasic populations and findings revealed greater frequency of perseveration. Different tasks have been adopted to elicit different types of perseveration. Limited studies have been conducted to study the nature of verbal perseveration in individuals with subcortical aphasics and the nature and amount of verbal perseveration between the two groups

Hence the current study was taken up to investigate the nature and frequency of verbal perseveration in individuals with Malayalam speaking subcortical aphasics and normal elderly population by using different tasks. The present study consists of 30 persons with subcortical aphasia and 30 normal elderly populations. They were matched with age, education, and handedness. Tasks included in the current study were picture naming, defining function, defining words, picture description, and answering questions. Types of verbal perseverations considered for the present study were continuous, recurrent and stuck in set.

Percentage scores for each individual were tabulated and appropriate statistical analysis was done. Mean and standard deviations were computed across task and type of verbal perseveration between subcortical aphasics and normal elderly population. In order to compare whether there is any significant difference between groups the independent t test was done.

Results revealed that individuals with subcortical aphasia exhibited higher frequency of verbal perseveration than normals. All tasks were found to be the potential task to elicit perseveration. Subcortical group obtained higher percentage frequency of perseveration in picture naming task and lesser in answering questions. Normal elderly populations were found to yield higher percentage frequency errors in answering questions and picture description tasks, and lesser in picture naming task. Subcortical group had more recurrent perseveration followed

by continuous type. Normals performed with more continuous perseveration followed by recurrent type. There was a total absence of stuck in set type of perseveration in both the groups. So it can be concluded that frequency of verbal perseveration are more in brain damaged individuals and the interference in the subcortical pathway may also leads to verbal perseveration.

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