GESTURE COMPREHENSION IN PERSONS WITH APHASIA

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Abstract

The literature postulates impairment in comprehending gesture in persons with aphasia. There are very limited tests available in Indian context for assessing gesture comprehension. Hence, the present study was planned. The study was carried out in two phases. The first phase was development of the test stimuli and the second phase was to administer the test on persons with aphasia. Thirty neuro-typical adults and ten persons with aphasia (5 Broca's aphasia and 5 global aphasia) participated in the study. It was noticed that there was a significant difference between the performance of neuro-typical adults and persons with aphasia.

Key words: *Neuro-typical, assessment, comprehension*

Introduction

Aphasia is a disorder that results from brain damage. The most common cause of aphasia is stroke. Additionally, infection, tumor and injury of the brain are also the leading causes of aphasia. The symptoms of aphasia have been described by Longerich and Bordeaux (1954) as an affliction that affects expressive and receptive communication in all modes including speaking, reading, writing, understanding and gesturing. Several studies reported that persons with aphasia (PWA) have difficulty in using and recognizing signs, gestures and pantomime (Duffy & Duffy, 1981; Wang & Goodglass, 1992; Bell, 1994). The evidence by Goodglass and Kaplan (1963) and Pickett (1972) substantiated the observation that persons with aphasia demonstrate significantly greater impairment in gesture and pantomime than either neuro-typical participants (NTP) or persons with non-aphasic brain damage.

Further, Netsu and Marquardt (1984) studied the effects of three types of stimuli i.e. objects, line drawings, and action pictures on the understanding of pantomimes in PWA. Fifteen PWA were included in the study. Each task contained fifteen items and was presented in random order. The investigator pantomimed a function and the participant was required to point to objects or pictures of objects. Results revealed significantly more number of proper pantomime responses for objects and action pictures compared to line drawings.

Many studies confirmed that verbal comprehension deficits lead to a greater dependency on gesture to interpret messages (Records, 1994). Further, Saygin, Wilson, Dronkers and Bates (2004) examined comprehension of visually presented action stimuli in PWA. The participants were asked to choose the object that matched visually presented stimuli. The investigators used black and white drawings of pantomimed actions. Results revealed that PWA were significantly impaired in comprehension of action.

In addition, Cocks, Sautin, Kita, Morgan, and Zlotowitz (2009) studied the consequence of aphasia on speech integration and co-speech gesture in one person with aphasia and twenty neuro-typical adults. Participants were asked to watch video vignettes of person producing twenty-one verb phrases in three different circumstances i.e. verbal, gesture, and verbal gesture combined. They were asked to choose a matching picture from four alternatives: integration target, a verbal only, a gesture only, and an unrelated foil. The results revealed that PWA acquired a notably lesser multi modal gain score as compared to NTP. PWA depended more on gesture in order to interpret the message while neuro-typical adults depended on speech in speech and gesture integration tasks. Further, PWA had better gesture comprehension than spoken word comprehension on speech only and gesture only tasks.

In conclusion, one can understand that PWA do face difficulty in comprehension of gesture. Several tests have been developed in western countries but there are limitations in using those tests in Indian context. There are very limited test available in Indian context to evaluate comprehension of gesture. Hence, there is a need to develop a test which can assess comprehension of gesture in PWA.

Method

The present study was carried out in two phases.

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The first phase consisted of the development of the test stimuli and the second phase included administration of the test on participants. All the items of the test were chosen on the basis of the culture background of the target population. Twenty five pictures of gesture were selected for the test and were given to five Speech Language Pathologists (SLPs), who have had at least two years of clinical experience were asked to rate the items for assessing comprehension of gesture in PWA. The SLPs used a two point rating scale i.e. inappropriate or appropriate to rate the stimuli. The final set of stimuli consisted of items which were rated by at least 90% of the judges as appropriate.

The finalized test consists of ten gesture pictures. Culturally appropriate picture stimuli were drawn by a professional artist. The stimuli were presented visually using pictures. The participants could respond to the question either verbally, gesturally or by pointing to cards having printed words on them. The response sheet consisted of four printed words out of which one was the target word and the other three were distracters. Different distracters were provided for different stimuli.

A three point scoring pattern was followed i.e. score of '2', '1' and '0' were given for every 'correct without prompt', 'correct with prompt', and 'incorrect/no response even after prompt' respectively.

Participants

In the present study, 30 neuro-typical adults and 10 PWA (5 Broca's aphasia and 5 global aphasia) participated. Table 1 illustrates the demographic details of PWA.

Table 1: Demographic details of persons with aphasia

Sl. No.	Age	Gender	Aphasia type	Time post onset	MRI/CT scan report	Education
1	49 years	Male	Global Aphasia	3 months	Left MCA territory in temporoparietal region	Graduate
2	57 years	Male	Global Aphasia	3 months	Left MCA territory	Graduate
3	65 years	Male	Global Aphasia	5 months	Left frontotemporoprietal and basal ganglia	Graduate
4	58 years	Female	Global Aphasia	3 months	Left MCA territory	10+2
5	62 years	Female	Global Aphasia	4 months	Left MCA territory	Graduate
6	28 years	Male	Broca's Aphasia	6 months	Left MCA territory	Post-graduate
7	42 years	Male	Broca's Aphasia	4 months	Left MCA territory	Graduate
8	43 years	Male	Broca's Aphasia	12 months	Left MCA territory	Graduate
9	49 years	Male	Broca's Aphasia	7 months	Left MCA territory	Graduate
10	43 years	Female	Broca's Aphasia	9 months	Left frontotemporoprietal and basal ganglia region	Graduate

Inclusion Criteria for the participants: The ethical standards and considerations set by All India Institute of Speech and Hearing (AIISH), Mysore; Karnataka, India was adhered to while carrying out the study. The participants or family members or care takers were explained about the purpose and procedure of the study and an informed written consent was taken. Participants were within the age range of 18-65 years. Pre-morbidly all participants were right handed and to assess the dominance of handedness, Edinburgh Handedness Inventory (Oldfield, 1971) was administered on participants. The participants had no history of pre-morbid neurological illness, psychological disorders, and other significant sensory and/or cognitive deficits. To rule out any cognitive-linguistic deficits in NTP Mini-Mental State Examination (Folstein, Folstein & McHaugh, 1975) was administered. The participants' cause of aphasia was diagnosed by a Neurologist/Physician using clinical examination and radiological evaluations (CT scan & MRI). Participants who had aphasia due to stroke, who were medically stable, and with post onset duration of a minimum period of three months were considered. Western Aphasia Battery test in Hindi (Karanth, Ahuja, Nagaraja, Pandit, & Shivshankar, 1986) was administered to assess the type of aphasia.

Test administration

Each participant was seated in front of a table at a comfortable distance from where it was easy for participants to reach and point to the test material. Further, the administration of the test was

recorded on a digital video camera recorder (Sony Handycam, model No. DCR-SR88).

Results and Discussion

The present study aimed at developing a test for assessing comprehension of gesture in PWA. The performance of NTP and PWA on gesture task is represented in Table 2.

Table 2: *Mean and SD values for neuro-typical participants and persons with aphasia on gesture*

Section	Mode	Neuro-typical participants		Persons with Aphasia	
		Mean	S. D	Mean	S. D
Gestures	Picture	19.96	0.18	8.20	6.19

Neuro-typical participants (Mean=19.96) scored better than PWA (Mean=8.20) on gesture task. Mann-Whitney test was carried out to examine the significant differences between NTP and PWA on gesture task. The results revealed a significant difference between NTP and PWA for gesture ($|Z|=5.95$, $p<0.001$).

The performance of NTP, persons with Broca's aphasia (PWBA) and persons with global aphasia (PWGA) on gesture task is represented in Table 3. It is indicated from Table 3 that neuro-typical adults (Mean=19.96) scored better than persons with Broca's aphasia (Mean=13.80) followed by persons with global aphasia (Mean=2.60) on gesture task.

Table 3: Mean and SD values for neuro-typical participants, persons with Broca's aphasia and persons with global aphasia on gesture

Sections	Mode	Neuro-typical		Broca's aphasia		Global aphasia	
		Mean	S.D	Mean	S.D	Mean	S.D
Gestures	Picture	19.96	0.18	13.80	2.68	2.60	0.89

Kruskal-Wallis test was carried out to compare the performance among NTP, PWBA and PWGA. The results revealed a significant difference for gesture [$\chi^2(2)=36.22$, $p<0.001$] between NTP, PWBA and PWGA. Pair-wise comparison was made and Mann-Whitney test was carried out to examine the significant difference between NTP and PWBA and the results revealed a significant difference for gesture ($|Z|=5.38$, $p<0.001$). Further, when NTP and PWGA were compared using Mann-Whitney test, results revealed a significant difference for gesture ($|Z|=5.38$, $p<0.001$). Similarly, performances of PWBA and PWGA were compared. Mann-Whitney test revealed significant difference for gesture ($|Z|=2.65$, $p<0.05$) between persons with Broca's and global aphasia.

Performance of NTP was better than PWA on the gesture task. The results showed that NTP have good ability to comprehend gesture whereas PWA had difficulty in understanding gesture. Further, PWBA performed better than PWGA on gesture task. PWGA performed poorly in the present study. This result shows that PWA have difficulty in recognizing gesture. This also depends on the severity and type of aphasia. Goodglass and Kaplan (1963) and Pickett (1972) reported that PWA demonstrate significantly greater impairment in gesture and pantomime than either neuro-typical or persons with non-aphasia brain injured. Duffy and Duffy (1975) also reported that PWA were impaired relative to persons with non-aphasia and that such impairment of gestural ability is highly correlated with impairment of verbal ability.

In addition, Gainotti and Lemmo (1976) reported that PWA performed significantly poorer as compared to any other group of brain damaged persons on the test of symbolic gesture interpretation. Within the PWA, the inability to comprehend the symbolic gestures was extremely associated to the semantic mistakes found at a verbal comprehension test. Gainotti and Ibba (1972) also reported that gesture comprehension disturbances were frequently noticed in PWA, and that they seem to be closely associated to the severity of the verbal communication disorder. Peterson and Kirshner (1981) also noticed impairment of gestural comprehension and expression in PWA. They reported that there is a close correlation among severity of aphasia and degree of gestural impairment.

In 1983, Ferro, Martins, Mariano, and Caldas suggested that gesture recognition is a multi-component task which consisted of linguistic, perceptual/conceptual symbolic and spatio-temporal demands. PWA reflects a central symbolic impairment that can affect both verbal and non-verbal processes, including pantomime recognition (Duffy & Watkins, 1984). Another study by Cocks et al., (2009) further supported the findings by reporting that the PWA performed poor than the NTP on gesture task.

Overall, the scores clearly showed that PWA have significant difficulty in comprehension of gesture. This again depends on the severity and type of aphasia.

Conclusion

The present study assesses the comprehension of gesture ability in PWA. The results of the study

conclude that there was a significant difference in performance between neuro-typical adults and PWA and thus intend toward the effectiveness of the test. This test would help in identifying the aphasics, describing the aphasia for the purpose of diagnosis, therapy and its prognosis.

Limitations of the study

The study has been carried out with a small number of PWA and different types of aphasia which restricts the generalization of the research finding for PWA.

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