PARAGRAPH COMPREHENSION DEFICITS IN HINDI SPEAKING PERSONS WITH APHASIA IN DIFFERENT MODALITIES: A PRELIMINARY STUDY

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Abstract

The study was carried out with the aim of developing a paragraph comprehension test in Hindi language for persons with aphasia in auditory and orthographic mode. The developed paragraph consisted of having five questions to evaluate paragraph comprehension in auditory and orthographic mode. The material was administered on 60 neuro-typical adults and 12 persons with aphasia aged 18-65 years. It was observed that there was a significant difference between the mean scores of neuro-typical adults and persons with aphasia. Based on this finding it is recommended that the developed material can be used to assess paragraph comprehension in persons with aphasia in auditory and orthographic mode.

Key words: *Neuro-typical, Hindi, Assessment.*

Aphasia is an acquired disorder of language in adults due to damage in the brain, most commonly caused by cerebrovascular accident (CVA) in the left side of the brain. Aphasia impairs a person's ability to comprehend and produce spoken and written language. Aphasia disrupts the symbolic systems of speaking, listening, reading, and writing (McNeil, 1983; Chapey & Hallowell, 2001; LaPointe, 2005).

Comprehension deficits of the spoken and written language are variable and involve multiple processes (Brookshire, 1974; Duffy & Coehlo, 2001). Researchers also suggest that the processes required for comprehension of words and sentences differ from the processes employed for comprehension of discourse. A review of the literature revealed a positive correlation between linguistic, extra-linguistic (visuographic) context, and improved auditory comprehension by persons with aphasia (Stachowiak, Huber, Poeck, & Kerchensteiner, 1977; Waller & Darley, 1978; Pierce & Beekman, 1985; Brookshire, 1987; Pierce, 1983; 1988; 1991; Duffy & Coelho, 2001).

Brookshire and Nicholas (1984) studied paragraph comprehension in persons with aphasia, persons with right hemisphere damaged, and persons with non-brain damaged. The participants were asked to pay attention to brief narrative paragraphs that contained four focal ideas with details that were related to those central ideas. Subsequent to listening to the narratives the participants were administered tests on comprehension and retention of the focal ideas and its adjunct details. The results of the test revealed that the participants were able to recall the focal ideas than the adjunct details presented in the paragraph. The scores for the comprehension of paragraphs for persons with non-fluent
aphasia and persons with right hemisphere damaged were not significantly dissimilar from the scores obtained by persons with non-brain damaged. The results obtained on the performance for comprehension of paragraph from persons with fluent and mixed aphasia were significantly lower than the scores obtained for persons with non-brain damaged and persons with right-hemisphere damaged.

Stachowiak, Huber, Poeck, and Kerchensteiner (1977) studied the impact of linguistic context on auditory comprehension. The researchers examined three hypotheses relative to the effect of contextual information on auditory comprehension: (a) persons with aphasia have an impaired ability to utilize context for comprehension, (b) linguistic deficits compromise contextual comprehension skills, and (c) persons with aphasia can utilize verbal and contextual information to fill in linguistic related deficits. The researcher read short passages to the participants. The participants have to select the picture from a multiple choice picture set of five line drawings that fit the story to the best. The three pictures included semantic foils, a picture depicting the main idea of the story, and one showing the literal sense of a metaphorical comment used in the story. The results revealed that the persons with aphasia performed similarly to both groups of control participants on the passage listening task. Waller and Darley (1978) reported that the brief presentation of context to the participants prior to the administration of the test improved their performances. Pierce and Beekman (1985)

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demonstrated that the auditory comprehension of syntactically and semantically complex sentences by persons with aphasia may be increased when provided extra-linguistic, visuographic, or context. The researchers presented target sentences to participants in three different experimental conditions: (a) in isolation, (b) following a picture that depicted the sentence, and (c) after a semantically related sentence. Results revealed an interaction between comprehension severity (high-level or low-level), sentence type (simple actives, reversible passives, and reversible actives), and contextual condition (linguistic or visuographic). Participants with low level comprehension skills demonstrated improved auditory comprehension both in the linguistic and visuographic conditions. However, statistical analyses revealed no significant differences between the two types of context.

The literature reveals a sequence of studies that disclose the positive impact of context on the auditory comprehension of persons with aphasia. However, there is limited research regarding the impact of linguistic and visuographic context on reading comprehension by persons with aphasia (Germani & Pierce, 1992; Smith, 2005).

Germani and Pierce (1992) studied the influence of linguistic context on the reading comprehension of persons with aphasia. Participants silently read three types of narratives: (a) predictive narratives, (b) non-predictive narratives, and (c) predictive narratives without target sentences. All stimuli were presented in enlarged type on 8x11-inch cards. After reading the narrative, the participants turned to the next page to find the related question. Participants pointed to the correct noun choice, from a field of two, without referring back to the narrative. Results revealed that 75% of the participants benefited from the predictive narratives and 83% of the participants benefited from the non-predictive narratives.

Familiar topics and contents can be domain knowledge, which individuals know something about the material they hear or read. Research on persons with neuro-typical demonstrates that persons having prior knowledge about the paragraph perform better than the persons having no prior knowledge about the paragraph. The study conducted by Hambrick and Engle, 2002; Miller, 2001; Van Overschelde and Healy, 2001, used test stimuli that incorporated familiar topics and created a high domain familiar knowledge.
Researchers have shown that context improves persons with aphasias auditory comprehension. Semantic constraints, semantic plausibility, predictive and non-predictive information, and familiar topics are the specific contextual information which helps in comprehension of paragraph. Jones, Pierce, Mahoney, and Smeach (2007) studied the influence of familiar content on comprehension in persons with aphasia. They included eleven persons with aphasia and eleven persons without brain damage in their study. All the participants listened to short paragraphs that differed in the presentation of the familiar context. In half of the paragraph the people and places remained generic and unknown to the participants while the other half were familiar to the participants. Questions were asked to the participants related to both. Results revealed that the participants answered the questions more correctly when content were known than with unknown content. Results reinforced the premise put forth by them and did not relate to age, education, time-post-onset, or comprehension and naming skills. Thus, the study proved that familiar content could be considered as a type of context that enhances comprehension skills in persons with aphasia. Several tests are available for paragraph comprehension evaluation tools such as the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass & Kaplan, 1972), Reading Comprehension Battery for Aphasia (LaPointe & Horner, 1979), and Western Aphasia Battery (WAB) (Kertesz, 1979).

The first edition of Boston Diagnostic Aphasia Examination (BDAE) was published by Goodglass and Kaplan in 1972. The BDAE-3 (Goodglass & Kaplan, 2001) has three versions: standard, short, and extended. BDAE-3 short form takes less administration time. The extended version of BDAE-3 provides an extensive examination than the standard version. The standard BDAE-3 is divided into five language related sections. These are conversational and expository speech, auditory comprehension, oral expression, reading and writing. The extended version includes a sixth section: praxis. The performance of the person is rated on a seven point rating scale. This test predicts progress in therapy (Davidoff & Katz, 1985; Helm-Estabrooks, & Ramsberger, 1986). BDAE is more useful for assessments during detailed studies of aphasia and aphasia rehabilitation. Reading includes basic symbol recognition (letters and numbers), word recognition (picture-word matching and lexical decisions), phonics (basic homophone matching and advanced phonic analysis), derivational and grammatical morphology, oral reading (basic words, sentence reading and comprehension, and paragraph reading and comprehension). Comprehension responses are based on a

multiple-choice format. The BDAE auditory comprehension subtest was not an adequate predictor of auditory paragraph comprehension in independent standardized material (Brookshire & Nicholas, 1984).

The first edition of Reading Comprehension Battery for Aphasia (RCBA) was developed by LaPointe and Horner, 1979 and revised RCBA-2 by LaPointe and Horner, 1999. The RCBA-2 is designed to provide systematic evaluation of the nature and degree of reading impairment in adolescents and adults with aphasia. The test is described by authors as a criterion referenced measure with no normative basis. It takes about one hour to administer the test. The test includes ten core subtests, each one containing ten tests items, and seven supplemental subtests of variable lengths. Core subtests include measures of single word comprehension, functional reading of short passages, synonyms, sentence and paragraph length comprehension, and syntax. Supplementary tasks examine single letter recognition, identification of real versus nonsense consonant-vowel-consonant trigrams, and oral reading of words and sentences. Items are scored on being correct or incorrect and the time to complete each subtest is recorded. Flanagan and Jackson (1997) examined test-retest reliability of the original RCBA in a small sample of non-brain-damaged adults and reported reasonable levels of reliability. A study checked for the aphasic performances on the original RCBA which examined aphasia treatment modalities (Wertz, Weiss, Aten, Brookshire, Garcia-Bunuel, Holland, et al., 1986).

The Western Aphasia Battery (WAB) was designed to evaluate the main clinical aspect of language function in person with aphasia. This test classifies aphasia sub-types and rates the severity of the aphasic impairment. The test is designed for both clinical and research use. Aphasia quotient (AQ) is determined by the performance on spontaneous speech, auditory comprehension, repetition, and naming. The performance quotient (PQ) is determined by the performance on the reading and writing, praxis, construction, and Raven's Colored Progressive Matrices. Cortical quotient (CQ) is determined by adding the AQ and the PQ. Language quotient (LQ) is the most recent score developed for this test (Shewan & Kertesz, 1984). The LQ is a composite of all language sections, including reading and writing. The revised version of this test is Western Aphasia Battery-Revised (WAB-R; Kertesz, 2006). It assesses both linguistic and non-linguistic skills. It also includes bedside evaluation which provides a quick look at the person's functioning. There are some Indian versions of WAB i.e. WAB- Hindi (Karanth, 1980), WAB- Kannada (Shymala & Vijayashree, 2008), and WAB-Telugu (Sripallavi & Shyamala, 2010). Study by Nicholas, MacLennan, and Brookshire (1986) reported that both persons with aphasia and neuro-typical participants were able to answer a similar number of questions about a paragraph without reading the passage. This is suggesting a high passage dependency of this test. This dependency applied to both test i.e. BDAE and WAB.

As reviewed above, the quoted tests vastly cover all the domains with not much emphasis towards assessment of paragraph comprehension across modes. This is more so in the Indian context. Hence, the need to develop a paragraph comprehension test for persons with aphasia was realised and Hindi was the chosen language.

The objectives of the study were development of the paragraph test in Hindi and administration of the test on neuro-typical and persons with aphasia

Method

Procedure

The present study was carried out in two phases. First phase included development of the passage; in the second phase, the passage was administered on neuro-typical adults and persons with aphasia.

Phase- I: Development and Description of Test Material*: Preparation of stimuli*

The first phase involved the development of the test material. Three passages were selected on the basis of the linguistic background of the target population. 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 passages for assessing paragraph 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 (in terms of familiar) by the SLPs. For the final set of test, 95% appropriate passage as rated by the SLPs was selected.

The finalized passage consists of 176 words with five questions. The passage was presented in auditory and orthographic mode separately. Researchers have used their own voices for the auditory mode presentation and kept the written

sentences in front of the participants for orthographic mode presentation. The answer set included multiple-choice answers that included one correct answer and three foils. For the response, the person had to point to the correct answer. Scoring pattern followed a three point rating scale as described in the following Table 1.

Table 1: *Scoring pattern.*

Score	Response
2	Correct
1	Correct with prompt
0	Incorrect even with prompt

Feedback about test

The test was given for feedback rating to 22 SLPs, who were native speakers of Hindi with at least three years of clinical experience. The SLPs were asked to judge the passage 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 passage on various parameters such as simplicity, familiarity, complexity, iconicity, arrangement etc., while keeping in mind 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				9	13
2	Familiarity				8	14
3	Presentation				8	14
4	Volume			3	10	9
5	Relevancy			1	7	14
6	Iconicity			0	11	11
7	Accessible			1	9	12
8	Flexibility			2	8	12
9	Trainability			1	11	10
10	Stimulability			0	9	13
11	Feasibility			1	9	12
12	Generalization			1	6	15
13	Scope of practice			1	8	13
14	Scoring Pattern				9	13
15	Publications, Outcomes and Developers (professional background)*	Yes			1	
		No			21	
Total				11	122	175
Total %				3.57	39.61	56.82

**The SLPs were asked to rate this parameter in terms of "Yes" or "No"*

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 and order of mode of administration of the test. The instructions to the participants were given verbally.

Participants

A total of 72 participated in the study. The participants were divided into two groups: Group- 1 consisted of neuro-typical adults (30 males and 30 females) and Group- 2 consisted of persons with aphasia (8 males and 4 females). Table 3 and Table 4 show the demographic details of the participants:

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	8	4

Table 4: *Demographic Summary of persons with aphasia.*

Age (years)	Gender	Provisional Diagnosis	Time post Onset (months)	Education level
49	M	Global Aphasia	3	Graduate
65	M	Global Aphasia	5	Graduate
58	F	Global Aphasia	5	10+2
62	F	Global Aphasia	4	Graduate
42	M	Broca's Aphasia	5	Graduate
48	M	Broca's Aphasia	6	Dip. in electronic communication
43	F	Broca's Aphasia	12	Graduate
57	M	Broca's Aphasia	23	Graduate
65	M	Broca's Aphasia	7	Graduate
65	M	Broca's Aphasia	19	Graduate
55	F	Broca's Aphasia	6	10+2
58	M	Wernicke's Aphasia	36	Post-graduate

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 the purpose and procedure of the study and their written consent was acquired. They were selected based on the following inclusionary criteria. The age of the participants was between 18-65 years. They didn't have any known history of pre-morbid neurological illness, psychological disorders, and significant sensory and/or cognitive deficits. All the participants under consideration were the native speakers of Hindi and had at least a high school education. Pre-morbidly, all participants were right handed. Mini-Mental State Exam (Folstein, Folstein & McHaugh, 1975) was administered on neuro-typical adults to rule out

any cognitive-linguistic deficits. The participants had aphasia due to ischemic stroke diagnosed by a Neurologist/Physician and were at least three months post-stroke and medically stable. WAB was administered to know the type of aphasia.

Presentation of Stimuli

The researcher read the paragraph to the participants to check their auditory paragraph comprehension. After reading the paragraph, the researcher asked questions to the participants related to the paragraph. Participants had to respond to the questions by pointing on multiple choice answer sheet provided. For orthographic mode, the researcher kept the paragraph in front of the participants. Immediately following completion of the reading passage, the researcher removed the passage stimuli, provided the participants with a copy of the written comprehension question and multiple choices answer sheet. Prior to proceeding to the comprehension questions, the researcher verified whether the participants understood the passage or not, or required repetition. Next, the researcher presented the corresponding question set, one question at a time, and the participants had to point to target answers. Once the participant provided an answer, the researcher presented the subsequent question. If a participant did not respond or said, "I don't know," the researcher repeated the question set up.

Setting and time duration for test administration

The researcher conducted the sessions in a quiet room at the participants' home. Only the researcher and the participant were present in the room during the session. They were seated beside each other in front of the table. The administration of the test was recorded on a digital video camera recorder (Sony Handycam, model no. DCR-SR88). The administration time of the test taken for neuro-typical participants was approximately 15 minutes and around 30 minutes for the persons with aphasia.

Data Analysis

The mean values for each group were calculated separately and the mean scores were compared between neuro-typical adults and the persons with aphasia groups across modes. 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). The researcher used non-parametric statistics due to non-normal distribution of the data. Non-parametric measures 'Mann- Whitney U-test' was used to obtain the significant difference measures. This allowed determination of group differences on passage comprehension in auditory and orthographic mode between neuro-typical adults and persons with aphasia.

Results and Discussion

In the present study, an attempt has been made to develop a paragraph for assessing comprehension for persons with aphasia. The mean and standard deviation values as shown in Table 5 revealed that neuro-typical adults had better performance on paragraph comprehension than persons with aphasia in both auditory and orthographic modes.

Table 5: *Mean and SD values for paragraph comprehension 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 (%)
Paragraph comprehension	Auditory	100.00	0.00	49.16	36.54
	Orthographic	100.00	0.00	48.33	39.50

Mann Whitney U test revealed that there was a significant difference in paragraph comprehension in auditory $|Z|= 8.38$, and orthographic modes $|Z|= 7.97$ between neuro-typical adults and persons with aphasia. However, inspection of individual reading comprehension response accuracy revealed variability within the aphasic group. Persons with global aphasia had performed poorly than the other types of aphasia. Persons with Broca's aphasia had performed better than those with Wernicke's aphasia and persons with global aphasia in both the auditory and orthographic modes. Persons with aphasia performed similarly in both auditory and orthographic modes.

The results of the current study state that persons with aphasia can answer more precisely when a paragraph includes familiar content. This endorses the earlier conclusion that persons with aphasia benefit from contextual information in the form of predictive information, redundant information, and familiar topics (Germani & Pierce, 1992; Jones, Pierce, Mahoney, & Smeach, 2007). Attention and the domain knowledge may be helpful effect for the familiar content. If the participants are aware about the contents of the paragraphs they could have found these paragraphs to be more fascinating (Hambrick & Engle, 2002; Miller, 2001; Van Overschelde & Healy, 2001).

Better performance of persons with aphasia in auditory comprehension than orthographic comprehension could be due to less taxing in auditory mode than the orthographic mode. This is supported by the study where improved attention has been shown to enhance auditory comprehension for persons with aphasia (Helm-Estabrooks & Albert, 2004; Murray, 2002). Persons with global aphasia performed very poor in both auditory and orthographic modes. It may be due to the less attention span. Persons with Wernicke's aphasia have comparatively poor comprehension than persons with Broca's aphasia (Kertesz & Hooper, 1982), may be because of that Persons with Wernicke's aphasia had performed poor on paragraph comprehension than persons with Broca's aphasia.

Persons with aphasia would have perceived orthographic context as helpful when paired with auditory reading passage. Persons with aphasia, however, did not reveal significantly improved reading comprehension in the pictures form only (Brennan, Worrall, & McKenna, 2005). Furthermore, persons with aphasia would have comprehended better when paragraph would have presented in all three modes auditory, picture, and orthographic together. Rose, Worrall, and McKenna (2003) who reported significantly superior confidence ratings reported by persons with chronic aphasia after reading health brochures that incorporated aphasia friendly principles (i.e., simple words and sentences, large print, large amounts of white space, and relevant pictures) than after reading traditionally formatted health brochures. These findings recommend that modification of the visuographic components of reading materials facilitates and enhance in the confidence of persons with aphasia to carry out reading tasks.

These findings mirror those of other researchers who concluded that persons with aphasia with reduced comprehension skills on standardized aphasia battery subtests improved in their auditory comprehension given supports in the form of linguistic and/or visuographic context (Garrett, 1993; Garrett & Huth, 2002; Lasker, Hux, Garrett, Moncrief, & Eischeid, 1997; Pierce & Beekman, 1985). These results supports the findings of other investigators suggesting pictures adversely affect the comprehension of persons with aphasia (Brennan, Worrall, & McKenna, 2005; Waller & Darley, 1978).

Qualitative analysis of the professionals' responses about the test

It is evident from the Table 2 that the 22 SLPs who rated the test based on a feedback questionnaire on overall parameters as 56.82% excellent, 39.61% good, and 3.57% fair. However, none of professional rated the test as poor and/or very poor. Also for the publications, outcomes and developers (professional background) domain, one professional reported that they were aware of the other material available which can be used for assessing paragraph comprehension, and 21 professionals stated that they were not aware of any other test available either in the western or Indian context. Therefore, the professionals view was that this test can be used for persons with aphasia.

Conclusions

The present study highlights the paragraph comprehension deficits in Hindi speaking persons with aphasia in different modalities. Result showed that there was a significant difference in the performance on paragraph comprehension between neuro-typical adults and persons with aphasia across all modalities. The neuro-typical adults exhibited significantly better comprehension as compared to the persons with aphasia in auditory and orthographic modes. Results underscore the fact that research should be orientated at development of language specific material in a multilingual country such as India, to cater to the needs of all the assessors within a broad work culture.

Limitations of the Study and Future Directions

The results of the study need to be interpreted with caution as number of the participants were less. Further, the reliability and validity of the stimuli were not taken up, which is one of the major drawbacks of this study. However, the results of the study do provide corroborative evidence for obvious paragraph comprehension deficits in persons with aphasia with varying degree in different modalities. This is preliminary stage of work and work is underway to include participants. As with most preliminary studies, several limitations warrant further discussion. These include participant recruitment and heterogeneity, and picture array. Examination of these limitations may reveal directions for future research on this topic.

Acknowledgments

The investigators would like to thank Director, All India Institute of Speech and Hearing, Mysore for granting permission to conduct the study at the institute. This study is a part of PhD work. The investigators would also like to thank the participants for their cooperation.

References

Brennan, A., Worrall, L., & McKenna, K. (2005). The relationship between specific features of aphasia-friendly written material and comprehension of written material for people with aphasia: An exploratory study. *Aphasiology, 19*, 693-711.

Brookeshire, R. H. & Nicholas, L. E. (1984). Comprehension of directly and indirectly stated main ideas and details in discourse by brain-damaged and non-brain-damaged listeners. *Brain and Language, 21*(1), 21-36.

Brookshire, R. H. (1974). Differences in responding to auditory materials among aphasic patients. *Acta Symbolica, 5*, 1-18.

Brookshire, R. H. (1987). Auditory language comprehension disorders in aphasia. *Topics in Language Disorders, 8*, 11-23.

Chapey, R., & Hallowell, B. (2001). Introduction to language intervention strategies in adult aphasia. In R. Chapey (Ed.), *Language Intervention strategies in aphasia and related neurogenic communication disorders* (4th ed., pp. 3-17). Baltimore, MD: Lippincott, Williams, and Wilkins.

Davidoff, M., & Katz, R. (1985). Automated telephone therapy for improving comprehension in aphasic adults. *Cognitive Rehabilitation, 3*, 26-28.

Duffy, J. R., & Coelho, C. A. (2001). Schuell's stimulation approach to rehabilitation. In R. Chapey (Ed.), *Language Intervention strategies in aphasia and related neurogenic communication disorders* (4th ed., pp. 341-382). Baltimore, MD: Lippincott, Williams, and Wilkins.

Flanagan, J. L., & Jackson, S. T. (1997). Test-retest reliability of three aphasia tests: Performance on non-brain-damaged older adults. *Journal of Communication Disorders, 30,* 33-42.

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.

Garrett, K. L. (1993). Changes in the conversational participation of individuals with severe aphasia given three types of partner support. *Dissertation Abstracts International, 54*, 5113.

Garrett, K. L., & Huth, C. (2002). The impact of graphic contextual information and instruction on the conversational behaviors of a person with severe aphasia. *Aphasiology, 16*, 523-536.

Germani, M. J., & Pierce, R. S. (1992). Contextual influences in reading comprehension in aphasia. *Brain and Language, 42*, 308-319.

Goodglass, H., & Kaplan, E. (1972). *The assessment of aphasia and related disorders*. Malvern, PA: Lea & Febiger.

Goodglass, H., & Kaplan, E. (2001). *The Assessment of Aphasia and Related Disorders* (3rd Ed.). Baltimore: Lippincott, Williams and Wilkins.

Goswami, S. P., Shanbal, J. C., Samasthitha, S., & Navitha, U. (2010). Feedback Questionnaire for Aphasia Treatment Manuals. *In Field Testing of Manual for Adult Non-fluent Aphasia Therapy in Kannada (MANAT-K).* A project under AIISH research fund submitted to All India Institute of Speech and Hearing, Mysore.

Hambrick, D., & Engle, R. (2002). Effects of domain knowledge, working memory capacity, and age on cognitive performance: An investigation of the knowledge-is-power hypothesis. *Cognitive Psychology, 44*, 339–387.

Helm-Estabrooks, N., & Albert, M. (2004). Manual of aphasia and aphasia therapy. Austin, TX: Pro-Ed.

Helm-Estabrooks, N., & Ramsberger, G. (1986). Treatment of agrammatism in long-term Broca's aphasia. *British journal of disorders of communication, 21*, 39-45.

Jones, D. K., Pierce, R. S., Mahoney, M., & Smeach, K. (2007). Effect of familiar content on paragraph comprehension in aphasia. *Aphasiology, 21*(12), 1218-1229.

Karanth, P. (1980). *Western Aphasia Battery in Hindi*. ICMR project, All India Institute of Speech and Hearing, Mysore.

Kertesz, A. (1979). *Aphasia & associated disorders: Taxonomy localization, recovery*. New York: Grune and Stratton.

Kertesz, A. (2006). *Western Aphasia Battery-Revised*. New York: Grune and Stratton.

Kertesz, A., & Hooper, P. (1982). Praxis and Language: The extent and variety of apraxia in aphasia. *Neuropsychologia, 20*(3), 275-286.

LaPointe, L. L. (2005). Foundations, adaptations, and accommodations, Aristos. In L. LaPointe (Ed.), *Aphasia and Related Neurogenic Language Disorders* (pp. 1-18). New York: Thieme Medical.

LaPointe, L. L., & Horner, J. (1979). *Reading Comprehension Battery for Aphasia.* Tegoid, OR: C.C. Publications.

LaPointe, L. L., & Horner, J. (1999). *Reading Comprehension Battery for Aphasia-2.* Austin, TX: Pro-Ed.

Lasker, J., Hux, K., Garrett, K., Moncrief, E., & Eischeid, T. (1997). Variations on the written choice communication strategy for individuals with severe aphasia. *AAC Augmentative and Alternative Communication, 13*, 108-116.

McNeil, M. (1983). Aphasia: Neurological considerations. *Topics in Language Disorders, 3*, 1-19.

Miller, L. (2001). The effects of real-world knowledge on text processing among older adults. *Aging Neuropsychology and Cognition, 8*, 137–148.

Murray, L. (2002). Attention deficits in aphasia: Presence, nature, assessment, and treatment. In L. Murray (Ed.), *Seminars in speech and language, 22* (pp. 107–116). New York: Thieme.

Nicholas, L. E., MacLennan, D. L., & Brookshire, R. H. (1986). Validity of multiple sentence reading of comprehension tests for aphasic adults.

Journal of Speech and Hearing Disorders, 51, 82-87.

Pierce, R. S. (1983). Decoding syntax during reading in aphasia. *Journal of Communication Disorders, 16,* 181-188.

Pierce, R. S. (1988). Influence of prior and subsequent context on comprehension in aphasia. *Aphasiology, 2,* 577-582.

Pierce, R. S. (1991). Contextual influences during comprehension in aphasia. *Aphasiology, 5,* 379-381.

Pierce, R. S., & Beekman, L. A. (1985). Effects of linguistic and extralinguistic context on semantic and syntactic processing in aphasia. *Journal of Speech and Hearing Research, 28,* 250-254.

Pierce, R. S., & Beekman, L. A. (1985). Effects of linguistic and extralinguistic context on semantic and syntactic processing in aphasia. *Journal of Speech and Hearing Research, 28,* 250-254.

Rose, T. A., Worrall, L. E., McKenna, K. T. (2003). The effectiveness of aphasia friendly principles for printed health education material for people with aphasia following stroke. *Aphasiology, 17,* 947-963.

Shewan, C. M., & Kertesz, A. (1984). Effects of speech and language treatment on recovery from aphasia. *Brain and Language, 23,* 272-299.

Shyamala, K. C. & Vijayashree (2008). *Standardization of Western Aphasia Battery-Kannada*. A project under AIISH research fund submitted to All India Institute of Speech and Hearing, Mysore.

Smith, C. E. (2005). A comparison of decontextualized and contextualized reading skills in persons with severe aphasia. *Masters Abstracts International, 43,* 2226.

Sripallavi, M. & Shyamala, K. C. (2010). *Development of Western Aphasia battery in Telugu.* Unpublished Master's dissertation, University of Mysore, Mysore.

Stachowiak, F., Huber, W., Poeck, K., & Kerchensteiner, M. (1977). Text comprehension in aphasia. *Brain and Language, 4,* 177-195.

Stachowiak, F., Huber, W., Poeck, K., & Kerchensteiner, M. (1977). Text comprehension in aphasia. *Brain and Language, 4,* 177-195.

Van Overschelde, J., & Healy, A. (2001). Learning of nondomain facts in high- and low-knowledge domains. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27,* 1160–1171.

Waller, M., & Darley, F. (1978). The influence of context on auditory comprehension of paragraphs by aphasic subjects. *Journal of Speech and Hearing Research, 21,* 732-745.

Waller, M., & Darley, F. (1978). The influence of context on auditory comprehension of paragraphs by aphasic subjects. *Journal of Speech and Hearing Research, 21,* 732-745.

Wertz, R. T., Weiss, D. G., Aten, J. L., Brookshire, R. H., Garcia-Bunuel, L., Holland, A. L., et al., (1986). Comparison of clinic, home, and deferred language treatment for aphasia: A Veterans Administration cooperative study. *Archives of Neurology, 43,* 653-658.