

An Objective Measure of Naming Errors in Individuals with Traumatic Brain Injury

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Abstract

Individuals with traumatic brain injury, due to the nature of the neuropathological conditions, the symptoms of naming deficits vary (Chapley, 2000). Both aphasic and TBI individuals produce circumlocutions and various paraphasias and have reduced fluency in the generation of category-specific words. TBI individuals, however, demonstrate additional naming errors. Hence, there is a strong need for the objective measure, qualitative and quantitative aspects of naming difficulties and errors exhibited by persons with TBI. The studies on naming errors among individuals with TBI are limited in Indian context. The present study was carried out measure the quantity and quality of naming errors objectively, who were in the chronic stage of recovery. There were total of 3 patients with the history of naming deficits associated with TBI. It was found from the result analysis the maximum number of correct response was achieved by the participant 1 with 12 correct responses. Also semantic paraphasias were predominant in all of participants compared to other types of naming errors. A standardized tool (ELAN 5.1 Version, Win 64) was used to document and analyse the naming deficits among the participants. This study was a preliminary attempt at objective measurement of naming deficits.

Keywords: TBI, Naming Errors, Elan Software

Background

Traumatic brain injury (TBI) can be defined as a blow to the head that results in diminished abilities and is primarily caused by motor vehicle accidents and violent crimes (Ellis & Christensen., 1996). TBI can either be open or closed head injury. Closed head injury is where the trauma does not cause an opening in the skull and Open head Injury are also called penetrating injuries, the common cause being gunshot wound or fracture of the skull, such injuries may produce focal lesions (Gillis 1996).

The National Head Injury Foundation (1991) defines head injury as a traumatic insult to the brain capable of producing physical, intellectual, emotional, social and vocational changes.

Communication challenges following TBI are most often non-aphasic in nature that is they co-exist with intelligible speech, reasonably fluent and grammatical expressive language and comprehension adequate to support everyday interaction. Depending on the site of the injury, stage of recovery and particular focus of research, the characteristic communication profiles following TBI have been variously referred to as “sub-clinical aphasia”, “cognitive-language disturbances” and “the language of confusion” (Chapey,2001).

The communication impairment of TBI patients can be broadly discussed under linguistic, extra and non-linguistic features.

Naming Deficits and TBI

The ability to recall the names of lexicons is affected in individuals with traumatic brain injury. The problem could be in either in terms of storage or retrieval. In the cortical areas, naming is represented in multiple areas in the cortex. Superior Temporal Gyrus and Medial Temporal Gyrus along with hippocampal circuits are the representation of names of different lexicons.

In individuals with traumatic brain injury, due to the nature of the neuropathological conditions, the symptoms of naming deficits vary (Chapley, 2000). It is the qualitative differences in the naming errors between the two groups that may be most useful in distinguishing between aphasic and non-aphasic responses. Both aphasic and TBI individuals produce circumlocutions and various paraphasias and have reduced fluency in the generation of category-specific words.

TBI individuals, however, demonstrate additional naming errors. For example, TBI individuals may also produce naming errors related to their personal situations or make errors of confabulation (bizarre responses related to the patient’s disorientation).

Need for the Study

In the process of assessment of associated naming deficits, subjective assessment of naming is more prone for evaluative errors as it would lead to misjudgement of the responses. Assessment of nature and types of naming deficits would support in the knowing the severity of the problems grossly.

The quality of naming errors would suggest whether the individuals have problems in retrieval or storage stages. The errors could be paraphasias which includes semantic paraphasia, phonemic paraphasia. The responses could be articulatory errors, and absence of response for naming tasks. An objective measure of the same would enable us to treat the naming deficits in speech- language pathology intervention.

Hence, there is a strong need for the objective measure, qualitative and quantitative aspects of naming difficulties and errors exhibited by persons with TBI. The studies on naming errors among individuals with TBI are limited in Indian context.

Aim

The present study aimed at objective measurement of quality and quantity of naming errors in individuals with traumatic brain injury.

Objectives

- To classify the naming errors based on quantitative and qualitative measures among individuals with traumatic brain injury

Method

A total of 3 patients with Traumatic Brain Injury resulting from road traffic accident took part in the study. There was a patient with medical history of seizure. All the patients had signs and symptoms of cognitive communicative disorders.

Inclusion Criteria

- Patients with a history of traumatic brain injury diagnosed by neurologists.
- Patients who were in the chronic stage of recovery from the TBI (Post treatment and 28 days from the day of trauma).
- Patients who had better comprehension and language expression skills upon the administration of standardized tests like WAB and Cognitive Linguistic Assessment Protocols.
- Patients who had the difficulty of naming predominantly.

Exclusion Criteria

- Patients in acute stage of recovery (before 28 days from the post trauma) were excluded.
- Patients with TBI but unfavourable medical conditions for the speech – language therapy.

Instrument

The participants were administered with various standardized speech and language tests for profiling communication behaviours. Western Aphasia Battery in Kannada and Malayalam were used to elicit the naming behaviours. Cognitive Linguistic Assessment Protocol was administered to document the cognitive and communicative behaviours.

Sony HD digital Handycam was used to record the responses for the naming task. A standardized video annotation tool ELAN, (5.1 Version) from Max Plank Group with Win-64 bits/sec operating system was used to document the naming responses. Statistical program (SPSS Version 20.0, from IBM, Bangalore) was used to carry out the statistical analysis.

Procedure

The present study was carried out in a tertiary neuro-rehabilitation super speciality hospital. Informed consent was taken from each participant/guardian. Upon the referral from neurologists for speech – language therapy, each participant was administered with patient's Cognitive Linguistic Assessment Protocol to profile cognitive and communication behaviours.

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As a part of profiling naming behaviour, participants were subjected to the naming task from standardized test material (Western Aphasia Battery).

A total of 20 flash cards from the category of animals, fruits, food items and clothing were used in the confrontation naming and responsive naming tasks. The naming responses were recorded in high quality video recorder (Sony HD Handycam). The recorded video samples were annotated using a standard video annotation software (ELAN, 5.1 Version, and Win- 64).

Coding of the tier system included, types of errors namely, Semantic Paraphasias, Phonemic Paraphasia, Articulatory errors, Phonemic transpositions and No Responses as annotations in the present study.

Results and Discussion

The present study had the objectives of objective measure of quantity and quality error`s among individuals with traumatic brain injury who were in the chronic stage of recovery. There were total of 3 patients with the history of naming deficits associated with TBI.

Participant 1 was a 21 years old male with the history of road traffic accident. The case was evaluated by neurologist and Speech Language Pathologist. The medical biography of the patient revealed the acute SDH in the Right Fronto-Parietal region causing midline shift and with multiple haemorrhagic contusions in right frontal lobe.

Participant 2 was a 18 years old male with the history of road traffic accident whose medical history shows Right temporal and Frontal contusions was diagnosed by neurologist under the criteria of Glasgow Coma Scale).

Participant 3 was a 45 years old male with the history of road traffic accident. The medical history of diffuse axonal injury was also diagnosed under the criteria of Glasgow Coma Scale.

It was found from the result analysis the maximum number of correct responses was achieved by the participant 1 with 12 correct responses.

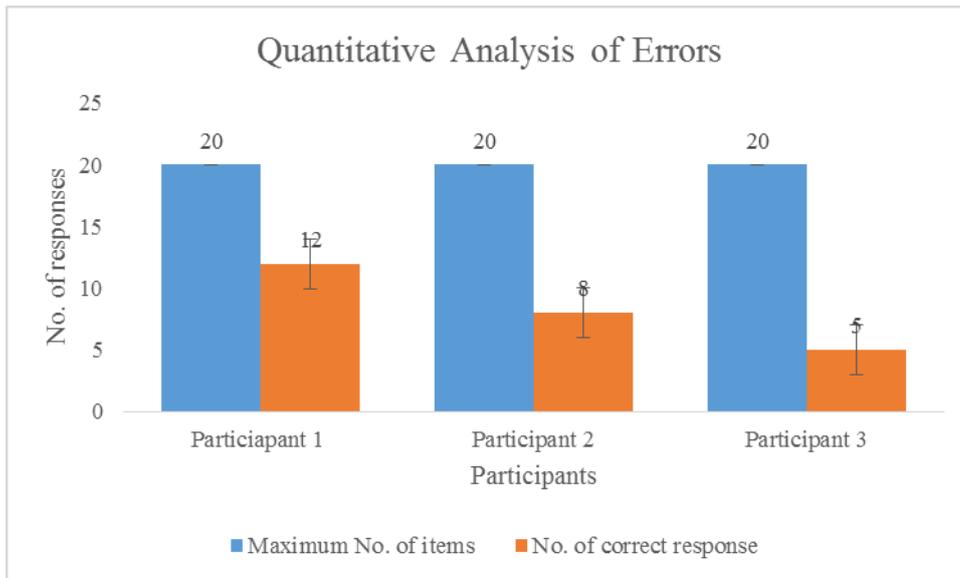


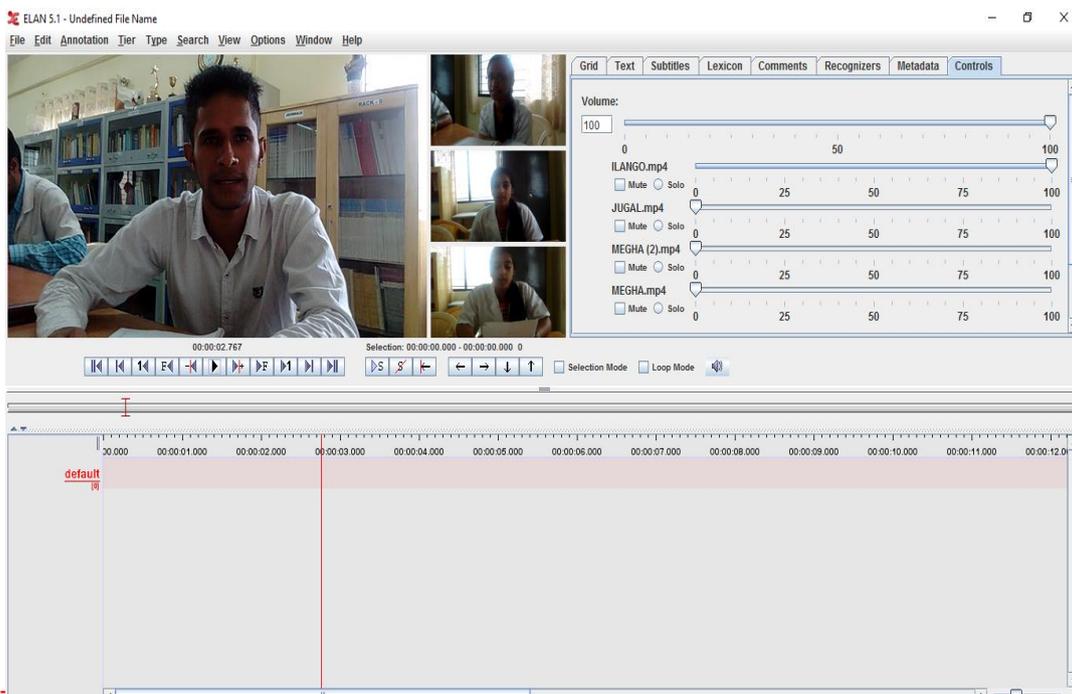
Table 1: *Quantitate analysis*

	Maximum No. of items	No. of correct response
Participant 1	20	12
Participant 2	20	8
Participant 3	20	5

Figure 1: Quantitative analysis of naming response

Qualitative Analysis

The responses from the patients were analysed for the qualitative aspects. It was found that semantic paraphasias were predominant in all of participants compared to other types of naming errors.



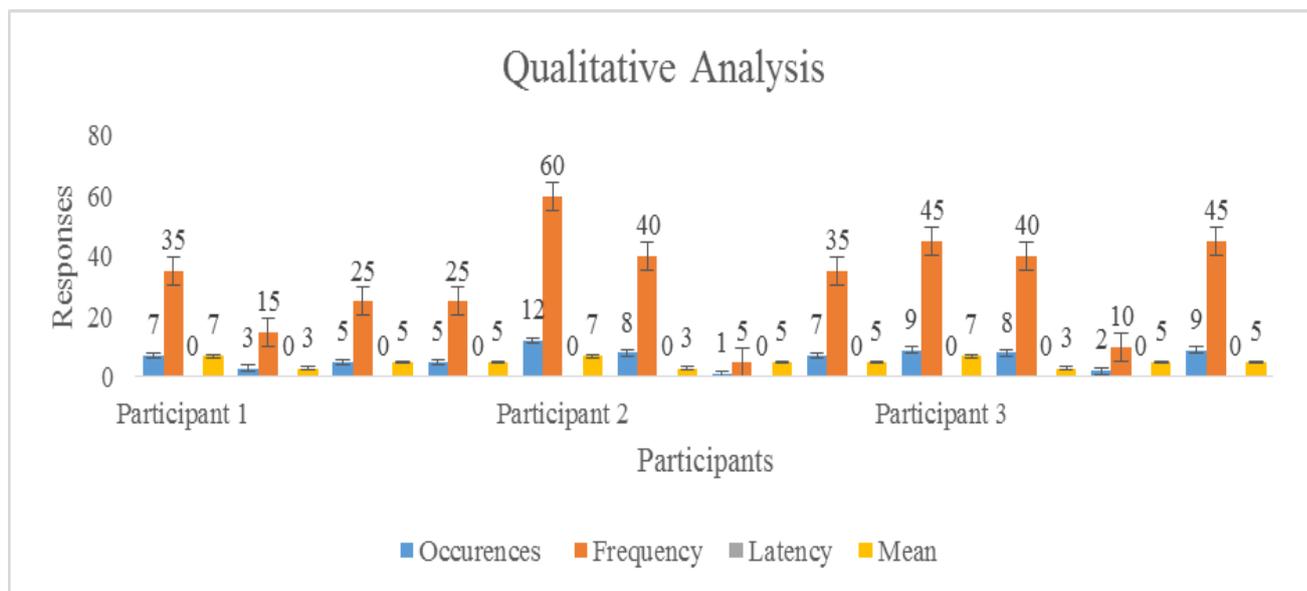


Table 2: *Qualitative analysis of naming errors*

Qualitative Analysis					
Participants	Annotation	Occurrences	Frequency	Latency	Mean
Participant 1	Semantic Paraphasias	7	35	NA	7
	Phonemic Paraphasias	3	15	NA	3
	Articulatory errors	5	25	NA	5
	No response	5	25	NA	5
Participant 2	Semantic Paraphasias	12	60	NA	7
	Phonemic Paraphasias	8	40	NA	3
	Articulatory errors	1	5	NA	5
	No response	7	35	NA	5
	Semantic Paraphasias	9	45	NA	7
Participant 3	Phonemic Paraphasias	8	40	NA	3
	Articulatory errors	2	10	NA	5
	No response	9	45	NA	5

Figure 2: Qualitative analysis of naming response

Conclusion

The present study investigated the naming errors in individuals with communication problems sequel to Traumatic Brain Injury objectively. A standardized tool (ELAN 5.1 Version, Win 64) was used to document and analyse the naming deficits among the participants. This study was a preliminary attempt at objective measurement of naming deficits.

The qualitative and quantitative information on naming deficits provides insights into the depth of cognitive and communication deficits sequel to the traumatic brain injury and shall direct guidelines in planning the intervention for the same.

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References and citations

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