Word-finding Functions in Tamil Speaking Individuals with Aphasia

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Abstract

Aim: To compare the performance of individuals with aphasia on verbal fluency task and confrontation naming with neurologically healthy individual. Second aim is to investigate the performance of individuals with aphasia on both the naming tasks and also to investigate the performance of aphasic sub-group (Non-fluent and Fluent aphasic) on both the tasks.

Material and Method: Two groups of individuals (individuals with aphasia and neurologically healthy individuals) were included in the study. 15 individuals with different types of aphasia were included. These individual were divided into two sub-groups of Non-fluent aphasic and fluent aphasic. For all the individuals two tasks (Verbal fluency task and confrontation naming task) were administered.

Results: The aphasic group performed poorer compared to neurologically healthy individual group on verbal fluency task and confrontation naming task. The performance of individuals with aphasia was better on confrontation naming task compared to verbal fluency task. Among the individuals with aphasia, fluent aphasic group performed better compared to non-fluent aphasic group on both verbal fluency task and confrontation naming task.

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Conclusion: This study highlights the naming deficits in individuals with aphasia and the importance of the naming task to examine the functioning of lexical semantic processing during aphasia evaluation

Keywords: Aphasia, Tamil Speaking, Naming, Confrontation Naming, Verbal Fluency.

Introduction

Word-finding is a complex cognitive function and if there is any damage to the component processes that are needed for retrieval of words that would perhaps affect the naming ability.[1] Naming is a delicate function and deficits in naming is found in most patients with aphasia. Deficits in naming are nonspecific.[2] In order to analyze the lexical semantic processing, naming tasks are employed. During naming task, retrieval of semantic and phonological information occurs. Naming includes lexical and non-lexical processing. The lexical processing involves storage and retrieval of semantic information. The non-lexical processing involves detection and perception of visual stimuli that initiates the lexical process.[3] Naming disturbances are frequently seen in aphasic individual regardless of the type of aphasia. Aphasia is the commonly occurring neurogenic language disorder. Aphasia is an "acquired communication disorder caused by the brain damage, characterized by an impairment of language modalities: speaking, listening, reading, and writing. It is not the result of sensory, motor or any general intellectual deficits, confusions or any psychiatric disorder".[4] The aphasic syndrome can be classified into fluent aphasias and non-fluent aphasias. Fluent aphasias include Wernicke's, Anomic, Transcortical Sensory and Conduction aphasia. Non-fluent aphasias include Broca's, Transcortical Motor and Mixed Transcortical aphasia.[5]

The most commonly used naming task to assess the word finding difficulties are verbal fluency and confrontation naming. Verbal fluency task requires a person to produce as many number of words as possible across a restricted section of possible responses over a defined time period.[6] verbal fluency tasks also called as generative naming task.[7] Naming task which is most commonly used in aphasia assessments for determining word retrieval abilities is confrontation naming. Confrontation naming task involves naming the target items that are presented in the form of pictures or objects.[3] Kohn and goodglass[8] administered picture naming test in English on individual with different kinds of aphasia (Broca's, Wernicke's, Conduction and anomic aphasia). They reported that participants with Broca's aphasia exhibited negated responses, individuals with Wernicke's aphasia exhibited poor phonemic cueing and those with frontal anomia had whole-part errors. The most prominent kinds of picture naming errors among the types of aphasia were semantic error, phonemic errors and multi-word circumlocutions. William and Canter[9] reported that confrontation naming task elicited higher semantic paraphasias in individuals with posterior aphasia. Basso, Captaini and Laiciona[10] conducted a study to compare generative naming ability in one group of individuals with aphasia

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and another group of neurologically healthy individuals. They found statistically significant difference between both the groups. In this study they used four semantic categories for generative naming (animals, vegetables, vehicles and birds). Among the four categories the mean value of animals was high followed by vehicles, fruits and vegetables. Shanthala[11] carried out a study with two group of individuals who were Kannada speakers, using three types of naming tasks confrontation naming, generative naming and responsive naming. One group of three persons with aphasia (Wernicke's aphasia, Broca's aphasia, Anomic aphasia). In all the three naming tasks, individual with anomic aphasia better compared to other aphasics. In confrontation naming task, individual with Broca's aphasia showed phonemic errors and neologisms. Anomic aphasics showed phonemic errors. Abhishek and Prema[3] conducted a study in Kannada language, to compare the performance of individuals with aphasics and neurologically normal individuals on generative naming and confrontation naming tasks. In this study they included eight individuals with aphasia (Wernicke's, Broca's, Anomic aphasia) and neurologically normal individuals. Finally they concluded that when compare to confrontation naming task, generative naming task was difficult. They also reported that on both the tasks, individuals with anomic aphasia performed better compared to other types of aphasia.

Need for the Study

There are very limited studies done in Tamil speaking individual with aphasia, so the current study was undertaken to compare the performance of individual with aphasia on confrontation naming and verbal fluency task.

There is a need for further investigation of naming deficits in individuals with aphasia for effective rehabilitation planning.

Aim

- To compare the performance of individuals with aphasia on verbal fluency task and confrontation naming with neurologically healthy individual.
- To investigate the performance of individuals with aphasia on verbal fluency task and confrontation naming
- To investigate the performance of aphasic sub-group (Non-fluent and Fluent aphasic) on verbal fluency task and confrontation naming

Method

Two groups of individuals were considered for the study. In experimental group, 15 individuals with aphasia were taken. In control group, neurologically healthy individual who were age and gender matched with the first group were taken. The neurologically healthy individuals were devoid of any history of neurological, communicative or sensory impairment. Individuals with aphasia who had a history of stroke confirmed by neurologist and computed

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tomography or magnetic resonance imaging were enrolled. The individuals age ranged from 30 years to 60 years were included for the study. Tamil was the native language for all these individuals. Table 1 shows the details of each individuals with aphasia. Western Aphasia Battery[12] was administered to all the participants. Among the 15 aphasic individuals, 5 had Broca's aphasia, 4 had Wernicke's aphasia, 3 had Anomic aphasia, 2 had Conduction aphasia and 1 had Transcortical Motor Aphasia. These individuals were divided into two sub-groups of Non-fluent aphasic and Fluent aphasic.

There were six individuals in Non-fluent aphasic Sub-group (5 Broca's and 1 Transcortical Motor aphasia) and nine individuals in fluent aphasic Sub-group (4 Wernicke's, 3 Anomic, 2 Conduction). For all the individuals two tasks were administered. First task was Verbal fluency task; here the examiner named a semantic field and the individual had to name as many items as possible in that given category within the time interval of 120 seconds. The number of items named by the individual under a semantic field were noted. The semantic field included for the study were animals, fruits, vegetables, common objects, vehicles, body parts, birds. Second task was confrontation naming task. Boston naming test was used for confrontation naming test. Picture stimulus from Boston naming test[13] was taken. It comprises of 57 line drawings of noun objects. The individuals were asked to name the stimulus within 60 seconds. If there was correct response, then a score of 2 was given. If there was no response in the first 20 seconds time interval, a semantic cue regarding the picture was given, if the individual named the picture correctly then a score of 2 was given. If no response or incorrect response following semantic cue, then phonemic cue was given about the picture. If there was a correct response with phonemic cue a score of 1 was given. If there was incorrect or no response, then 0 score was given.

TABLE 1

S.no	Age/ gender	MRI/CT findings
1	60/M	Acute infract in left frontoparietotemporal region
2	39/F	Subacute infarct in left MCA territory. Hypodensity noted in left parietotemporal region.
3	48/F	Acute infarct in left centrum semiovale left frontotemporoparietooccipital region
4	42/M	Acute infarct with hemorrhagic transformation in left frontal, temporal lobes, right corona radiata, left ganglio capsular region and left centrum semiovale.
5	31/M	Acute infarct in left perisylvian and high parietal lobe
6	42/M	Hypodensity in left parietal region
7	49/F	Acute infract involving left ganglio capsular region. Glottis changes noted right parietal region

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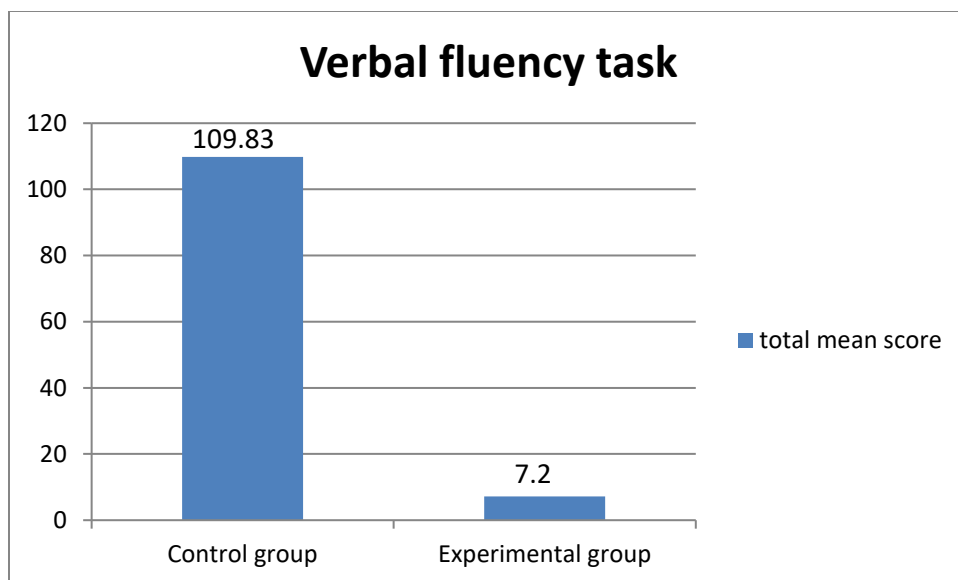| 8	37/M	Subacute infarct left fronto parietal region with hemosiderin deposition due to hemorrhage
9	30/M	Left temperoparietal hemorrhagic infract with midline shift. Hypodensity noted involving the left parietal, temporal and occipital region.
10	30/M	Subacute infarct left fronto parietal region with hemosiderin deposition due to hemorrhage
11	43/M	Chronic infract in left temporo-parietal region. Hypodensity noted in left temporo-parietal region.
12	51/F	Acute infract involving left ganglio capsular region. Glottis changes noted right parietal region
13	40/M	Acute infract in left fronto-temporo-parietal region
14	38/M	Subacute infarct left fronto parietal region with hemosiderin deposition due to hemorrhage
15	40/M	Acute infarct in left perisylvian and high parietal lobe

Results

The first objective of the current study aimed to compare the naming abilities in individual with aphasia and neurologically healthy individuals on verbal fluency task and generative naming task.

Comparison between neurologically healthy individuals (control group) and individuals with aphasia (experimental group) on verbal fluency task

Table 1 represent the overall mean score for control group and experimental group

	Control Group	Experimental Group
Overall Mean Score	109.83	7.2
Standard deviation	3.55	0.43

Figure 1 represent the overall mean score for control group and experimental group

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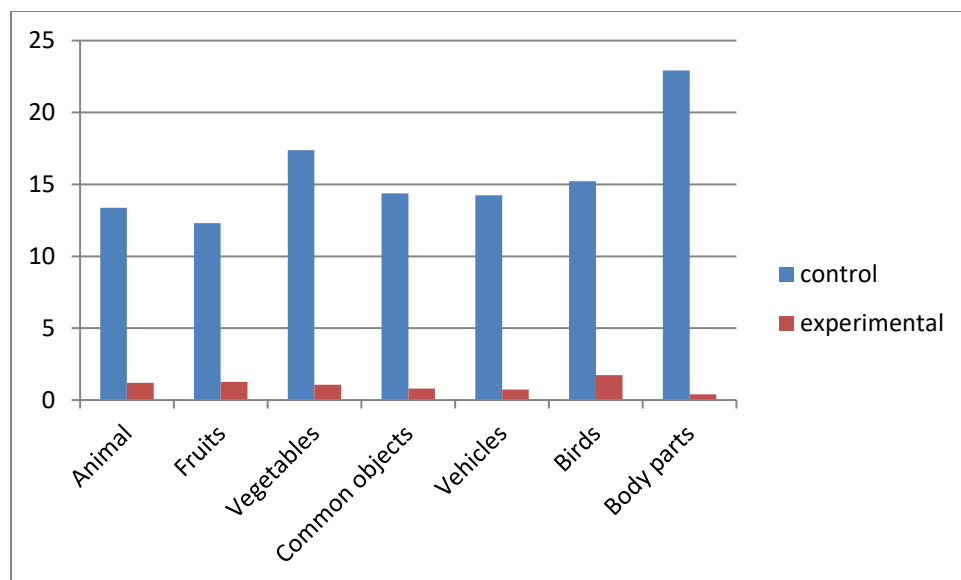
Verbal fluency task

As from table 1 and figure 1, control group (109.83) has highest overall mean score than that of experimental group (7.2). Thus, there was a significant difference in Verbal fluency task performance between Experimental group and Control group.

Table 1 represent the mean values for control group and experimental group on verbal fluency task

	Control group	Experimental group
Animal	13.38	1.2
Fruits	12.31	1.27
Vegetables	17.38	1.07
Common objects	14.38	0.8
Vehicles	14.23	0.73
Birds	15.23	1.73
Body parts	22.92	0.4

Figure 2 represent the mean values for control group and experimental group on verbal fluency task

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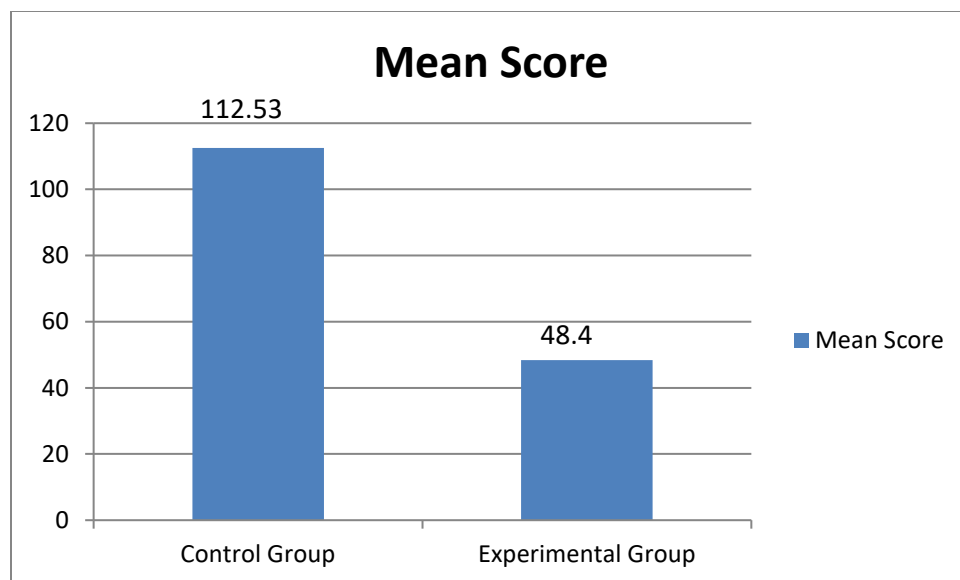
As from the table 2 and figure 2, for experimental group, the highest mean value was obtained for lexical category birds and lowest mean value was obtained for body parts lexical category. Whereas for control group the highest mean value was for body parts and lowest mean value for fruits.

Comparison between neurologically healthy individuals and individuals with aphasia on Confrontation Naming task

Table 3 represent the overall mean values and standard deviation for control group and experimental group on Confrontation Naming task

	Control Group	Experimental Group
Overall Mean Score	112.53	48.4
Standard deviation	1.59	24.8

Figure 3 represent the mean values for control group and experimental group on Confrontation Naming task

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Mean Score

As from table 3 and figure 3, control group (112.53) has highest overall mean score than that of experimental group (48.4). Thus, there was a significant difference in Confrontation Naming task performance between Experimental group and Control group.

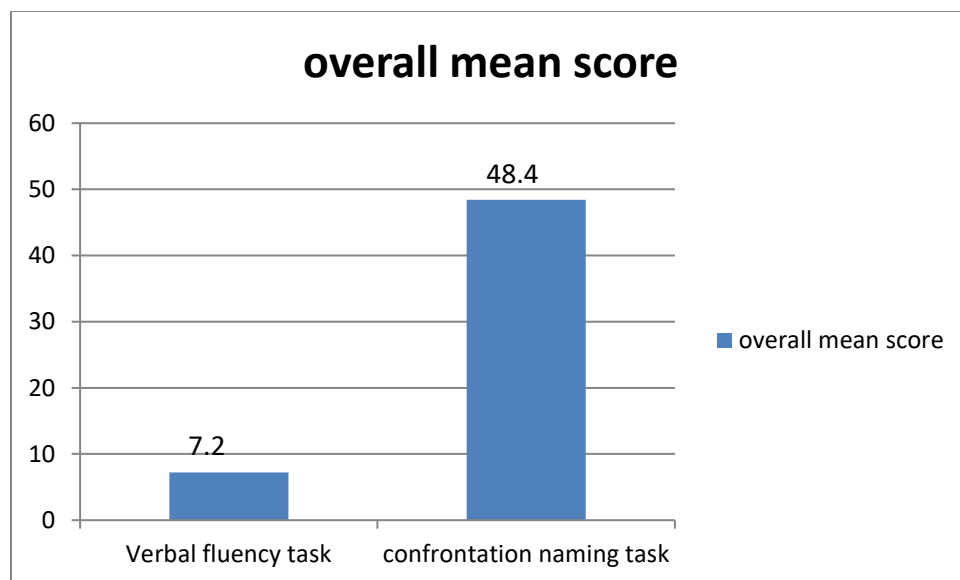**Comparison between verbal fluency task and confrontation naming task for experimental group**

To check the nature of data distribution, Shapiro-Wilk test of normality was done. The data followed the trend of normality ($p > 0.05$), parametric test, paired sample t test was selected to compare the two task of experimental group. There was a statistically significant difference ($p<0.05$) between verbal fluency task and confrontation naming task for experimental group [$t(14)=-6.525$, $p=0.000013$]

Table 4 represent the overall mean values and standard deviation for Experimental group on Verbal fluency task and Confrontation Naming task

Experimental group	Verbal fluency task	Confrontation naming task
Overall mean score	7.2	48.4
Standard Deviation	0.43	24.8

Figure 4 represent the overall mean values and standard deviation for Experimental group on Verbal fluency task and Confrontation Naming task

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overall mean score

As from table 4 and figure 4, for experimental group, confrontation naming task (48.4) has highest overall mean score than that of verbal fluency task (7.2). Thus, there was a significant difference in Confrontation Naming task performance and verbal fluency task performance for Experimental group.

Comparison between Non-Fluent Aphasic and Fluent Aphasic on Verbal fluency task and Confrontation Naming task

Table 5 represent the overall mean values for Non-Fluent aphasic group and Fluent aphasic on Verbal fluency task and Confrontation Naming task.

	Non-Fluent Aphasic group	**Fluent Aphasic group**
Verbal fluency task	4.83	8.77
Confrontation Naming task	37.33	55.77

As from table 5, overall mean scores indicate that fluent aphasic group on verbal fluency task (8.77) and confrontation naming task (55.77) was higher than the non-fluent aphasic group's overall mean score on verbal fluency task (4.83) and confrontation naming task (37.33).

Discussion

The findings from the present study indicate that neurologically healthy individuals performed better compared to individuals with aphasia on verbal fluency task and confrontation naming task. This results receives support from the studies done by William and Canter[9]; Shantala[11]; Abhishek and Prema.[3]

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The second objective of the study was to check if there was difference in the performance of individuals with aphasia on verbal fluency task and confrontation naming task. The results derived from paired sample t test showed that there was statistically significant difference in the performance between verbal fluency task and confrontation naming task. Mean scores showed that individuals with aphasia performed better on confrontation naming task compared to verbal fluency task. These results are in agreement with the studies done by William and Canter[9]; Abhishek and Prema.[3] The individuals with aphasia performed better on confrontation naming task over verbal fluency task because, it is considered that confrontation naming task is simple task than verbal fluency task. In confrontation naming task, the individuals were provided with pictures which makes the task more redundant when compared to verbal fluency task.[9] The other reason for better performance in confrontation naming task is the cognitive load. For Verbal fluency task, the cognitive load is more compared to confrontation naming task.[14]

The third objective of the study was to investigate if there was any difference in the performance of individuals with non-fluent aphasia and fluent aphasia on verbal fluency task and confrontation naming task. Mean scores revealed that among the individuals with aphasia, fluent aphasic group performed better compared to non-fluent aphasic group on both verbal fluency task and confrontation naming task. The results obtained are in congruence with the findings by Basso, Razzano, Faglioni, and Zanobio[15] who studied the naming performance of non-fluent and fluent aphasic group on three tasks (Confrontation naming, picture description, and action naming) and reported that in all three tasks, non-fluent aphasic individuals performed significantly poor compared to fluent aphasic group. The results of the present study are also in consonance with the results of a study done by Kim, Sim and Kim[15] who investigated generative naming ability among 10 individuals with fluent aphasia and 10 individuals with non-fluent aphasia. They reported that individuals with fluent aphasia performed better in generative naming task compared to non-fluent aphasia individuals.

Conclusion

To conclude, deficits in Naming were observed in individuals with aphasia in the present study. Their performance in Confrontation naming task was better compared to verbal fluency task. The fluent aphasic individual's performance in naming tasks was comparatively better compared to non-fluent aphasic. Confrontation naming task is relatively simpler task with less cognitive load compared to verbal fluency task.[9][14] Though the two naming task included in this study serves distinct purpose, verbal fluency task evaluates the divergent retrieval and confrontation naming task evaluates the convergent retrieval. For assessing the two phenomena of lexical semantic processing, verbal fluency and confrontation naming task are used.[3] Through this way, a speech language pathologist during an assessment can include the naming tasks to investigate the functioning of lexical semantic processing in an individual with aphasia.

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