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## Phonology Comprehension Deficits in Persons with Aphasia

Santosh Kumar, Ph.D. Candidate

S. P. Goswami, Ph.D.

### Abstract

The study was carried out with the aim to develop a test of phonology comprehension in Hindi language. The objective of the study was to conduct a relative study of phonology comprehension between neuro-typical adults and persons with aphasia with respect to auditory and orthographic modes.

The present study was done in two phases. First phase included development of test material and in the second phase, the test battery was administered on neuro-typical adults and persons with aphasia. The developed material consisted of two sections, viz., syllable identification and syllable discrimination. Each section consisted of 10 items in auditory and orthographic mode. The material was administered on 60 neuro-typical adults and 13 persons with aphasia aged 18 to 65 years.

It was observed that there was a significant difference between the mean scores across the neuro-typical adults and persons with aphasia on the entire task in all the modalities. Based on this finding it is recommended that the developed test can be used for assessment of phonology comprehension for persons with aphasia.

**Key words:** Modality, Hindi, Neuro-typical

### Introduction

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Aphasia has a large impact on a person's life, turning everyday communicative situations into a struggle to understand, and be understood. Improvement of the communicative ability in daily life of persons with aphasia is the main goal of aphasia therapy. This may be achieved after doing thorough assessment and establishing baseline for therapy. This also depends on the type and severity of aphasia. For persons with prominent linguistic-level disorders, assessment should be done on the main linguistic skills i.e semantic, phonological, and syntactic processing.

Studies on segmental perception have shown that persons with aphasia have deficits in processing segmental contrasts. Although the classical view of aphasia suggest that reception abilities primarily lie in posterior brain structures and phonological impairments are more likely found in Wernicke's aphasia (Luria 1966), certain studies also show that nearly all persons with aphasia, regardless of clinical type and underlying neuropathology show some problems in discriminating phonological contrasts (Blumstein, Baker, & Goodglass, 1977) or in labeling or identifying consonants presented in a consonants vowel context (Basso, Casati, & Vignolo, 1977; Blumstein, Cooper, Zurif, & Caramazza, 1977).

Miceli, Gainotti, Caltagirone, and Masullo (1980) studied the relationship between expressive and receptive phonemic disorders in 69 persons with aphasia. They found no correlation between the degree of phonemic output disorder and the number of phonemic discrimination errors. When they examined the performance in persons with aphasia of varying severity, persons with severe discrimination output disorders did not show discrimination deficits while other persons with similar or less severe output disorders were unable to achieve the phonemic discrimination.

Caramazza, Berndt, and Basili (1983) reported that persons with aphasia have deficits in auditory comprehension tasks and made phonological errors in production task. They also reported that written comprehension of the person with aphasia was intact. Allport (1985) also assert that there should be an association between phonological deficits in comprehension and production. He suggested that spoken word recognition and production comprises of a set of auto-associated patterns within a phonological space. He further argues that the retrieval of these word forms for both input and output is affected by the reduced discriminability of all learned patterns.

Dell (1985, 1989) stated that the interactive activation lexical network accounts for patterns of speech errors in production. It is also used for lexical access in comprehension. This would predict that when the network is damaged, then phonological errors both in production and comprehension would occur as a consequence.

The phonological input and output routes are more generally agreed to be separable (Caramazza & Miceli, 1990; Romani, 1992). This view is supported by a large amount of case-reports of persons with selective disorders in the output route in the context of intact phonemic processing of auditory verbal material (Caplan & Waters, 1995; Kohn & Smith, 1995; Willshire & McCarthy, 1996).

Persons with aphasia have more difficulty in identification tasks than they do in discrimination task. These problems emerge for the perception of both real and nonsense

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syllables. Persons with aphasia are more likely to make perception errors for consonants when the stimuli contrast by a single phonetic feature than when they contrast by 2 or more features (Blumstein, Baker, & Goodglass, 1977; Baker, Blumstein, & Goodglass, 1981). Perceptual performance is influenced by the phonetic position in which the contrast appears. More perceptual errors occur for consonants. Pattern of perception of real words and for non-words are similar among the person with aphasia is consistent with the view that the organizational properties of the sound structure of language are still intact. Similar phonological patterns of misperceptions of words and non-words suggest that the same processing mechanisms are used in the mapping acoustic structure to phonological structure.

Goswami (2004) made use of Kannada versions of Western Aphasia Battery, Linguistic Profile Test, and Revised Token Test to investigate the comprehension abilities across different aphasias at phonological level. Results revealed that persons with aphasia had difficulty in comprehension at phonology level.

Several studies have investigated the perception of the acoustic parameters associated with phonetic features. Participants were presented with an acoustic continuum in which certain acoustic cues or acoustic attributes are systematically and parametrically varied. Subjects are asked to either categorize or identify the phonetic category of the stimuli or alternatively, to discriminate pairs of stimuli from the continuum. Results showed that in persons with aphasia had great difficulty in performing discrimination tasks. The discrimination functions were generally similar in step and the locus of the phonetic boundary was comparable to those of normals, even for those persons with aphasia who could not reliably identify the stimuli. This suggests that persons with aphasia do not have deficit specific to the extraction of the spectral patterns corresponding to the phonetic categories of speech. Rather their deficit seems to relate to the threshold of activation of the phonetic/phonological representation itself or to its ultimate contact with the lexicon.

It is evident from the existing review of literature that persons with aphasia have difficulty in comprehension of phonology. There are many aphasia test batteries which are commonly used in both clinical and research settings. However, in the Indian context much emphasis has not been paid towards assessment of phonology across modes. Moreover, assessment of persons from diverse ethnic, cultural, and linguistic backgrounds present significant challenges for clinicians as most tests may not have included a representative number of people from diverse backgrounds in their standardization (Screen & Anderson, 1994; Horner, Swanson, Bosworth, & Matchar, 2003; Munoz & Marquardt, 2003; Edwards & Bastianse, 2007; Penn, 2007). Also, there are limited tests to assess the phonology comprehension abilities of the persons with aphasia in Indian context and the available Western assessment tests pose limitations in Indian contexts due to the linguistic and ethno-cultural diversity.

However, there is growing evidence that a diagnosis in terms of affected linguistic levels -semantics (word meaning), phonology (word sound), and syntax (grammatical structure) - is more useful than diagnosing aphasia type (Howard & Patterson, 1989). For the assessment of aphasia in the Indian context, it is necessary to have a culturally standardized test to identify the problem and classify the problem into various groups for the purpose of

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diagnosis, therapy and prognosis. Thus, the aim of the present study was to develop a test of phonology comprehension in Hindi language.

A linguistic profile of the persons with aphasia is needed for adequate referral and for guiding aphasia therapy. Phonology comprehension in Hindi language for persons with aphasia test was developed to measure impairment at the phonological level. In this study, the normative value and phonological deficits in persons with aphasia were estimated. The presence and severity of phonological deficits were described for the persons with aphasia.

## **Method**

The study endeavored to develop a test of phonology comprehension in Hindi language. The objective of the study was to conduct a relative study of phonology comprehension between neuro-typical adults and persons with aphasia with respect to auditory and orthographic modes. The selection of participants followed a set criteria and the data collected were analyzed with respect to auditory and orthographic mode. The following procedure was adopted for the study.

### ***Procedure***

The present study was done in two phases. First phase included development of test material and in the second phase, the test battery was administered on neuro-typical adults and persons with aphasia.

#### ***Phase- I: Development and Description of Test Material***

The first phase involved the development of the test material. All the items of the test were selected on the basis of the linguistic background of the target population. The phonology comprehension test consisted of two sections viz. syllable identification and syllable discrimination. In each section, 20 items were selected from newspaper or day to day materials. Twenty Speech Language Pathologists (SLPs), who were proficient in speaking, reading, and writing Hindi language and who had at least two years of clinical experience, were asked to rate the items for assessing phonology comprehension in persons with aphasia. A three point rating scale was applied to rate the stimuli on the basis of inappropriate, appropriate and most appropriate by the SLPs. An average of minimum 90% appropriate items rated by the 20 SLPs was selected as the final set of stimuli for the test. SLPs were also asked to arrange the items in a hierarchical manner in the order of complexity.

The finalized test, phonology comprehension test in Hindi language, consists of 10 items in each section/mode. A total of 40 stimuli (20 stimuli in auditory mode and 20 stimuli in orthographic mode) were considered for the final test. The stimuli were presented in auditory and orthographic mode separately and randomly.

The response sheet contains four letters/words out of which one is the target letter/word and other three are the distracters in both modalities. Different distracters were provided for different stimuli. In auditory mode, person has to point to the target letter/word, on provided response sheet, told by clinician. In orthographic mode, person has to match the

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target letter/word, on provided response sheet, told by clinician. Responses could be either verbal, gestural or pointing pictures/cards having ‘yes’ and ‘no’ written on them. Scoring pattern followed a three point rating scale as described in the following Table 1.

Table 1. *Scoring pattern*

Score	Response
2	Correct without prompt
1	Correct with prompt
0	Incorrect even with prompt

*Instructions for the professionals while administering the test*

Different sections have different instructions. Repetition of stimulus was allowed once, if necessary. While responding, if the person self-corrects then the last answer was considered as the final response. The details of the instructions given to participants have been stated in Appendix.

*Feedback about test*

The test was given for feedback rating to 24 SLPs, who were native speakers of Hindi with at least three years of clinical experience. The SLPs were asked to judge the test based on feedback rating questionnaire adopted from “Feedback Questionnaire for Aphasia Treatment Manuals” (Field Testing of Manual for Adult Non-fluent Aphasia Therapy in Kannada, MANAT-K; Goswami, Shanbal, Samasthitha, & Navitha, 2010) (Table 2). The feedback rating questionnaire required the rater to judge the test on various parameters such as simplicity, familiarity, complexity, iconicity, arrangement etc., while considering the abilities and performance of a person with aphasia.

Table 2. *Responses of the judges regarding the test material.*

Sl. No.		Very Poor	Poor	Fair	Good	Excellent
1	Simplicity				11	13
2	Familiarity			1	9	14
3	Size of the picture			2	9	13
4	Color and appearance				11	13
5	Arrangement			1	9	14
6	Presentation				10	14
7	Volume			5	10	9
8	Relevancy			2	8	14
9	Complexity			1	8	15
10	Iconicity			1	12	11
11	Accessible			2	10	12
12	Flexibility			2	10	12
13	Trainability			2	12	10

14	Stimulability		1	10	13
15	Feasibility		2	10	12
16	Generalization		1	8	15
17	Scope of practice		3	8	13
18	Scoring Pattern		1	10	13
19	Publications, Outcomes and Developers (professional background)*	Yes		2	
		No		22	
20	Coverage of parameters (Reception & expression)**			8	16
	Total		27	183	246
	Total %		5.92	40.13	53.95

\*The SLPs were asked to rate this parameter in terms of “Yes” or “No”

\*\*The SLPs were asked to rate this parameter in terms of reception only

### Phase- II: Administration of the test

The neuro-typical participants between the age group of 18-65 years were tested to establish a baseline which was considered as normative for this test. The participants were seated comfortably in a quiet environment. The test materials were arranged according to the demands of the task of each section and order of mode of administration of the test. The instructions to the participants were given verbally.

### Participants

A total of 73 participants participated in the study. The participants were divided into two groups: Group- 1 consisted of neuro-typical adults and Group- 2 consisted of persons with aphasia. In group-1, 30 Males and 30 Females, and in group-2, 4 Global aphasia (2 Males and 2 Females), 7 Broca’s aphasia (5 Males and 2 Females), 1 Wernicke’s aphasia (Male), and 1 Anomic aphasia (Male) participated in the study. The following Table 3 and Table 4 produces the details:

Table 3. Details of the participants of the study.

Participants	Age range	Male	Female
Neuro-typical adults	18-65	30	30
Persons with aphasia	18-65	9	4

Table 4. Details of persons with aphasia.

Sl. No.	Age	Gender	Provisional Diagnosis
1	49 years	Male	Global Aphasia
2	65 years	Male	Global Aphasia

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3	58 years	Female	Global Aphasia
4	62 years	Female	Global Aphasia
5	42 years	Male	Broca's Aphasia
6	48 years	Male	Broca's Aphasia
7	43 years	Female	Broca's Aphasia
8	57 years	Male	Broca's Aphasia
9	65 years	Male	Broca's Aphasia
10	65 years	Male	Broca's Aphasia
11	55 years	Female	Broca's Aphasia
12	58 years	Male	Wernicke's Aphasia
13	38 years	Male	Anomic Aphasia

### *Inclusion Criteria*

Ethical standards and considerations was maintained and adhered to while selecting the participants for the study. The participants (or family members/care takers in case of persons with aphasia) were explained about the purpose and procedure of the study and written consent was acquired. They were selected based on the following inclusionary criteria. The age of the participants should be between 18-65 years. All the participants under consideration should be the native speakers of Hindi and Pre-morbidly all participants have been right handed. There should not have been any known history of pre-morbid neurological illness, psychological disorders, and no other significant sensory and/or cognitive deficits. Mini-Mental State Exam (Folstein, Folstein & McHaugh, 1975) was administered on neuro-typical adults to rule out any cognitive-linguistic deficits. The persons with aphasia were identified through hospitals, neurological clinics and/or speech and hearing centers. The participants were diagnosed as having Ischemic stroke by a Neurologist/Physician.

### *Test administration, Arrangement and Placement of the Material*

The test materials were presented and the order of stimuli presentation was random in all modes for all groups of participants. Each participant was seated in front of a table at a comfortable distance from where it was easy for him/her to reach and point to the test material. The administration of the test was recorded on a digital video camera recorder (Sony Handycam, model no. DCR-SR88). The video camera was mounted on a stand for ease of recording.

### *Pretest Instructions*

Pretest instructions were given to the participant to make sure that the participant understood the test instructions. The instructions were given as follows:

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*“I am going to administer a test on you. I will be asking you to point to or match the letters/words or you can respond orally or gesturally. The instructions for responding for each section will differ. Whenever you feel that you have not understood what I have told then please stop me and ask me to repeat. I will repeat the instructions again.”*

In case of unsuccessful trial performance the instructions were repeated to the participants.

### **Scoring**

All the sessions were video recorded. Participant’s responses were analyzed and a score of ‘2’, ‘1’, and ‘0’ was given for every correct without prompt, correct with prompt, and incorrect/no response even after prompt (see Table 1) respectively.

### **Statistical Analysis**

The normative values for group-1 were calculated separately and the mean scores were compared between neuro-typical adults and the persons with aphasia groups across all sections. Statistical analysis was done using SPSS software (Statistical Package for the Social Sciences package, version 18.0). The tabulated scores were used for obtaining the mean (M) and standard deviation (SD). Non-parametric test ‘Mann- Whitney U-test’ was used to compare the performances of neuro-typical adults and persons with aphasia participants.

### **Results**

This study was undertaken to investigate comprehension of phonology in persons with aphasia and neuro-typical adults. 60 neuro-typical adults and 13 persons with aphasia participated in the study. The responses of the participants were tabulated and statistical analysis was done using SPSS software (Statistical Package for the Social Sciences package, version 18.0). Mann-Whitney U test was executed as a part of statistical analysis of the data and the results of the analysis are presented as follows.

Table 5. Mean and SD values for neuro-typical adults and persons with aphasia in auditory and orthographic modes.

Section	Mode	Neuro-typical adults		Persons with Aphasia	
		Mean(%)	SD(%)	Mean(%)	SD(%)
Syllable identification	Auditory	100.00	0.00	67.69	27.43
	Orthographic	100.00	0.00	80.00	27.08
Syllable discrimination	Auditory	100.00	0.00	49.23	28.12
	Orthographic	100.00	0.00	58.46	37.82

### **Performance of participants on syllable identification task**

The performance of persons with aphasia and neuro-typical adults on syllable identification task is represented in Table 5. It is indicated from Table 5 and Fig. 1 that the mean score of syllable identification task in auditory and orthographic mode for persons with

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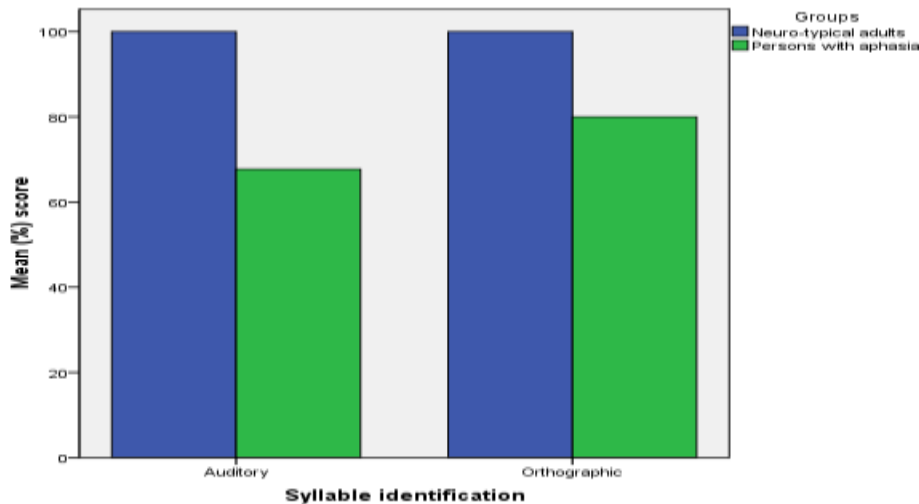
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aphasia as 67.69 (S.D=27.43) and 80.00 (S.D=27.08) respectively, which is comparatively less than their neuro-typical counter parts whose mean score of syllable identification task were 100.00 (S.D=0.00) in both modes. Persons with aphasia have performed better in orthographic mode than auditory mode on syllable identification task. To know the statistical significance, Mann-Whitney U test was carried out and the results revealed a significant difference in auditory ( $Z=-7.64$ ,  $p < 0.01$ ) and orthographic ( $Z=-5.44$ ,  $p < 0.01$ ) modes across the neuro-typical adults and persons with aphasia.



*Fig 1.* Response of syllable identification task in auditory and orthographic mode of neuro-typical adults and persons with aphasia.

***Performance of participants on syllable discrimination task:***

Table 5 and Fig. 2 indicate the mean score of syllable discrimination task in auditory and orthographic mode for persons with aphasia as 49.23 (S.D=28.12) and 58.46 (S.D=37.82) respectively, which is comparatively less than their neuro-typical counter parts whose mean score of syllable discrimination task were 100.00 (S.D=0.00) in both modes. Comprehension of syllable discrimination is better in orthographic mode than the auditory mode for the persons with aphasia whereas neuro-typical adults have performed better in both modes. On the Mann-Whitney U test, it was observed that there was a significant difference in auditory ( $Z=-8.04$ ,  $p < 0.01$ ) and orthographic ( $Z=-7.23$ ,  $p < 0.01$ ) modes across the neuro-typical adults and persons with aphasia.

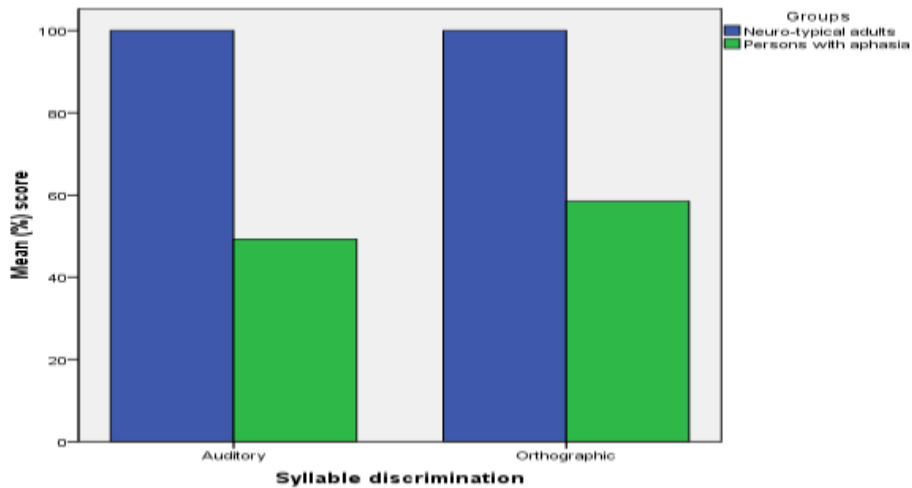


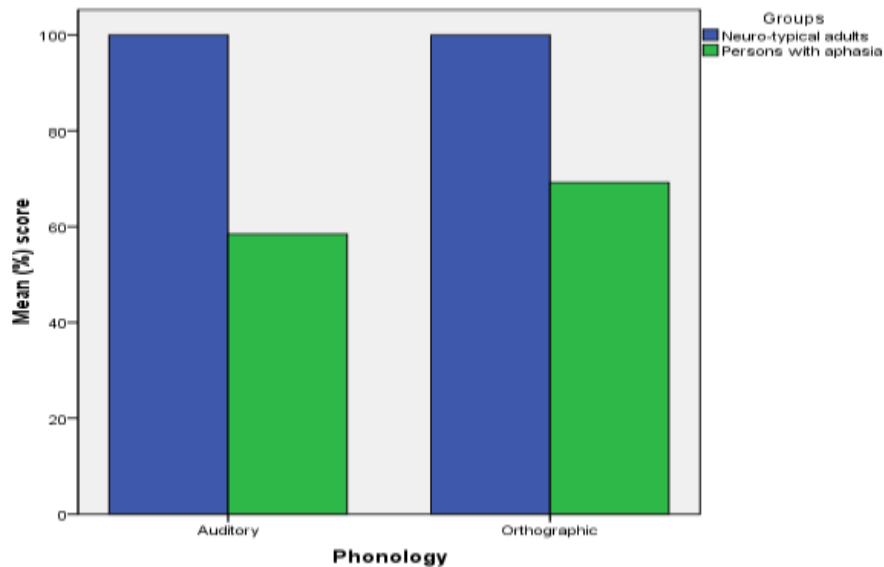
Fig 2. Response of syllable discrimination task in auditory and orthographic mode of neuro-typical adults and persons with aphasia.

Table 6. Mean and SD values for comprehension of phonology for neuro-typical adults and persons with aphasia in auditory and orthographic modes.

Mode		Neuro-typical adults		Persons with Aphasia	
		Mean(%)	SD(%)	Mean(%)	SD(%)
Phonology	Auditory	100.00	0.00	58.46	25.36
	Orthographic	100.00	0.00	69.23	31.34

**Overall performance of participants on syntax task:**

The overall total scores for phonology comprehension were summed up for both modalities separately. The mean and standard deviation for auditory and orthographic mode were calculated. From Table 6 and Fig. 3, it can be seen that the persons with aphasia scored an overall mean of 58.46 (S.D=25.36) and 69.23 (S.D=31.34) in auditory and orthographic modes respectively. Performance of persons with aphasia for overall phonology task was better in orthographic mode than in auditory mode. This was comparatively lesser than the performance of neuro-typical adults whose scored an overall mean of 100.00 (S.D=0.00) in both modalities. A Mann-Whitney U test was carried out to examine for statistical significance and the results reveal a significant difference in auditory ( $Z=-8.43$ ,  $p < 0.01$ ) and orthographic ( $Z=-7.23$ ,  $p < 0.01$ ) modes across the neuro-typical adults and persons with aphasia.



*Fig 3.* Response of phonology task in auditory and orthographic mode of neuro-typical adults and persons with aphasia.

Result showed that there was a difference in the performances in phonology task between neuro-typical adults and persons with aphasia across the both modalities.

The normatives obtained on the phonology comprehension test in Hindi language for persons with aphasia, as put forth, have been collected from a group of persons who belong to a part of Northern India, and thus acknowledge the fact that these performances (scores) can be accepted and generalized to the wider dimension of inhabitants residing in this region of the country.

## Discussion

In present study, an attempt was made to investigate the phonology comprehension in persons with aphasia and neuro-typical adults in auditory and orthographic mode. Results reveal that comprehension of syllable identification and syllable discrimination was better in orthographic mode than auditory mode for persons with aphasia. Comprehension of syllable identification was better than syllable discrimination in both modalities for persons with aphasia, whereas neuro-typical adults have performed well on both task in both modalities. Hence, overall results reveal that brain damage can cause deficits in phonology comprehension in auditory and orthographic modes in persons with aphasia.

Studies in literature have reported comprehension deficits in persons with aphasia at phonological level (Alajouanine & Lhermitte, 1964; Blumstein, Baker, & Goodglass, 1977; Caramazza, Berndt, & Basili, 1983). The present study also supports this finding. On the phonological level the different aphasic types exhibited comprehension deficits to variable degrees. This shows that the site and the extent of the lesion affecting the language region do have a major influence on the comprehension.

The performances of the Broca's and Wernicke's aphasics were similar quantitatively, however, qualitative differences were found to exist. Poor performance of persons with aphasia on phonology comprehension in Hindi language for persons with aphasia test may be because of using single mode. Schuell and Jenkins (1959) reported that the performance of persons with aphasia improve when the linguistic stimuli is presented in both graphic and verbal modalities, rather than the verbal modality alone. The person with Broca's aphasia also showed evidence of self monitoring behaviors, where as these were not shown by person with Wernicke's aphasics. It was also seen that the Broca's aphasics showed delayed and inaccurate responses and there was improvement with slower rate of presentation of stimuli. Improvement observed in persons with aphasia with slower than normal rates have also been reported by Schuell, Jenkins, and Jiminez-Pabon, (1964); Albert and Bear (1974); Liles and Brookshire (1975); Gardner, Albert, and Weintraub, (1975), Weidner and Lasky (1976); Cermak and Moreines (1976). These responses could probably be due to auditory processing deficits. Performance of anomic aphasia was similar to performance of neuro-typical adults.

The performances of the global aphasics were poorest among all the aphasics but they made attempts to carry out the commands indicating that they have the intent to carry out the command. But their responses were mere guesses. No self-monitoring behaviors were noticed. Further, even when the stimuli were presented in both graphic and verbal modalities, their responses did not improve to a considerable extent, indicating that even the multi-modality option does not influence their responses. Thus the global aphasics exhibited severe syllable identification and syllable discrimination deficits.

### ***Qualitative analysis of the professionals' responses about the test***

The 24 SLPs who rated the test based on a feedback questionnaire as shown in table 2. It is evident from the table 2 that the professionals rated the test on overall parameters as 53.95% excellent, 40.13% good, and 5.92% fair. However, none of professional rated the test as poor and/or very poor. Also for the publications, outcomes and developers (professional background) domain, two professionals reported that they were aware of the other materials available which can be used for assessing phonology comprehension, and 22 professionals stated that they were not aware of any other test available either in the western or Indian context. Therefore, the professionals were of the opinion that this test can be used effectively on persons with aphasia.

### **Conclusion**

The present study intended to investigate comprehension deficits in Hindi speaking persons with aphasia at phonology level in different modalities. Review of relevant literature revealed the existence of phonology comprehension deficits in persons with aphasia. Result showed that there was a significant difference in the performances on phonology task between neuro-typical adults and persons with aphasia across the both (auditory and orthographic) modalities. The neuro-typical adults exhibited significantly better comprehension as compared to the persons with aphasia in auditory and orthographic modes on phonology comprehension test in Hindi language. Phonology comprehension was better in orthographic mode than auditory mode stimuli presentation on all tasks for persons with

aphasia. Persons with aphasia showed better comprehension for syllable identification compared to syllable discrimination in both modalities.

### **Implications of the study**

Results of the study present the importance of having testing tools that assess a person's skills at various aspects of phonology and revealed conclusive evidence of comprehension deficits in persons with aphasia at phonology level in auditory and orthographic modalities. Results also underscore the fact that research should be orientated at ameliorating the language specific test development in a multilingual country as India, and that it caters to the needs of all the assessors within a broad work culture. Thus, it is imperative that separate clinical tools i.e. competence and performance tools for diagnostic assessment are required for persons with aphasia. It is also stressed that in persons with aphasia there should be intervention goals directed to improve their comprehension abilities at phonology level in different modes besides, ascertaining their carry out in responsive and conversational speech. Further, clinical research should be orientated at ameliorating comprehension deficits at all severity and finer levels, dealing with multitude language aspects involved in Indian context such as, bilingual, multilingual, differences in language specific, cognitive linguistic and the persons specific demands with respect to each of these are warranted.

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### **References**

- Alajouanine, T., & Lhermitte, F. (1964). The phonemic and semantic components of jargon aphasia. *International Journal of Neurology*, 4, 277-286.
- Albert, M. L., & Bear, D. (1974). Time to understand: a case study of word deafness with reference to the role of time in auditory comprehension. *Brain*, 97, 373-384.
- Allport, D. A. (1985). Distributed memory, modular systems and dysphasia. In S.K. Newman and R. Epstein (Ed.). *Current perspectives in dysphasia*. Edinburgh: Churchill Livingston.
- Baker, E., Blumstein, S. E., & Goodglass, H. (1981). Interaction between phonological and semantic factors in auditory comprehension. *Neuropsychologia*, 19, 1-16.
- Basso, A., Casati, G., & Vignolo, L. (1977). Phonemic identification deficits in aphasic. *Cortex*, 13, 84-95.

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- Blumstein, S. E., Baker, E., & Goodglass, H. (1977). Phonological factors in auditory comprehension in aphasia. *Neuropsychologia*, *15*, 19-30.
- Blumstein, S. E., Cooper, W. E., Zurif, E. B., & Caramazza, A. (1977). The perception and production of voice onset time in aphasia. *Neuropsychologia*, *15*, 371-383.
- Caplan, D., & Waters, G. S. (1995). Aphasic disorders of syntactic comprehension and working memory capacity. *Cognitive Neuropsychology*, *12*, 638 – 649.
- Caramazza, A., Berndt, R., & Basili, A. G. (1983). Phonological factors in auditory comprehension. *Neuropsychologia*, *15*, 19-30.
- Caramazza, A., & Miceli, G. (1990). The structure of graphemic representations. *Cognition*, *37*, 243–297.
- Cermak, L. S., & Moreines, J. (1976). Verbal retention deficits in aphasic and amnesic patients. *Brain and Language*, *3*, 16-27.
- Dell, G. S. (1985). Positive feedback in hierarchical connectionist models: Applications to language production. *Cognitive Science*, *9* (1), 3-23.
- Dell, G. S. (1989). The retrieval of phonological forms in production: Tests of predictions from a connectionist model. In W. Marslen-Wilson (Ed.). *Lexical Representation and Process*. Cambridge, M.A: MIT Press.
- Edwards, S., & Bastianse, R. (2007). Assessment of aphasia in a multicultural world. In M. Ball & J. S. Damico (Eds). *Clinical aphasiology: Future directions: A festschrift for Chris Code*. London: Psychology Press, Taylor & Francis Group.
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). “Mini-Mental State”: A practical method for grading the mental state for the clinician. *Journal of Psychiatric Research*, *12*, 189-198.
- Gardner, H., Albert, M. L., & Weintraub, S. (1975). Comprehending a word: The influence of speed and redundancy on auditory comprehension in aphasia. *Cortex*, *2*, 155-162.
- Goswami, S. P. (2004). *Comprehension deficits in aphasics*. Unpublished Doctoral Thesis, University of Mysore, Mysore, India.
- Goswami, S. P., Shanbal, J. C., Samasthitha, S., & Navitha, U. (2010). “Feedback Questionnaire for Aphasia Treatment Manuals”, *Field Testing of Manual for Adult Non-fluent Aphasia Therapy in Kannada (MANAT-K)*. Project All India Institute of Speech and Hearing, Mysore.

- Horner, R. D., Swanson, J., Bosworth, H., & Matchar, D. (2003). Effects of race and poverty on the process and outcome of inpatient rehabilitation services among stroke patients. *Stroke*, 43 (4), 1027-1031.
- Howard, D., & Patterson, K. (1989). Models for therapy. In X.Seron & G. Deloche (Eds.), *Cognitive approaches in neuropsychological rehabilitation* (pp. 39-62). London-Hillsdale, NJ: Lawrence Erlbaum.
- Kohn, S. E., & Smith, K. L. (1995). Serial effects of phonemic planning during word production. *Aphasiology*, 9, 209-222.
- Liles, B. Z., & Brookshire, R. H. (1975). Effects of pause time on auditory comprehension of aphasic subjects. *Journal of Communication Disorders*, 8, 221-236.
- Luria, A. R. (1966). *Human brain and psychological processes*. Harper and Row, New York.
- Miceli, G., Gainotti, G., Caltagirone, C., & Masullo, C. (1980). Some aspects of phonological impairment in aphasia. *Brain and Language*, 11, 159-169.
- Munoz, M. L., & Marquardt, T. P. (2003). Picture naming and identification in bilingual speakers of Spanish and English with and without aphasia. *Aphasiology*, 17 (12), 1115-1132.
- Penn, C. (2007). Cultural dimensions of aphasia: adding diversity and flexibility to the question. In M. Ball & J. S. Damico (Eds). *Clinical aphasiology: Future directions: Afestschrift for chris code*. London: Psychology Press, Taylor & Francis Group.
- Romani, C. (1992). Are there distinct input and output buffers? Evidence from an aphasic patient with an impaired output buffer. *Language and Cognitive Processes*, 7, 131-162.
- Schuell, H., & Jenkins, J. J. (1959). The nature of language deficit in aphasia. *Psychological Review*, 66, 45-67.
- Schuell, H. M., Jenkins, J. J., & Jiminez-Pabon, E. (1964). *Aphasia in adults*. Harper and Row publishers, Hoeber medical Div., New York.
- Screen, H. M., & Anderson, N. B. (1994). *Multicultural perspectives in communication disorders*. San Diego: Singular Publishing Group.
- Weidner, W., & Lasky, E. (1976). The interaction of rate and complexing of stimulus on the performance of adult aphasic subjects. *Brain and Language*, 3, 34-40.
- Wilshire, C. E., & McCarthy, R. (1996). Experimental investigation of an impairment in phonological encoding. *Cognitive Neuropsychology*, 13, 1059-1098.



Santosh Kumar (Corresponding Author)  
Doctoral Student  
All India Institute of Speech and Hearing,  
Manasagangothri, Mysore-570006  
[santoshasp@gmail.com](mailto:santoshasp@gmail.com)

S. P. Goswami, Ph.D.  
Reader in Speech Pathology  
Head, Department of Clinical Services  
All India Institute of Speech and Hearing  
Manasagangothri  
Mysore-570006  
[goswami16@yahoo.com](mailto:goswami16@yahoo.com)

Language in India [www.languageinindia.com](http://www.languageinindia.com)

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Santosh Kumar, Ph.D. Candidate and S. P. Goswami, Ph.D.  
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