STANDARDIZATION OF WESTERN APHASIA BATTERY IN TELUGU MONOLINGUALS AND TELUGU-ENGLISH BILINGUALS

Project under AIISH Research Fund (ARF) 2010-2012

(Ref: SH/CDN/ARF/3.98/2010-12

With total funds of Rs 5, 92, 000)

Department of Speech-Language Pathology

All India Institute of Speech & Hearing,

Manasagangothri, Mysore- 570006.

September 2012

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September 2012

Acknowledgement

We thank Late Dr. Vijayalakshmi Basavaraj, Ex- Director and Dr. Savithri, S. R., the present Director, All India Institute of Speech and Hearing, Manasagangothri, Mysore for allowing us to carry out this project and for the funds that were provided. We extend our sincere thanks to managements of rehabilitation centers and hospitals where we were allowed to conduct the study which included Anurag Rehabilitation Center, Sweekaar Upkaar Rehabilitation Institute for Handicapped. We acknowledge our subjects and family members for their cooperation during the study. The project wish to thank Mrs. M. S Vasantha lakshmi, Lecturer in Biostatistics for her sincere works during the statistics analysis of the study. We extend our thanks to Ms, Sonal Chitins, Speech Language Pathologist in Yashoda hospital, Hyderabad. Ms. Anjali Maratt Z & Mrs. Navya Kishore, (Research Officers in ARF projects) Mr. Gopi Kishore, (Lecturer in Speech Pathology) and Mr. Sunil kumar Ravi, Junior research fellow, AIISH, Manasagangothri, Mysore for their timely help during the preparation of this project report.

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INTRODUCTION

Communication is a vital skill that permits us to interact with the world through various modes. All the living beings express their needs, negotiate adversity and convey feelings. Losing our ability to communicate effectively compromises our independence. People with aphasia clearly will have difficulties in communicative activities and therefore are very likely to have restriction upon their participation.

Language is considered as a primary way of communication and it is a form of social behavior. Moreover, language is a set of symbols and codes. This is considered as one of the "unique" features which only pertain to humans. However, when the breakdown occurs, there is interplay of various levels as seen in patients with aphasia. The expression of language break down in aphasia is manipulated by the site of lesion causing the language deficits.

Aphasia is a language disorder which is defined as an acquired impairment of language processes underlying receptive and expressive modalities and caused by damage to areas of the brain which are primarily responsible for language function (Davis, 1983). It is generally caused by diffuse or focal injury to brain, and thus impairs a individual's capacity to understand, express and use language. Over the years, classical views of aphasiologist have categorized aphasia into different syndromes or types (Weisenbrug & Mc Bride, 1964: Goodglass & Kaplan, 1983). Aphasia types resulted in many arguments; revolve around a few observations. However some authors debate over this classification due to supportive reasons, such as Hegde, 1998:

- Localization of site of lesion is not similar to the localization of language function.
- The brain functions as an integrated unit in controlling language.

- A lesion in a site associated with a particular type of aphasia in some patients may not produce the same type in other patients.
- Comprehension of the spoken language is impaired in all patients but only to varying degrees.
- Periodical research studies demonstrate that aphasic subjects who appear similar later during the course of recovery.

Darley, Aronson, and Brown (1975) describe aphasia as "a multi-modality reduction in the capacity to decode (interpret) and encode (formulate) meaningful linguistic elements. It is manifested in difficulties in listening, reading, speaking and writing". Kertesz (1985) defined aphasia as "an acquired loss of language due to cerebral damage, characterized by errors in speech (paraphasias), impaired comprehension, and word-finding difficulties (anomia)".

More recently, Basso and Cubelli (1999) has defined aphasia as “the loss or deterioration of verbal communication due to an acquired lesion of the nervous system involving one or more aspects of comprehending and producing verbal messages”. Language assessment of aphasia is a highly structured observation based upon the use of bedside and screening assessment tools, comprehensive aphasia batteries, and/or tests of specific language functions.

Western Aphasia Battery (WAB) (Kertesz, 1979) is considered as one of the important assessment tool which is widely used in clinics for the assessment of individuals with aphasia and associated disorders. But the results are not valid unless we have our own norms in Indian context as the standardized norms are available based on western population. Such a test would help in identifying the aphasics, describing the aphasia and classifying it into various subgroups for the purpose of diagnosis, therapy and prognosis. WAB helps in

categorization of different types of aphasia. Moreover, it allows the individual patients can be placed explicitly into one of the eight basic types according to the averaged score obtained on the diagnostic subtests. The WAB is designed to assess clinical aspects of language functions in aphasic patients and to provide the data needed to establish a prognosis for therapy. The procedure is based on the principle of modern neurolinguistics and the neuroanatomical model. Such a test would be very useful for Speech - Language Pathologists when they deal with Telugu (which is widely spoken in the state of Andhra Pradesh of southern part of India) aphasic population as one of the primary concerns is to assess and improve the communication skills in individuals with aphasia.

Aphasia in bilinguals

Webster (1961) defined a bilingual as having or using two languages especially as spoken with the fluency characteristics of a native speaker, a person using two language habitually, with control like that of a native speaker and bilingualism as the constant oral use of two languages. Bloomfield, (1933) who defined bilingualism as "native-like control of two languages" whereas on the other end Haugen (1950) takes a lax view by observing that bilingualism begins when the speaker of one language can produce complete meaningful utterances in the other language. In some of the bilingual societies, mixing of language is not considered as strange or idiosyncratic but a norm of verbal interaction. Code mixing and code switching are the two most prominent phenomena, which are seen in bilinguals.

Aphasia in bilinguals can influence their languages uniformly or differentially. Bilingual aphasia has been a extensively researched area as it provides insight into the brain functioning of a bilingual and effect of the injury on this functioning. Studies on bilingual aphasia are vital and have focused on a number of issues that have proven useful for the understanding of aphasia in monolinguals and the brain processing in general.

The high incidence of bilingualism in many parts of the world (Fabbro, 2001) and the universal presence of stroke combine to produce large number of bilingual adults with aphasia (Paradis, 2001). The majority of the population in an Indian context, arises a need to pay attention to the 'bilingual phenomenon' in clinical settings as well. It is thought to be an adaptive strategy of the minor and minority linguistic community for the maintenance of the mother tongue. The typical language use pattern is likely to be use of L1 in the intimate domain, L1, L2 (both Indian languages) or even L3 (English) in the informal domain and mostly English in the formal domain. This variability in language use is likely to impact functional communication in aphasic patients, assessment of language in Indian aphasic patients, and also in planning rehabilitation strategies.

Bilingualism or the usage of two or more languages is an essential part of globalization and community mobility. Mcnamara (1967) proposes bilingualism as having a minimal competence in one or more of the four language skills, i.e. listening comprehension, speaking, reading and writing in a language other than mother tongue. Whether bilingual's two languages are organized partly in common areas, in specific or in separate areas of the brain, is not completely proved. However, some studies have found that bilinguals have areas where stimulation could interrupt naming in a first language, a second language or both (Ojemann and Whitaker, 1978).

Paradis (1994) postulated that mother tongue or L1 and L2 of a bilingual may rely upon different memory systems. Mother tongue relies upon implicit memory and procedural memory, which is related to automatic process, completed within nominal awareness, whereas L2 depends upon explicit memory or declarative memory which involves control processes carried out at conscious level. While implicit memory heavily relies on subcortical structures like basal ganglia, cerebellum as well as left frontal lobe. Explicit memory relies mainly on widely distributed cortical network (including bilateral temporal lobe structures).

As these memory systems employ different cerebral pathways, bilinguals L1 or L2 may be selectively affected by different pathologies. This results in different types of recovery patterns in aphasics.

The clinician should be cautious, taking into account the features of the language while interpreting the results of testing. In bilinguals, competition between the processing strategies must be considered before determining what a clinical symptom is and what a pre-morbid feature of bilingualism. There are also error types that occur in a particular language but not in the other (Roberts, 2001). Therefore, there is a great need to have norms for different languages and also for monolinguals and bilinguals. Hence, this study is conducted to establish norms for monolingual (Telugu) and bilingual (Telugu-English) speakers.

REVIEW OF LITERATURE

Communication is necessary to achieve quality of life. Communication is a basic human need to connect with others to touch other's lives, and have others touches our lives. It is a basic human right to express ideas, thoughts and feelings freely. As a person develops communicative competence, he or she meets this human need, realizes this human right, and attains this human power (Light, Beukelman & Reichle, 2003).

A language is a code whereby ideas about the world are represented through an entire system of arbitrary signals for communication (Bloom & Lahey, 1978). A code is a means of representing information by forming words or sentences based on language rules. The five major components of language are: phonology, semantics, morphology, syntax and pragmatics. Thus, language consists of some of content or meaning about the world that is coded represented by linguistic form for some purpose or use in a particular context.

Aphasia is a breakdown in the two-way translation process that establishes the relation between thought and language (Damasio, cited in Chapey, 2001). As a consequence, people with aphasia have an inability to translate, with reasonable fidelity. Nonverbal sets of images (thoughts) into linguistic symbols and grammatical relationship (or the inverse problem-translating a received language massage into thought). Rather, aphasia is a defect in aspects of linguistic processing like syntax, lexicon, phonology, morphology of a word.

According to Henry Head, (1962) each group of observers have been screening "Aphasia" from their different point of views and coming up with their own explanations of the problem. And still aphasia has remained as a challenging field in terms of examination. The diversity of the opinions among the people concerned with this problem can be even seen at the level of definitions. Several definitions of aphasia have been proposed and have been

used (Broca, 1861; Marle.P, 1906; Henry Head, 1926; Penfield & Robert, 1959; Wepmen, 1964 Benson, 1970: Eisenson, J., 1973;; Schuell, 1975;).

Eisenson (1973) states that "aphasia is an impairment of language functioning of persons who have incurred localized cerebral damage that results in a reduced likelihood that an individual involved in a communicative situations will understand or produce appropriate verbal formulations". Darley (1982) defined aphasia as "Impairment, as a result of brain damage, of the capacity for interpretation and formulation of language symbols; multimodality loss or reduction in efficiency of the ability to decode and encode conventional meaningful linguistic elements (morphemes and larger syntactic units); disproportionate to impairment of other intellective functions, not attributable to dementia, confusion, sensory loss, or motor dysfunction; and manifested in reduced availability of vocabulary, reduced efficiency in application of syntactic rules, reduced auditory retention span, and impaired efficiency in input and output channel selection".

Goodglass & Kaplan (1972) stated that normal language depends on complex interaction between sensory-motor skills, symbolic associations and habituated syntactic patterns, all at the service of speaker's intent to communicate, and subject to the intellectual capacity which he brings to the task of manipulating them so as to carry out his intent. Aphasia refers to the disorder of any or all of the skills, association and habits of spoken or written language, produced by damage to certain brain areas which are specialized for these functions.

McNeil (1988) defined aphasia as "a multimodality physiological inefficiency with ["greater than loss of"] verbal symbolic manipulations (e.g. association, storage, retrieval, and rule implementation). In isolated form it is caused by focal damage to cortical and/or subcortical structures of the hemisphere(s) dominant for

such symbolic manipulations. It is affected by and affects other physiological information processes to the degree that they support, interact with, or are supported by the symbolic deficits".

Goodglass & Kaplan (1972) outlined the major characteristics of different types of aphasia which were given in the table1.

Table 1: Classification of aphasia (Goodglass & Kaplan, 1972):

Aphasic Syndromes	**Characteristics**
Broca's Aphasia	Non-fluent type of aphasia, have restricted vocabulary & grammar, articulation is affected and well preserved auditory comprehension.
Wernicke's Aphasia	Fluent type of aphasia, have impaired auditory comprehension, speech is paraphasic, presence of word finding difficulties
Anomic Aphasia	Fluent type of aphasia, they have severe word finding problems, speech is fluent with few paraphasias.
Global Aphasia	They have severe verbal comprehension deficits, vocabulary &grammar is limited, speech is restricted to stereotyped utterances
Conduction Aphasia	Fluent type of aphasia, repetition of sentences is selectively impaired in relation to auditory comprehension.
Transcortical Sensory Aphasia	Have severe verbal comprehension deficits, near-normal repetition, impaired naming with paraphasias, perseverations & little extended expressive language
Pure word deafness /verbal auditory agnosia	They have poor verbal comprehension
Mixed non-fluent	Non-fluent speech , moderate verbal comprehension problems but

Aphasia	some expressive language

Apart from many classifications of dichotomies, these classification systems have validity and usefulness in the both research and clinical settings. But these dichotomies have neither adequately characterized nor distinguishes the features of the variety of aphasias. Thus, there was need to divide the aphasic disturbances into a greater number of types rather than simply dividing into dichotomies which have been mentioned before.

Diagnosis and assessment hold a very prominent place in the historical and contemporary aphasiology. Diagnostics provide the database for clinicians and the researchers in the area of aphasiology. It is very important to have a test which identifies a problem, and to describe about its related problem and to classify into various groups for the purpose of diagnosis, therapy and prognosis. However, there are several tests that have been proposed and being used in various clinical setups to assess the individuals with aphasia. The assessment procedures that are being employed would include asking of questions and observations. When the testing is been done in a controlled conditions, further the observations can be repeated which help us in comparing the patients behaviours from time to time and in various environmental conditions.

Several researchers have developed tests to assess individuals with aphasia still the attempts are being made to construct tests keeping in mind the cautions to overcome the limitations of the previously developed tests, even though developing a test is considered to be not an easy task. However, it has been reported that one would face several pitfalls while constructing a test for individuals with aphasia. According to Benton, L. A. (1967) he states that “If we look to the problem of constructing a test and its application in the field of aphasia we can say that we are in 1900, i.e., in the Pre Binet state”. There are several tests for

assessing aphasics have been developed and are being used in various clinics. However, these tests developed, of which only few are being found in clinical use, either in their original form or in their modification, in some clinics. This may be because (as attributed by Benton 1967)

- The test that is being developed may not have been published in usable form.
- No information regarding the standardization has been given with any of these tests
- The exact scoring procedures have not been prescribed.
- No information regarding the guidelines has been provided for further interpretation of performances correctly.
- Moreover, none of them present convincing evidences that the utility is significantly greater than any other services of aphasia test which might be assembled.

While constructing a standardization test, one should also take into account (1) the frequency of occurrence of words (2) and its relative ease or difficulty of pronouncing words (3) the grammatical form in which the preposition is stated in that particular language. Moreover, one should give attention to the homogeneity of the stimuli and test items. There should be a range of difficulty in the testing items. Therefore, the review of literature on problems in developing a test indicates that apart from inherent problems which are technical in nature, one would also encounter problems of choosing appropriate conceptual frame work.

The first comprehensive battery of psychological and educational achievements tests for individuals with aphasia was used by Weisenberg & Mc Bridge (1935) in a five year study of 60 aphasic patients and this was considered as a landmark by Schuell (1964) as it

was the first to use control subjects, and language was compared between aphasics and non aphasic brain damaged subject and to use standardization methodology.

Shortly after World War II, the Halstead Wepman Aphasic screening test (1949) was developed to provide a quick evaluation of aphasia and its related language behaviours of the individuals. At the same time, Eisenson (1946) published a more extensive battery for assessing individuals with aphasia using aphasia test battery. Both the tests were served as the major diagnostic instruments for assessing adults aphasics until 1960's. However, these tests were quickly accepted and were used in assessing individuals with aphasia. But they lacked a firm psychometric foundation. So the administration of the test, scoring and interpretation of responses would become necessary if treatment were to be subjected to critical evaluation. Aphasia tests were developed since the early 1960's with more and more research, in turn which has been increasing in the number of tests development.

All these tests have a commonality which includes:

- Testing of various modalities to determine areas of strength and their corresponding weaknesses.
- They provide the examiner with a severity index
- These tests also serve as good prognostic indicators

Several tests of aphasia have been constructed; an attempt has made to review some of them here. There by the various types of evaluation and their corresponding purposes can be classified, in the assessment dealing with persons with aphasia also include (a) the screening procedures (b) diagnostic assessment (c) and descriptive assessments measures. Therefore, it requires a well balanced approach while using the above mentioned types of

assessment procedures, and is appropriate empirically and clinically sounds, but it requires a sincere commitment to make thoughtful judgments regarding the assessment.

The screening procedure refers to a concise and brisk assessment to detect the presence of aphasia, and often does not exceed the duration of 5 -15 minutes. So this process is best pursued when the clinician can identify in advance, the implied results would be positive or negative based on the screening. Further these screening procedures which are relevant to individuals with aphasia are divided into (1) the bed side clinical examination (2) screening tests (3) and the standardized test which limit to measure a specific aspect of the language functioning, but notably sensitive to the presence of aphasia.

The bedside clinical evaluation – The bedside examination has been the crucial method of assessing individuals with aphasia and it remains a standard tool for professional like physicians, neurologists and speech and language pathologists. It permits a concise and practical evaluation of the language of the patients. The experienced clinician makes a maximal use of communication with the patient to rule out aphasia. The breadth of these screening procedures ranges from unstructured conversation with patients to a structured set of items, such as pointing to a watch or listing the days of a week.

Screening tests – Screening tests refer to a short and quick examination to detect the presence of aphasia, often not exceeding 5 or 10 minutes. One such screening test includes Halstead-Reitan test battery (Reitan, 1991; Wheeler & Reitan, 1962) in relation to aphasia; some relatively short and extremely sensitive screening procedures are being carried out. The accuracy of screening devices is limited which is usually 80% (Spreen & Benton, 1965).

Standardised tests assess a specific facet of language in detailed manner .These test have enough items to assess all the areas with reasonable sampling of the behaviours and to consist of suitable levels.

Diagnostic assessment refers to the thorough evaluation of a patients language performance to arrive at both diagnostic label and a report of areas of cognitive strengths and weaknesses, it is sometimes forgotten that comprehensive assessments are valuable for treatment purposes; (for example, Kertesz, 1988) in treating an aphasic patient in the absence of diagnostic data as "trying to navigate an uncharted sea". Because of the wide-ranging nature of this type of examination, it is appropriate for patients who are medically stable in the later acute or post acute period of recovery and for initial and follow-up evaluation of outpatients with subjective complaints of language and related problems.

When the assessment is limited to performances on language and aphasia related tasks, the diagnostic outcome may be either refer to the type or severity of aphasia or go beyond the description of the functional deficits and arrive at tentative conclusions about the nature and site of the underlying brain disorder. Aphasia test batteries are inevitable choices for clinicians looking a comprehensive diagnostic instrument. There are a variety of these batteries available to clinicians. However, unless all subtests in a battery are required to score performance, clinicians pursuing a comprehensive assessment can usually pick and choose at the subtest level from many different tasks found in those comprehensive batteries. Some batteries such as the third edition of the Boston Diagnostic Aphasia Examination (Goodglass et al., 2000), are structured so as to offer the clinicians choice of shorter or longer administration formats, in addition to a standard format.

Aphasia assessment involves the following dimensions- spontaneous speech, auditory verbal comprehension, naming, repetition, reading, writing and praxis. One more area of assessment is “functional communication”. Functional communication is defined as “the ability to receive or convey a message, regardless of the mode, to communicate effectively and independently in a given natural environment” (ASHA, 1990). While assessing pragmatic ability in terms of speech act usage, turn-taking ability, and lexical selection

categories, conversation plays an important role. Thus Conversational Analysis (CA) on the social role of language use provides an additional dimension to other approaches in aphasia assessment.

The Western Aphasia Battery (WAB), developed by Kertesz and his associates (Kertesz and Poole, 1974), presently is being utilized by many SLPs to assess individuals with aphasia. The earliest version of WAB represented a revision of the Boston Diagnostic Aphasia Examination (BDAE, Good glass & Kaplan, 1972). The WAB used the clinical and neuro-linguistic principles and a few of the subtests developed by Goodglass and Kaplan (1972).

The Western Aphasia Battery (WAB; Kertesz, 1982) has become a popular protocol for the clinical evaluation of aphasia. Among its advantages are the simplicity of the test, yet quantifiable scoring system and a relatively short administration time (approximately 1 hour), although for few aphasics it may take two sessions often required to complete the full battery. The WAB was intended to assess the main clinical aspects of the verbal language functions: spontaneous speech, auditory verbal comprehension, repetition and naming, as well as reading, writing and calculation. Nonverbal skills are also tested, such as drawing, block design and praxis and Raven's Progressive Matrices.

(1) **Spontaneous speech**: Spontaneous speech, measured in terms of fluency and information content. This is tested/ designed to elicit conversational speech from the patient in reply to questions asked in the context of an interview and a picture description. The information content measures functional communication and it is relatively easy to score. Correct response is what conveys appropriate information. Phonemic paraphasia are acceptable as long as the content is clear. This portion measures functional communication. The second important aspect of spontaneous speech is fluency. Carefully graded criteria are used to judge

fluency of speech in one to ten point rating Scales. The spontaneous speech is scored for information content depending on the number of items answered correctly.

(2) **Comprehension**: It includes three subtests, yes/no questions, auditory word recognition, and sequential commands.

(3) **Repetition**: It is tested by high frequency single words of increasing complexity and length, includes number-word combinations.

(4) **Naming** is scored by:

a. Picture naming.

b. Generative naming.

c. Sentence completion.

d. question requiring single word responses

The summary of these entire subtest provide the Aphasia Quotient (AQ). Kertesz (1979), described additional tests for reading, writing and nonverbal functions, from which he derived the performance quotient (PQ). The score is derived from all subtests is the cortical quotient (CQ).

$$C.Q. = A.Q. + P.Q.$$

A.Q. < 93.8 indicates aphasia which is used in research studies (Kertesz, 1979). In normal's, A.Q. is considered as 98.4 (or) 99.6 (mean A.Q). Diagnosis of aphasia is based on the performance of patients in different tasks like spontaneous speech, comprehension, repetition and naming. They can be classified under Broca's, Wernicke's, Transcortical sensory (TCS), Transcortical motor (TCM), Conduction, Anomic, Isolation and Global

aphasia based on their performance score obtained in each task. The Cortical quotient is presented as an indicator of the patient's cognitive functioning.

The sub-scores allow a classification of the patient according to the taxonomic principles into one of the eight subtypes of aphasia. The taxonomic classification is given in the table 2 which is considered as a clinically valid baseline, diagnosis and prognosis (Kertesz, 1979):

Table 2. Taxonomic classification of WAB:

	Fluency	**Comprehension**	**Repetition**	**Naming**
Global	0-4	0- 3.9	0- 4.9	0-6
Broca's	0-4	4-10	0- 7.9	0-8
Isolation	0-4	0-3.9	5-10	0-6
Transcortical motor	0-4	4-10	8-10	0-8
Wernicke's	5-10	0- 6.9	0- 7.9	0-9
Transcortical sensory	5-10	0- 6.9	8-10	0-9
Conduction	5-10	7-10	0- 6.9	0-9
Anomic	5-10	7-10	7-10	0-9

The classification is accepted as clinically valid baseline for research, diagnosis, and the prognosis. Apart from the English version of WAB, adapted versions of Kannada, Hindi, Guajarati, Marathi, Telugu, Tamil and Malayalam are being used extensively for clinical purposes in India.

Caramazza & Zurif (1976) reported that Broca's aphasic had difficulty in comprehending sentences when the crucial cues for comprehension were purely syntactic (for example, grammatical markers).

Gerda Helene killmer (2010) studied the origins and causes of repetition in three persons with aphasia through a detailed analysis of their use of repetition with a thorough assessment of their language and cognitive functioning. Quantitative and qualitative instruments are combined to achieve more knowledge about the relation between language and cognitive abilities and the use of repetition in conversation. The use of repetition of three persons with different types of aphasia (Anomic, Broca's and Conduction aphasia) is compared. Results revealed that the participants use intentional repetition differently and that the use of intentional repetition seems to relate to the cognitive and linguistic profiles of the participants. It is suggested that they use different strategies to overcome their language and cognitive problems.

Sri Pallavi. M & Chengappa, (2010) developed Western Aphasia Battery in Telugu (WAB-T) based on the adaptation of Western Aphasia Battery (Kertesz, 1979) to assess the language abilities of aphasic subjects.Two groups of subjects were taken for the present study in which, one group consists of normal adults in different age groups and the other group consists of experimental group, i.e., aphasic subjects.The development of the test was done in two phases. In the first phase, development of the test material in Telugu was done and in Second phase, the test battery (WAB-T) was administered on normal and then on the persons with aphasia.When considering the AQ of normal subjects, all the age groups have scored above the AQ score of 93.8, the cut off score which was given by Kertesz (1979). AQ scores for the aphasics are less when compared to the cut off score (93.8). This test would provide an objective assessment tool for assessing individuals with aphasia in Telugu language. This

test battery can be used to classify various aphasic syndromes. It can be used to plan therapy programs in individuals with aphasia.

McGlone (1977) reported that following left hemisphere damage 14 out of 29 right-handed males (48%) as against only 2 out of 16 right-handed females (13%) were diagnosed as aphasic on the basis of Schuell test, a significant difference was found at the level of .02. Ravi kumar (2008) aimed to standardize the Kannada version of Western Aphasia Battery and to present the normative data of normal individuals and patients with aphasia. The K-WAB contains the same test contents and structure as the original WAB (Kertesz and Poole, 1974) which is a commonly used assessment tool by SLPs for evaluation of aphasia. The test is modified with the cultural and linguistic adaptations and the general test administration method was maintained. The Aphasia Quotient (AQ) was evaluated for different ages and gender groups. Results revealed that that there was no significant effect with respect to age and gender.But significant variation was found in normal and different categories of aphasics within themselves in all parameters of WAB (spontaneous speech, repetition, comprehension, and naming). It is proved beyond doubt that WAB differentiates normal and aphasic performance, finding support from the well established trend in literature.

Chin Li & Williams (1990) investigated the repetition deficits in 95 subjects in three aphasic syndromes (32 conduction, 38 Broca's, and 25 Wernicke's aphasics). Subjects repeated phrases and sentences from the Repeating Phrases Subtest of the Boston Diagnostic Aphasia Examination. They reported that conduction aphasics exhibited a greater number of phonemic attempts, word revisions, and word and phrase repetitions, Broca's aphasic’s uses more phonemic errors and omissions and Wernicke's aphasicsshowed unrelated words and jargon. Kohn &Goodglass (1985) examined the distribution of error types in picture naming task for 9 Broca's aphasics, 9 Wernicke's aphasics, 7 frontal anomics and 9 posterior anomics. The relative distribution of the three most prominent naming errors –phonemicerrors,

semantic errors, and multiword circumlocutions tended to distinguish the two anomic subgroups from the other aphasia subgroups. They reported that anomic aphasics produced the fewest phonemic errors, and the most multiword circumlocutions which suggest that minimal word-production difficulty in anomic aphasia relative to other aphasia syndromes.

Bhatnagar (2002) studied the interactional effect between age and gender in 97 Hindi speaking aphasics following CVA. The results were relatively in agreement with the age, aphasia type patterns discussed in western countries. The mean age of Indian patients with aphasia was significantly lower.

Bi/Multilingualism

A holistic view of bilingualism proposes that the bilingualism is an integrated whole which cannot be easily decomposed into two separate parts. The co-existence and constant interaction of two languages in a bilingual produces different but complete linguistic entity. Albert and Obler (1978) reported that there is no difference in cerebral organization of bilinguals and multilingualism. Mackey (1968) observed that bilingualism far from being exceptional is the problem that affects majority of world's population. He concluded that is thus monolingualism that represents a special case rather than bilingualism, which is very true in Indian linguistic context.

Globalization has brought along with its rapid technological advancement and an increase in educational and employment opportunities. Majority of individuals in today's society are bilinguals or polyglots. This is particularly true in a country like India which is linguistically and culturally diverse. It is not uncommon to see that in regions of close proximity people speak languages which are similar in origin. In a vast majority of literates the medium of education is in the native language and English is taught as a second language or vice versa. With increased awareness about disease and improved access to health care it is

not uncommon for Speech pathologist to encounter bilingual aphasics in their day to day practice especially in the urban setting. Today, Speech Language Pathologist (SLP) needs to be equipped with effective assessment and treatment methods to provide services to their bilingual patients. Most of our understanding of the cerebral organization of language has been from the studies of bilingual aphasia.

Webster (1961) defines a bilingual as "one using two languages with a fluency characteristics of native speakers: a person using two languages habitually: with control like that of a native speaker and bilingualism as the constant oral use of two languages". Mcnamara (1967) proposes that bilingualism is "having a minimal competence in one or more of the four language skills, i.e. listening, comprehension, speaking, reading, writing in a language other than mother tongue". Whether bilingual's two languages are organized partly in common areas and partly in specific and separate areas of the brain is not completely proved.

Streven & Halliday (1972) refers bilingual as one who can speak only one language but who can switch register, styles and functionally differentiated language varieties to coincide with place, topic and inter counter.

Bilingualism has been defined variously by different authors. According to Grosjean (1994) the term "bilingual" refers to all people who use two or more languages or dialects in their everyday lives. As defined in Webster's dictionary (1961), a bilingual is one having or using two languages habitually: with control like that of a native speaker and bilingualism as the constant oral use of two languages. Haugen, (1950) feels that bilingualism begins when the speaker of one language can produce complete meaningful utterances in the other languages where as: the extremist view of Bloomfield (1993) defines bilingualism as "native-like control of two languages".

Baker (1993) states that the bilingual individuals knowing two or more words for one object or idea may possess an added cognitive flexibility. Cognitive expansion and flexibility in individuals exposed to two or more languages was also reported by Chengappa (2008). Bilingualism in India is different in comparison to western countries. According to Ferguson, (1968) the majority of bilingualism persistent in western world is constituted of the acculturating immigrant and his off springs, the westernizing native, the struggling foreign language students, the downtrodden but dedicated minority group patriot. According to 1991 census, the national average of bilingualism in India is 19.44%. As is evident from the figures below, there is a steady increase in the percentage of bilinguals since 1961 (Pattanayak, 1990). This shows the trend towards learning of second language.

Table 3: shows the percentage of bilinguals across different years

Year	Percentage of bilinguals
1961	9.70%
1971	13.04%
1981	13.34%
1991	19.44%
1961	9.70%

According to Srivastava, (1980) there is not a single state in the country which is completely monolingual: not a single major modern Indian language whose speakers don't employ atleast three contact languages and not a single speech community which has less than atleast three distinct linguistic codes in its verbal repertoire. In the south Indian state of Karnataka where this study was carried out, 1991 census shows English as second language

for 9.44% and third language for 2.54% of population showing that English has entered the realm of daily life in this state.

Aphasia in bilinguals

The first major question that dominated the field of study of bilingual aphasia, reviewed by Albert and Obler (1978) and by Fabbro (2001), was which language would return first. It was Pitres (1895) who actually studied a series of cases and posited that rather than the first-learned language returning first: it appeared that the language that was most familiar, or most used, around the time of the aphasia producing incident was the one which returned first.

Karanth, (1981) discussed a case of pure alexia in a kannada-English bilingual who was a fluent speaker of Telugu, Kannada, Tamil and English. Her subject showed greatest deficit in the area of reading and had more difficulty in Kannada (most fluent language premorbidly) than in English. Results were explained in terms of the orthographic differences between the two languages.

One of the largest reports in bilingual aphasics has been that of Junque, Vendrell and Vendrell, (1955) in 50 Spanish- English bilingual aphasics. They studied performance on three linguistic tasks of naming, pointing and word-translation. There was no difference between two languages in tasks of naming and translation but pointing showed differential impairment. Specific phenomenon (shift of dominance, mixing and/or selective loss of access) was also frequently reported. Their results support the idea that each bilingual type may be sustained by a different acquired pattern of cerebral organization.

An investigation into naming was carried out by Bose (1997) on Kannada- English bilingual aphasics. There were three naming tasks i.e. confrontation naming, responsive

naming and generative naming. Parallel naming deficits were seen in both languages except for confrontation naming where differential impairment was seen with better responses in first language than in second language. Sreedevi (1999) on similar lines tested comprehension of bilingual aphasics who were fluent speakers of Tamil and English premorbidly. As expected, performance was better in first language and she reported of differential recovery in all of her 20 subjects. There was no specific mention with regard to laterality.

Recent studies by Chengappa, Bhat & Damle (2003) investigated these aspects in a multilingual Wernicke's aphasic. There was lesser evidence of neologisms and jargon in pre-morbidly more proficient language in comparison to other languages. They concluded that this suggested preserved semantic and phonemic network in comparison to language show higher neologisms. Similar results have been reported by Chengappa, Bhat & Padkannya (2004) in written language errors of multilingual aphasics.

Sreedevi (1999) investigated the comprehension disturbances in Tamil – English Bilingual aphasics. 8 bilingual aphasics (2 Broca's, 2 Wernicke's, 2 Anomics & 2 Globals) and 8 normal subjects were included. All had Tamil as L1 and learnt English in school. These subjects performance on Revised Token Test on both languages were studied. Result revealed that normals had no differences between the languages and between subtests in their performance. Aphasics performed poorly on all subtests compared to differences. Some aphasics had better comprehension in Tamil L1 than in English while some had in English L2. Among different types of aphasics, Anomic had better comprehension in both languages (Tamil L1 4 English L2) followed by Broca's, Wernicke's and Global. The aphasics who attended more no. of therapy sessions had greater performances improvement in their comprehension. The recovery pattern that was seen in all the cases was found to be

differential recovery. Some showed good performance in Tamil while the other showed better performance in English which roughly depended on proficiency in each of the language.

In a large scale study on an unselected population of stroke patients, Karanth, P. Ahuja, G.K.,Nagaraj, D., Pandit, R,. & Shivashankar, N. (1991) evaluated 123 stroke subjects for aphasia. Out of 123 subjects 87 had left hemisphere lesions and 36 had right lesions with a 5.5% incidence of crossed aphasia. As two languages spoken by these 123 stroke subjects, 92 were multilingual, 48 of who had become aphasic and none of them reported of differential loss. Only 15 could be tested in more than one language for lack of parallel tests in the many Indian languages that they spoke, 14 of whom exhibited parallel impairment. The one exception showed differential loss- Kannada his native language was better preserved (Wernicke's) while English his medium of instruction in college which he subsequently used only for reading and writing showed a more severe loss (global). The findings of this large scale study on an unselected population of bi/multilingual aphasics are largely in consonance with those complied on the basis of the many case studies reported earlier.

In a longitudinal case study of a multi-literate and multilingual aphasic who had pure alexia the current author (Karanth, 1981) has documented the therapeutic and recovery of his reading skills in Kannada the alpha syllabary, as compared to English the alphabetic script. While the initial severity of the alexia was the same in both of these writing systems, the patients recovered his reading skills in English much more rapidly than in Kannada, despite the fact that Kannada was the language that he had learnt earlier. This differential recovery was attributed to the visual complexity of the Kannada writing system as against the relatively simpler 26 lettered English- writing system, for a patient who had issues with visual word form perception. In contrast a Hindi-English bilingual aphasic who was pre-morbidly literate in Hindi and English with greater amount of reading and preference for reading in Hindi showed some reading skills in English post morbidly with deep dyslexia

type of errors whereas he had no reading skills at all available in Hindi, despite the fact that he used to prefer to read in Hindi prior to becoming an aphasic. His subsequent recovery was also in English.

In an effort to relate the patterns of acquired dyslexia to the alpha syllabic writing systems Karanth (1985) argued that surface dyslexia is unlikely to be seen in highly transparent writing systems like Kannada. If for instance a Kannada- English bilingual had a lesion that particularly affected the 'lexical route' then it should have very minimal effect on the reading of the highly transparent Kannada script with its high grapheme-phonemic correspondence but reading in the opaque script of English should be characterized by surface dyslexia type of errors. No evidence for the above argument has been documented so far in Kannada-English bi-literate dyslexic children learning to read Kannada and English (Karanth, 1992). If the structural difference in the writing system influences the degree and type of the post morbid severity and error patterns of reading skills in this manner, it follows that choice of language for reading and writing intervention would have to be influenced by these factors. The implication of these findings for our understanding of the models of acquired dyslexia's and the neural models of reading as well as for therapeutic intervention have been presented at length in Karanth, 2003.

Several authors report lexical level mixing to be more frequent in comparison to any other normal as well as aphasic bilinguals (Perceman, E, 1984, Bhat, S & Chengappa, S, 2005). As lexical retrieval deficit appears as the most prominent in bilingual aphasics, they tend to seek help from other languages to overcome these. Thus to overcome a communication breakdown, bilingual aphasics repair that by using equivalent expression from other languages. Various studies on Indian and western languages point to clear-cut lexical deficits in aphasics [Bhat, S. & Chengappa, S, (2005), Krupa, E.D., Chengappa, S. & Bhat, S (2004), Munoz, M.L., Marquardt, T.P., & Copeland, G, (1999)]. The knowledge is

not lost as the concepts were accessible in other languages. It suggests that access to lexical item in particular language probably is affected and aphasic look for the same in the other language. Thus knowledge of two languages appears to prove more beneficial to bilingual aphasics. These results point to necessity to observe the effects of cueing across various subtypes and across various languages known to bilingual aphasics. In case of positive findings cross linguistic cueing could be a very effective strategy for bilingual aphasics.

Studies on normal bilinguals

Western studies

Albert & Obler (1978) in their study report that perceptual strategies of bilinguals differ from those of monolinguals. The bilinguals seem to have mastery over two different sets of skills or strategies which monolinguals use for each language. They reported that bilinguals mature earlier than monolinguals both in terms of cerebral lateralization for language and in acquisition skills for linguistic abstraction. They also reported that bilinguals have better developed auditory language skills than monolinguals but there is no clear evidence that they differ from monolinguals in written skills.

The effect of image ability was investigated by Kiran & Tuchtenhagen (2005) in fifteen normal bilingual (English-Spanish) adults and one bilingual adult person with aphasia. The participants had to perform two tasks; naming to definition task and semantic priming task in English and in Spanish. The stimuli consisted of 120 words for both these tasks, and they were either concrete or abstract nouns. Higher accuracy on the naming to definition task and faster reaction times on the semantic priming task revealed better performance in English than in Spanish for the normal bilingual participants. But these bilingual people with aphasia showed equal performance across both languages.

Ridhima B (2009) investigated Paraphasias in bilingual aphasics. 24 individuals with aphasia in the age range of 30-80 years (mean age of 55 years), identified through various sources like institutes, hospital records were taken for the study. These participants were divided into two groups 12 monolinguals and 12 bilinguals the results of the present study establish the fact that paraphasias exist in all the types of aphasia and across all the languages. The paraphasias can be similar or may vary in the different languages of a bilingual individual with aphasia. The types of paraphasias also vary across different language tasks namely naming, repetition and picture description task among the various sub types of aphasia. However, the generalization of the results would be difficult unless variables like severity of language impairment, large and equal sample size of all the sub types of the aphasia, the literacy level and the pre-morbid language proficiency of the different languages known by the bilingual aphasics are controlled and studied.

Simmy (2008) investigated confrontation naming versus picture to word matching in bilingual (Malayalam and English) persons with aphasia. The overall results indicated that responses varied across the different tasks, i.e., confrontation naming and picture to word matching rather than across both languages for all groups of bilingual persons with aphasia. Thus, the study indicated that there is no influence of orthographic regularity across the tasks. Thus, the view that it is mandatory to make diagnostic assessments across both the languages that any bilingual person with aphasia is proficient in, has been questioned.

Chengappa,Vijayshree & Ravi Kumar (2008) studied Standardization of (WAB-K). 30 normal native speakers of Kannada and 150 native Kannada speakers with different types of aphasia ‘were participated’ & ‘were performed’ in the study. Normal and aphasic clients showed no gender differences on different parameters of WAB-K. Normal clients showed similar performance across language contexts for all parameters. Aphasics showed significant variation in their performance across language context for different parameters. Results

revealed that in information content, fluency and repetition tasks, multi lingual subjects were performed better than monolingual subjects. Bilinguals were performed better than the multilingual and monolingual in the comprehension task. It would provide an objective assessment tool for aphasics in Kannada context. It would add to the clinical utility of the standardized tests providing for norms.

Chengappa & Sunil kumar (2010) developed and established preliminary normative data on the BNT for Kannada-English and Telugu-English bilingual speakers in Karnataka and Andhra Pradesh states of India. Four groups of subjects were taken in each language group (Kannada-English & Telugu-English) in which three groups of typical adults in the age range ranges of 20-40 years (n=35), 40-60 years (n=35), and the fourth group comprised of 13 Kannada-English and 20 Telugu-English bilingual individuals with aphasia diagnosed by a neurologist and a Speech Language Pathologist (SLP) based on the Western Aphasia Battery (Kertesz, 1982) test results. To overcome cultural and linguistic bias, the Boston Naming Test material developed by Shanthala & Shyamala (1977) was taken and was developed in Telugu language. This includes a set of 57 line drawing and these were displayed on a 4"x6" cards. This test was administered in their respective native language and also in English. Language History Questionnaire (Ping Li, Sepanski, S. & Zhao, X., 2006) was used to measure the language proficiency in each language of all the participants. The results of Kannada-English normal bilingual groups revealed significant differences between the three groups on Bonferroni post hoc analysis, significant difference was found between young adults and geriatric groups ($p<0.05$) found between young and middle age typical adult groups. These results indicated a significant deterioration in the abilities of naming as the age increased.

The analysis of Telugu-English normal bilingual groups revealed significant difference ($F (2, 97) =5.641$, $p<0.05$) between the three groups and on Bonferroni post hoc

analysis, significant difference was found between young adults and middle-aged adult groups ($p<0.05$); middle aged adults and geriatrics ($p>0.05$). However, there was no significant difference ($p>0.05$) found between normal young and geriatric groups. These differences can be attributed to the familiarity of the words and imageability of the stimuli. The analysis of Kannada-English bilingual aphasics revealed that the Sub cortical aphasics performed better on naming followed by Wernicke's aphasia, Anomic aphasia, Broca's aphasia and Transcortical aphasia. Global aphasics obtained the least scores on BNT. The analysis of Telugu-English bilingual aphasics revealed that the Transcortical Motor aphasics performed better on the naming test followed by Broca's aphasia, Transcortical Sensory aphasia, Anomic aphasia, Subcortical aphasia and Wernicke's aphasia. Global aphasics obtained the least scores on BNT.

Need for the study

Considering the incidence of aphasia related disorders is increasing in India, there is a need to develop test batteries for identification and diagnose aphasia by Speech Language Pathologists. We need to have a test battery which will be used for differential diagnosis between normal and several types of aphasia. Recently Western Aphasia Battery was developed in Indian context (Telugu) but less number of subjects in aphasic group was taken, monolingual and bilingual categorization was not considered, variables like education were not monitored in the study. Hence there is a need to standardize the Western Aphasia Battery in large group of aphasics, monolinguals and bilinguals and also considering the variables like education, on which we can plan individual treatment programmes depending upon the type and severity of aphasia.

Aim of the study

The aim of the present study was to obtain norms for Western Aphasia Battery in Telugu (WAB-T) for monolinguals (Telugu) and bilinguals (Telugu-English) subjects, which is the most frequently encountered population in modern clinic of South India (Situated in Andhra Pradesh) and to compare these norms with various types of aphasic syndromes.

METHOD

In the present investigation, an attempt was made to standardize a test in Telugu based on the principles of Western Aphasia Battery (WAB) (Kertesz, 1979) and to assess the language ability in terms of Aphasia Quotient (A.Q) in adults with and without language pathology.

The study consisted of two stages:

1. Test description
2. Administration of the test

I. TEST DESCRIPTION:

The following language parameters identified as being important for an aphasia test, are described:

a) Description of spontaneous or conversational speech

b) A measure of information value.

c) A measure of fluency

d) Auditory comprehension

e) Repetition

f) Naming

The present test had subtests which are based on similar lines as that of WAB (Kertesz, 1979). Under each subtest, materials were mainly translation of WAB- English (Kertesz, 1979) but some materials were modified keeping in view the linguistic principles of Telugu and the Indian cultural context (Appendix-I).

Thus the subtests of the test description were as follows:

Oral language subtests (A.Q):

I. Spontaneous speech:

a) Description of test and materials: this item was designed to elicit conversational speech from the patient in reply to questions asked in the context of an interview and a picture description. Changing the questions and few encouraging comments were permitted. The important aspects of spontaneous speech to be examined were the information content and fluency. It consisted of six questions which were mainly the translation of original WAB along with picture card. This picture card had been modified to the Indian culture.

Scoring:

Information content and fluency were scored according to, the set criteria for spontaneous speech (see Appendix I).

II. Auditory Verbal Comprehension:

Since patient performance was often complicated by difficulties of verbal expression, apraxia and intellectual functions, comprehension task attempts to cover various aspects of this feature, by using (a) yes- no questions, (b) a pointing task of auditory recognition, and (c) a series of sequential commands.

(a) "Yes-No" Questions:

Description of the materials:

The patient was asked to reply or nod "Yes" or "No" to 20 questions. The first nine questions were the most relevant to the patient's own person. The next five questions were related to the environment and the last six were more general in their context, yet remain semantically simple and short, although there was an increase in linguistic complexity requiring more comprehension of syntax, such as relational words. The use of Yes/No responses avoid to some extent the pointing difficulty or apraxia that may interfere with other task of comprehension.

Instruction: The patient should be instructed to answer with yes or no only. If the patient continues to chat or answers in sentences, the instruction should be repeated. If it is difficult to establish a consistent verbal or gestural Yes/No response, then eye closure for "Yes" should be established. The instructions should be repeated, if necessary, during the test.

Scoring:

Score 3 points for each correct answer. Recorded responses in appropriate column: Verbal, gestural or eye blink. If the patient self corrects, the last answer was scored. If the response was ambiguous, score 0.

b) **Auditory Word Recognition**:

Description of the test and materials:

The patient was asked to point to an item, spoken by the examiner, from an array in the same category. Materials of this task were six objects, six line drawing of objects, six

letters, six numbers, six geometric forms, six colors, six items of furniture in the room, six body parts of the patient, five items of finger recognition and seven of right and left orientation.

Instructions:

Asked the patient to point to each item, by saying, point to the…… or show me the …… in the order listed. One repetition of each command was allowed.

Scoring:

Score 1 point for each correct response. If the patient points to more than one item, score 0, unless it was clear that the patient recognizes his or her error and corrected. For the seven items requiring left-right discrimination, the patient must get both the side and body part correct to receive to receive credit.

c) **Sequential commands**:

Description of the test:

This subject was also used to examine the comprehension of syntax consisted of 11 commands. The initial commands and sequences were simple and short to establish rapport, to place the patient in set and to allow the examiner to ascertain that the patient understands that he or she is to perform to the commands that he or she is willing to co-operate. Most of the sequential commands involve the manipulation of touching one object with another, using prepositions of “with/to” “on/top” “over” and “other side”. The length of the sentences and the number of clauses were also increased.

Instruction:

On the table before the patient line up the pen, comb and book in the respective order and label each, verbally "see the pen, the comb and the book. I will ask you to point them and do things with them just as I say. Are you ready? If the patient doesn't seem to understand the task, point with the comb to the pen to demonstrate and start again.

Scoring:

Scoring was same as given in the original WAB. Credit was given for partial response if the underlined portion of the sentence, representing action or an object, was appropriately performed.

III. **Repetition**:

Description of test:

Repetition was tested by high frequency words by increasing length, composite words, numbers, number word combinations, high and low probability sentences and sentences of increasing length and grammatical complexity. It included test of oral agility, a test sentence that contained all the letters and a test sentence which consists specifically of short grammatical words.

Instruction:

Ask the patient to repeat the words listed below and then record the responses. The stimulus may be repeated once, only if the patient asks or does not seem to hear, not because the patient's response was incorrect.

Scoring:

Scoring two points for each recognizable word. Minor dysarthric errors or colloquial pronounciations were scored as correct. Take 1 point off for errors in order of word sequence or for each literal paraphasias (phonemic error.)

IV. **Naming:** this task includes:

(a) Object naming:

Naming of objects on visual confrontation constituted 60% of the naming score. Twenty common prototypical objects that were easily available and shown individually. The sample contained various categories, shapes and sizes. The patient first was asked to name the object on visual presentation. In the case of no response or incorrect response, the patient was allowed to palpitate it and if necessary, the phonemic of the word was given as a cue. If it is a composite word, the first half was given as a semantic prompt. A total of 20 second was allowed for all of the steps for each object.

Scoring:

Scored 3 points if named correctly or with minor articulatory error, 2 points for a recognizable phonemic paraphasia and 1 point if a phonemic or tactile cue was required.

(b) **Word fluency**:

It consisted 20% of the naming score. It is measures by naming as many animals as the patient can in 1 minute. The patient should be prompted by being given examples at the beginning (not to be counted if the patient repeats them) and again at 30 second if no responses were forthcoming.

Scoring:

Scored 1 point for each animal named, even if distorted by literal paraphasia.

(c) Sentence completion:

It consisted 10 % of the naming score. Here the patient was asked to complete what the examiner says. There were 5 items here.

Scoring:

Score 2 points for correct responses and 1 point for phonemic paraphasias.

(d) Responsive speech:

It consisted 10 % of the naming score. Here the word finding was facilitated by the context of the preceding sentence. There were 5 items here.

Scoring:

Score 2 points for correct responses and 1 point for phonemic paraphasias.

(2) **ADMINISTRATION OF THE TEST:**

Subjects

The aim of the present study was to standardize norms for Western Aphasia Battery in Telugu (WAB-T) for monolingual (Telugu) and bilingual (Telugu-English) subjects, and compare the norms with various types of aphasic syndromes. Recently Western Aphasia Battery in Telugu (WAB-T) which was developed by Sri Pallavi. M & Shyamala Chengappa, (2010) was administered on 120 normal adult Telugu speakers in the age range of 20-70 years who constituted the control group. These 120 subjects were categorized into five age

groups like 20-30, 31-40, 41-50, 51-60 and 61-70 years with 24 subjects in each group. Each group consisted of 12 monolinguals (6males and 6 females) and 12 bilinguals (6 males and 6 females). All the subjects were matched for their age, sex, language level, handedness and educational level. All the participants in the study were native speakers of Telugu, and with no history of any neurological or psychiatric illness or of alcoholism or drug abuse. The no. of individuals in the each age range of control group is given in the table 4.

Table 4: shows the total no. of individuals in the control group:

		Age range				
		20-30	31-40	41-50	51-60	61-70
Monolinguals	Males	6	6	6	6	6
	Females	6	6	6	6	6
Bilinguals	Males	6	6	6	6	6
	Females	6	6	6	6	6

A total of 39 adult aphasic patients in the age range of 25-70 years 'were participated' & 'were performed' in the study. And the educational standards of these individuals ranged from 5th standard to doctorate level. The demographic details of aphasic individuals are given in the table 5. The participants were diagnosed based on the neurological findings which were obtained from neurologist.

Table 5: shows the demographic details of the aphasic individuals:

S.no	Age/ sex	Education	Handedness	Monolingual /Bilingual	Neurological findings	Diagnosis
1	50y/M	5thstd	Right handed	Monolingual	Left MCA infarct	Broca's aphasia
2	55y/M	-	Right	Monolingual	Left MCA territory	TCS

			handed		Multiple infarct	aphasia
3	32y/M	Post graduation	Right handed	Bilingual	Left MCA territory infarct	TCS aphasia
4	53y/M	Graduation	Right handed	Bilingual	Left MCA infarct	Broca's aphasia
5	25y/M	Graduation	Right handed	Bilingual	Left MCA infarct	Broca's aphasia
6	40y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	Anomic aphasia
7	78y/M	Post graduation	Right handed	Bilingual	Left MCA territory infarct	Broca's aphasia
8	63y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	Broca's aphasia
9	60y/F	-	Right handed	Monolingual	Left MCA territory infarct	Anomic aphasia
10	45y/M	Graduation	Right handed	Bilingual	Acute Left capsulo ganglionic bleed	TCM aphasia
11	75y/M	-	Right handed	Monolingual	Acute infarct in Left parietal region	TCS
12	75y/F	-	Right handed	Monolingual	Acute Left MCA territory infarct	TCS
13	40y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	Broca's aphasia
14	42y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	Anomic aphasia

15	45y/M	10th std	Right handed	Monolingual	Acute Left MCA territory infarct	TCS
16	62y/F	10th std	Right handed	Bilingual	Acute subdual hematoma with mid line shift	TCS
17	45y/M	10th std	Right handed	Monolingual	Left basal ganglion infarct	TCM
18	64y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	TCM
19	35y/F	Post graduation	Right handed	Bilingual	Left MCA territory infarct	Anomic aphasia
20	48y/M	Post graduation	Right handed	Bilingual	Infarct involving temporo-parietal region corresponding to MCA territory	Global aphasia
21	46y/M	Post graduation	Right handed	Bilingual	Left MCA territory infarct	Wernicke's aphasia
22	68y/M	Graduation	Right handed	Bilingual	Hyper acute infarct involving Left capsulo ganglion region	Anomic aphasia
23	85y/M	-	Right handed	Monolingual	Left basal ganglion infarct	Global aphasia
24	22y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	Anomic aphasia

25	58y/M	Graduation	Right handed	Bilingual	Infarct involving temporo-parietal region corresponding to MCA territory	Global aphasia
26	60y/F	Graduation	Right handed	Bilingual	Left basal ganglion infarct	Global aphasia
27.	58y/M	10^{th}std	Right handed	Bilingual	Left MCA territory infarct	Wernicke's aphasia
28	50y/F	-	Right handed	Monolingual	Left basal ganglion infarct	Global aphasia
29	58y/F	-	Right handed	Monolingual	Infarct involving temporo-parietal region corresponding to MCA territory	Global aphasia
30	63y/M	-	Right handed	Monolingual	Left MCA territory multiple infarct	Wernicke's
31	60y/M	10^{th}std	Right handed	Bilingual	Left MCA territory infarct	Anomic aphasia
32	30y/M	Graduation	Right handed	Bilingual	Acute Left MCA territory infarct involving lateral part of left temporal and parietal lobe	Global
33	54y/M	Graduation	Right handed	Bilingual	Left MCA territory infarct	Wernicke's aphasia

34	65Y/M	Post graduation	Right handed	Bilingual	Multiple infarct in Left parieto temporal occipital region	Wernicke's aphasia
35	70y/M	Graduation	Right handed	Bilingual	Left-fronto parietal infarct	Wernicke's aphasia
36	58y/M	Post graduation	Right handed	Bilingual	Left basal ganglion haematoma	TCM aphasia
37	49y/M	Post graduation	Right handed	Bilingual	Left MCA territory infarct	TCM aphasia
38	56y/M	Graduation	Right handed	Bilingual	Left-temporal parietal infarct	TCM
39	60y/M	Post graduation	Right handed	Bilingual	Sub acute infarct in Left-fronto temporo-parietal lobe and Right temporal-occipital lobe.	Global

RESULTS AND DISCUSSION

In the present study, an attempt has been made to standardize Western Aphasia Battery in Telugu (WAB-T) for monolinguals (Telugu) and bilinguals (Telugu-English). Recently, Western Aphasia Battery in Telugu (WAB-T) was developed by Sri Pallavi. M & Shyamala Chengappa, 2010 was used in the present study. Some of the material was modified according to the frequency of occurrence of words and linguistic principles of Telugu.

The results were analyzed using SPSS 17.0 version. MANOVA was done to compare the performance across normal and aphasics, monolingual and bilingual subjects, males and females and also the educational performance. The nonparametric Mann Whitney U test was performed to determine if there was significant difference in performance between normal's and aphasics for each task in Western Aphasia Battery. Mann Whitney U test was also employed to delineate the significant difference in performance between males and females monolinguals and bilinguals across various age groups.

Table 6: Mean, SD and significant difference for the comparison of normal monolinguals and aphasic monolinguals across different tasks. (*represents significant difference between the groups):

Tasks	Normal monolinguals		Aphasic monolinguals		Level of significance
	Mean	SD	Mean	SD	
Information content	9.41	0.49	2.58	1.62	**0.05***

Fluency	10	0	2.0	0.95	
Yes-No	59.6	1.02	43.3	20.9	
Auditory word recognition	59.3	1.54	42.5	25.3	
Sequential commands	77.8	4.2	54	32	
Repetition	97.1	2	55.3	40.2	
Object naming	60	0	20.1	15.1	
Word fluency	14.2	2.99	2.5	3.2	
Sentence completion	8.6	1.1	1.8	2.2	
Responsive naming	9.2	1.1	2.2	1.65	
Aphasia quotient	96.4	1.13	39.5	22.1	
Reading	76.6	27	11.7	28.2	
Writing	55.6	31.3	.83	2.8	
Apraxia	60	0	47	23.5	
Drawing	21.4	8.1	12.4	8.53	
Block design	7	2.9	5.5	3.58	0.10
Calculation	10.1	6.15	6.6	5.14	**0.05***
Ravens colored progressive matrix	22.5	6.9	18.4	11.7	0.39

Cortical quotient	72.6	3.79	33.6	18.2	**0.00***

From the above table it was depicted that there was significant difference between normal monolinguals and aphasics monolinguals across all the tasks except for the nonverbal tasks like block design, calculation and ravens colored progressive matrix.

Table 7: Mean, SD and significant difference for the comparison of normal bilinguals and aphasic bilinguals across different tasks. (*represents significant difference between the groups):

Tasks	Normal bilinguals		Aphasic bilinguals		Level of significance
	Mean	SD	Mean	SD	
Information content	10	0	3.48	1.92	0.05*
Fluency	10	0	2	1	
Yes/no	59.8	0.65	37.8	24.6	
Auditory word recognition	60	0	36.4	26	
Sequential commands	80	0	45.7	35.7	
Repetition	99.1	1.1	51	43.1	
Object naming	60	0	21.2	16.6	
Word fluency	17.9	1.54	5	5.9	
Sentence completion	9.36	0.93	3	3.19	

Responsive naming	9.70	0.72	2.9	3.16	
Aphasia quotient	99.2	0.48	39.7	25.8	
Reading	96.3	6.72	51.2	36.5	
writing	94.0	4.83	16.6	15.9	
Apraxia	60.0	0	38.6	26.4	
Drawing	27.9	2.22	12.7	9.34	
Block design	8.7	0.7	5.37	4.16	
Calculation	19.1	2.69	9.3	8.1	
Ravens colored progressive matrix	29.4	4	21	9.93	
Cortical quotient	77.2	9.13	34.6	22.6	

From the above table it was depicted that there was significant difference between normal bilinguals and aphasics bilinguals across all the tasks.

Table 8: Mean, SD and significant difference for the comparison of gender with in aphasics across different tasks:

Tasks	Male aphasics (Mean)	Male aphasics (SD)	Female aphasics (Mean)	Female aphasics (SD)	Level of significance

Spontaneous speech	5.3	2.3	4.6	3.8	0.15
Yes/no	41.6	22.58	29.6	27	0.38
Auditory word recognition	41.2	24.23	25	31	0.15
Sequential commands	51.5	33	33.7	40	0.35
Repetition	56.5	41.3	33	41.4	0.1
Object naming	21.8	14.87	16.7	21.18	0.34
Word fluency	4.15	5.12	4.57	6.55	0.36
Sentence completion	2.68	2.81	2.42	3.82	0.23
Responsive naming	2.59	2.65	3.28	3.49	0.64
Aphasia quotient	41.8	22.72	30	31.5	0.21
Reading	42.2	37.67	24.7	42.2	0.24
writing	13	15.12	5.71	15.11	0.07
Apraxia	44	24.28	28.7	29.38	0.08
Drawing	13.5	8.45	8.42	10.82	0.17
Block design	5.8	3.77	3.42	4.39	0.16
Calculation	9.18	7.20	5.57	7.82	0.18

Ravens colored progressive matrix	21.7	9.13	12.57	13.26	0.12
Cortical Quotient	36.4	19.74	24.7	26.47	0.18

From the above table it was depicted that there was no significant difference between genders with in aphasics across different tasks.

Sub tests:

1) **Spontaneous Speech**

This subtest was designed to elicit conversational speech from the patient in reply to questions asked in the context of an interview and a picture description. The two important aspects of spontaneous speech to be examined are the information content and fluency. The maximum score for each aspect is 10. The mean and standard deviation of monolinguals and bilinguals males and females across different age groups were given in table 9.

Table 9: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age Group (yrs)	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	19.3	0.51	20	1	19.5	.54	20	0
31-40	19.1	0.40	20	0	19.1	.40	20	0

41-50	19.1	0.40	20	1	19.3	.51	20	0
51-60	19.6	0.51	20	0	19.6	.51	20	0
61-70	19.5	0.54	20	1	19.6	.516	20	0

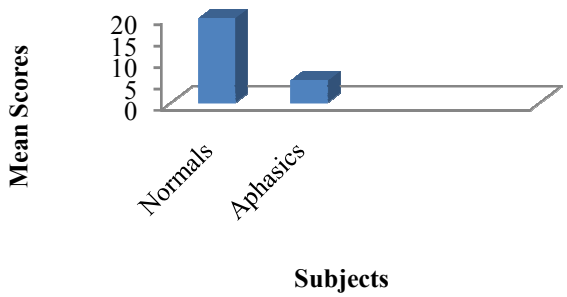
The above table shows the mean and standard deviation of the normal monolinguals and bilinguals across the gender in different age groups. The highest mean and SD was seen in the bilinguals (males and females). Duncan's test revealed a statistically significant difference in the 2nd and 4th groups (31-40 and 51-60 years.)

The mean and standard deviation of overall normal and aphasics are given in table 10 and graphical representation of the means is shown in Figure-1.

Table 10: Mean and Standard deviation of normal and aphasics:

Tasks	Control group		Experimental group	
	Mean	SD	Mean	SD
Spontaneous speech	19.70	0.456	5.20	2.61

Figure 1: Mean scores of normal group and clinical group for spontaneous speech:



As it can be seen from the above table 10 the mean and standard deviation of

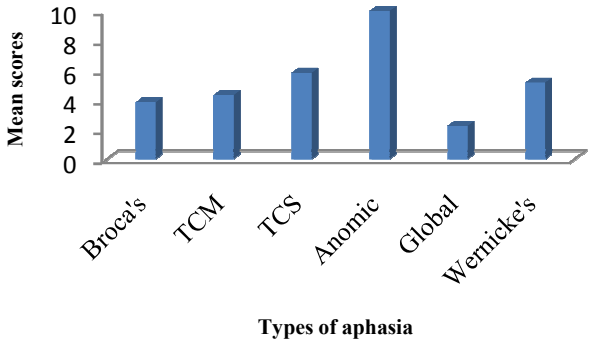
normal and aphasic are 19.70, 0.45, 5.20, and 2.61 respectively. Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal and aphasic, which shows that there is a significant difference between normal and aphasics. The mean and standard deviation of different types of aphasics are given in table 11.

Table 11: Mean and Standard deviation of aphasic subjects on spontaneous speech

Group	Spontaneous speech		
	N	Mean	Standard deviation
Broca's	6	3.83	0.40
TCM	6	4.33	0.81
TCS	6	5.83	0.75
Anomic	7	10.0	0
Global	8	2.25	0.46
Wernicke's	6	5.16	0.75

The above table shows the higher mean and SD of (10, 0) in the anomic aphasics; followed by transcortical sensory subjects with a mean and SD of (5.83, 0.75). Subsequently Wernicke's, transcortical motor, Broca's and Global aphasics performed poor on spontaneous speech. The same is graphically represented in figure 2.

Figure 2: Mean value for the comparison of different types of aphasia:



In the present study, information content was found to be the best forecaster of severity of aphasia, which is in support with the study done by Crary & Rothi (1989) who reported that information content was the best predictor of the severity of the aphasic impairment as measured by the AQ.

2) Auditory Verbal comprehension

The auditory verbal comprehension subtest includes (a) Yes-No questions, (b) Auditory word recognition, and (c) Sequential commands. The maximum scores are 60, 60, and 80 respectively.

a) **Performance on Yes-No questions**: The mean and SD of monolinguals and bilinguals males and females across different age groups are given in table 12.

Table 12: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	60	0	60	0	60	0	60	0
31-40	59	1.54	60	0	60	0	60	0
41-50	60	0	60	0	60	0	60	0
51-60	60	0	60	0	60	0	58.5	1.6
61-70	58.5	1.6	60	0	58.5	1.6	60	0

The table shows mean and SD scores of normal monolinguals and bilinguals across the gender in different age groups for yes/no task. Duncan's test revealed a statistically significant difference in the 5th group (61-70 years.)

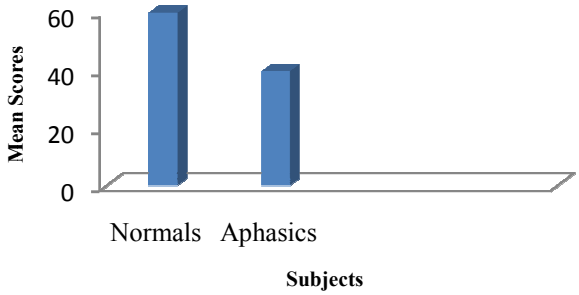
The mean and standard deviation of overall normal and aphasics are given in table 13 and graphical representation of the means is shown in Figure-3.

Table 13: shows the mean and SD of Normal and aphasic:

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Yes-No	59.72	0.87	39.5	23.46

The table shows the higher mean and SD for normal's i.e., 59.72, 0.86.

Figure 3: shows mean scores of normal group and experimental group for Yes/No:



Non-parametric test (Mann-Whitney test) was administered to obtain the level of significance in normal's and aphasics. Results showed that there is a significant difference between normal's and aphasics. The mean and standard deviation of different types of aphasics are given in table 14.

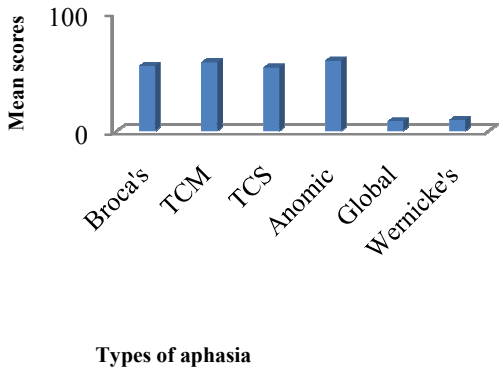
Table 14: The mean and SD of aphasic subjects in Yes/No:

Group	Yes/No		
	N	Mean	SD
Broca's	6	55.1	1.47
TCM	6	58.0	1.54
TCS	6	53.6	3.14

Anomic	7	59.5	1.13
Global	8	8.25	2.12
Wernicke's	6	9.50	2.94

The table 11 shows that the persons with anomic and transcortical motor aphasia were obtained the highest score with mean values (59.5, 58) and SD (1.13, 1.54) respectively followed by persons with Broca's and Transcortical sensory aphasia. Persons with Wernicke's aphasia had a greater difficulty in comprehending the questions, and the clinician had to simplify the related question to elicit the response from the patients. Thus these subjects had poor mean score and SD (9.50, 2.94). Persons with Global aphasia performed poorly on comprehension task in spite of repetitions or even provided with clues. They scored mean value and SD (8.25, 2.12).

Figure 4: Mean values of different types of aphasic are shown in graphical representation:



b) **Performance on Auditory word recognition**: In this sub section of auditory verbal comprehension, subjects were asked to point to the body parts, real objects, drawn objects, colors, forms, letters, numbers, and furniture that were asked by the clinician.

Table 15: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	60	0	60	0	60	0	60	0
31-40	60	0	60	0	60	0	60	0
41-50	60	0	60	0	59.5	1.22	60	0
51-60	58.5	2.5	60	0	57.1	2.4	60	0
61-70	59	1.54	60	0	59	1.5	60	0

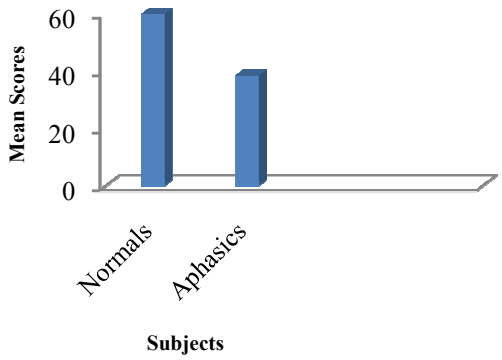
Both males and females (bilinguals) showed higher mean and SD across the gender in different age groups for auditory word recognition in the age range of 20-60 years. Duncan's test revealed a statistically significant difference in the 4^{th} group (51-60 years.)

The mean and SD of overall normal and aphasics are given in table 16 and graphical representation of the means is shown in Figure-5.

Table 16: Mean and Standard deviation of Normal and aphasic

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Auditory word recognition	59.65	1.14	38.3	25.93

Figure 5: Mean scores of normal group and clinical group for auditory word recognition:



The table shows that normal's performed better than aphasics in auditory word recognition task with mean and SD of 59.6, 1.1 in comparison to aphasics with mean and SD of 38.3, 25.93. Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows a significant difference between normal's and aphasics. The mean and standard deviation of different types of aphasics are given in table 17.

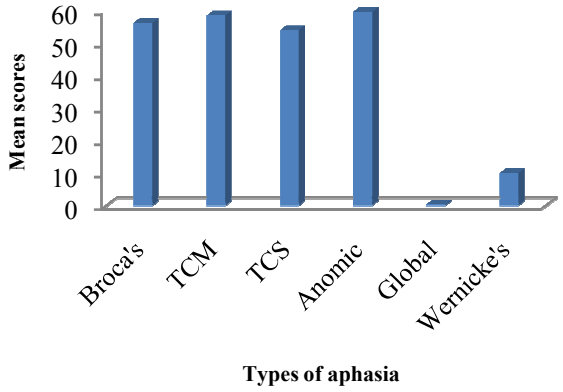
Table 17: Mean and Standard deviation of aphasic subjects in auditory word recognition:

Group	Auditory word recognition		
	N	Mean	SD
Broca's	6	56.3	1.0
TCM	6	58.6	2.16
TCS	6	54.0	4.04
Anomic	7	59.7	0.755
Global	8	0.375	0.74
Wernicke's	6	10.0	1.26

The persons with anomic aphasia scored a mean and SD of 59.7, 0.75, these individual performances were near to the scores of normal subjects and Transcortical Motor aphasics, Broca's, Transcortical Sensory had poor mean scores and SD of 58.6, 2.16: 56.3,1.0:54.0,4.04 when compared to anomic subjects.

The mean values of different types of aphasic are shown in the figure 6.

Figure 6: Mean values of different types of aphasic are shown in graphical representation:



When the responses were considered in terms of categories the performance of the aphasic groups were better for objects, drawn objects, colors, body parts, letters and furniture compared to fingers, numbers, the geometrical shapes and left-right directions. Considering the Wernicke's aphasics obtained a mean and SD of 10.0, 1.26, these individuals were not able to recognize the letters, numbers, fingers, geometrical shapes and left-right directions. On the other hand, they were able to recognize the real objects, body parts and furniture correctly. They required repetition the stimulus that was presented to them.

Global aphasics obtained a mean and SD of 0.37, 0.74 performed poorly when compared to all other aphasics. They were able to recognize few real objects. They fail to identify the letters, numbers, fingers, geometrical shapes and left-right direction. Even when the presentation of the stimuli was repeated and slowed down they fail to recognize other categories included in the section.

c) **Performance on sequential commands**: This section which includes sequential commands is considered to be the complex tasks assessing the auditory verbal comprehension.

Table 18: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	80	0	80	0	77.6	5.7	80	0
31-40	80	0	80	0	80	0	80	0
41-50	80	0	80	0	80	0	80	0
51-60	76.6	5.1	80	0	75	5.4	80	0
61-70	73.3	5.1	80	0	75.8	4.9	80	0

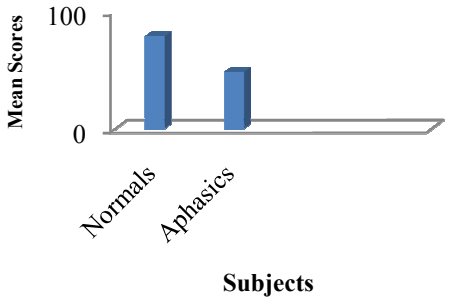
The table shows mean and SD of normal monolinguals and bilinguals across the gender in different age groups for sequential commands. Bilingual females showed higher mean and SD than the males across all the age groups. Where, the male group showed higher mean across 20 – 50 years. Duncan's test revealed a statistically significant difference in the 4^{th} and 5^{th} groups (51-60 and 61-70 years.)

The mean and standard deviation of overall normal and aphasics are given in table 19 and graphical representation of the means is shown in Figure-7.

Table 19: Mean and Standard deviation of Normal and aphasic:

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Sequential commands	78.9	3.15	48.3	3.46

Figure 7: Mean scores of normal group and clinical group for sequential commands:



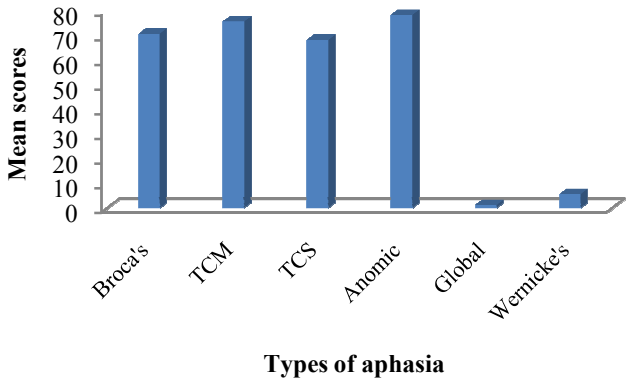
The table shows that normal's performed better than aphasics in sequential commands with mean and SD of 78.9, 3.15 in comparison to aphasics with a mean and SD of 48.3, 3.46. Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, results shows a significant difference between normal's and aphasics in sequential commands.The mean and standard deviation of different types of aphasics are given in table 20.

Table 20: Mean and SD of aphasic subjects in sequential commands:

Group	Sequential commands		
	N	Mean	SD
Broca's	6	70.8	2.0
TCM	6	75.8	2.04
TCS	6	68.3	2.58
Anomic	7	78.5	1.90
Global	8	1.25	1.03
Wernicke's	6	5.66	1.50

As it can be seen from above Table 11, it was depicted that in sequential commands, anomics and Transcortical Motor had a better performance equal to that of normal's with mean and SD of 78.5,1.90:75.8,2.04. These two types of aphasic subjects had a high score when compared to all other type of aphasics. It was noticed that these subjects have demonstrated a better performance when the commands were repeated and rate of presentation of the stimuli was slow. Thus the responses that were elicited by these individuals were accurate.

Figure 8: Mean values of different types of aphasic are shown in graphical representation:



Persons with Broca's and Transcortical Sensory aphasia were obtained mean and SD of 70.8,2.0: 68.3,2.58 considering their responses, these subjects were able to follow the one step and two step commands, at times they even required repetition of the commands. Few subjects had self correction, which was noticed during testing. Persons with Wernicke's and Global aphasia had a very poor performance SD compared to all other types of aphasics.

The above results support the results obtained in the study by Heilman and Scholes (1976), Wernickes performed significantly poorer than Broca's with more lexical errors however Broca's made more syntactic errors than that of normal's.

Repetition

Repetition is tested by high frequency words of increasing length, composite words, numbers, number-word combinations, high and low probability sentences and sentences of increasing length and grammatical complexity. It includes tests of oral agility, attest sentence that contains all the letters and test sentences which consists specifically of short grammatical words. The maximum score for repetition is 100.

Table 21: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

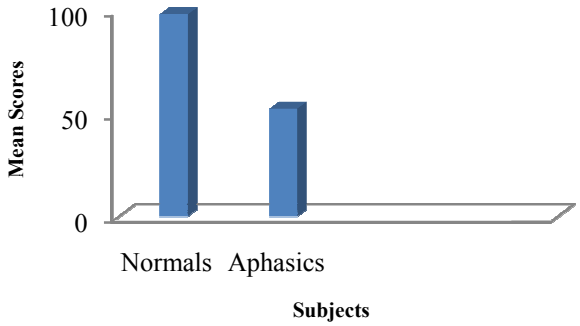
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	98.3	0.81	98.5	0.83	98.5	.83	100	0
31-40	96.8	0.75	99	1.1	97.5	1.6	98.1	0.98
41-50	97	1.5	100	0.81	98	1.2	99.3	0.82
51-60	95.3	3.4	99	1.0	95.1	2.7	99	1.0
61-70	97.6	2.1	99	2.0	96.8	2.1	100	0

The table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for repetition task. Female bilinguals showed higher mean and SD in the age range of 20-30 and 61-70 years. Male bilinguals showed higher mean and SD in the age range of 41-50. Duncan's test revealed a statistically significant difference in the 4^{th} group (51-60 years.). The mean and SD of overall normal and aphasics are given in table 22 and graphical representation of the means is shown in Figure-9.

Table 22: Mean and SD of Normal and aphasic:

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Repetition	98.13	1.95	52.3	41.79

Figure 9: Mean scores of normal group and clinical group for repetition:



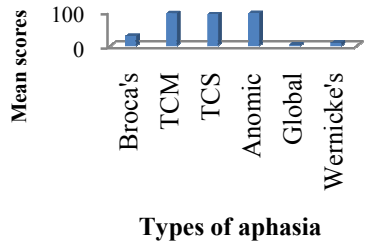
The above table was illustrated that normal's performed better than aphasics in repetition task with mean and SD of 98.13, 1.95 in comparison to aphasics with a mean and SD of 52.3, 41.79. Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows a significant difference between normal's and aphasics in repetition task. The mean and SD of different types of aphasics are given in table 23.

Table 23: Mean and SD of aphasic subjects in Repetition:

Group	Repetition		
	N	Mean	SD
Broca's	6	28.3	5.3
TCM	6	94.6	2.58
TCS	6	91.6	2.58
Anomic	7	95.0	3.74
Global	8	4.0	2.39
Wernicke's	6	9.33	2.06

From the above table the mean and SD scores for repetition task shows Anomic aphasics, Transcortical Motor aphasics and Transcortical Sensory aphasics performing better with mean values (95.0, 94.6, 91.6) and SD (3.74, 2.58, 2.58). Thus infers that all these aphasic individuals were able to repeat the commands presented to them adequately followed by Broca's with mean value 28.3 and SD of 5.3. Wernicke's and global performed poorly when compared to all other aphasics. The mean values of different types of aphasic are graphically represented in Figure 10.

Figure 10: Comparison of different types of aphasia:



Edith & Sarah (1990), where they reported that Broca's aphasics have exhibited more number of phonemic errors, whereas, conduction aphasics had greater number of phonemic attempts, for words and phrases. Wernicke's aphasics repeated more number of unrelated words and few jargons were also noticed in their speech. This study is in support with the present study.

Chin Li & Williams (1990) investigated the repetition deficits in 95 subjects in three aphasic syndromes (32 conduction, 38 Broca's, and 25 Wernicke's aphasics). Subjects repeated phrases and sentences from the Repeating Phrases Subtest of the Boston Diagnostic Aphasia Examination. They reported that conduction aphasics exhibited a greater number of phonemic attempts, word revisions, word and phrase repetitions, Broca's aphasics used more phonemic errors and omissions whereas Wernicke's aphasics showed unrelated words and jargon. This is in support to the present study in which Broca's and Wernicke's exhibited similar kind of error patterns.

Gerda Helene killmer (2010) studied the origins and causes of repetition in three persons with aphasia through a detailed analysis of their use of repetition with a thorough assessment of their language and cognitive functioning. Quantitative and qualitative instruments were combined to achieve more knowledge about the relation between language

and cognitive abilities and the use of repetition in conversation. The use of repetition of three persons with different types of aphasia (Anomic, Broca's and Conduction aphasia) were compared. Results revealed that the participants use intentional repetition differently and that the use of intentional repetition seems to relate to the cognitive and language profiles of the participants. It is suggested that they use different strategies to overcome their language and cognitive deficits.

Naming

The patients are asked to name the objects (twenty common prototypical objects; contains various categories, shapes and size) showed to him/her. This constitutes 69% of the score. 20% of the score consist of word fluency; it was measured by asking the patient to name as many as he/she can in 1 minute. Sentence completion consisted of 10% of the score. The patients are asked to complete the verbal sentence given by the examiner. Responsive speech consists of 10% of the naming score. The word finding is facilitated by the context of the preceding sentence. The maximum score for each subtest are 60, 20, 10 and 10.

a) Object naming:

Table 24: Mean and SD of comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	60	0	60	0	60	0	60	0

31-40	60	0	60	0	60	0	60	0
41-50	60	0	60	0	60	0	60	0
51-60	60	0	60	0	60	0	60	0
61-70	60	0	60	0	60	0	60	0

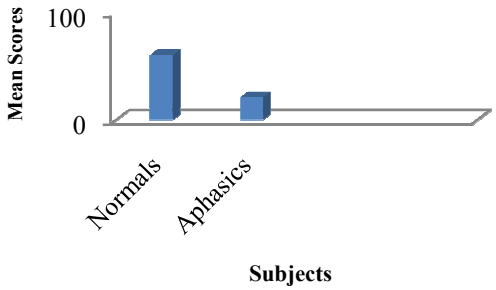
The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for object naming task. This shows that there is no significant difference between male and female monolinguals and bilinguals across the different age groups.

The mean and SD of overall normal and aphasics are given in table 25 and graphical representation of the means is shown in Figure-11.

Table 25: Mean and SD of Normal and aphasic:

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Object naming	60.0	.00	20.8	15.97

Figure 11: Mean scores of normal group and clinical group for object naming:



The above table shows that normal's performed better than aphasics in object naming with mean value (60, 0) in comparison to aphasics with a mean value (20.8, 15.97). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows a significant difference between normal's and aphasics. The mean and SD of different types of aphasics are given in table 26.

Table 26: Mean and SD of aphasic subjects in object naming:

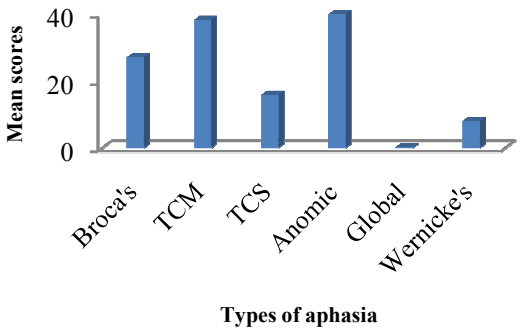
Group	Object naming		
	N	Mean	SD
Broca's	6	27.0	6.32
TCM	6	38.1	7.22
TCS	6	15.8	3.76
Anomic	7	39.8	2.91

Global	8	.25	.70
Wernicke's	6	8.00	2.19

The above table shows that in object naming task anomic aphasics and Transcortical Motor obtained scores (39.8, 2.91, 38.1, 7.22). Broca's aphasics were able to name few common items and they had a mean value 27 followed by Transcortical Sensory with a mean score (15.8), Wernicke's and global individuals performed very poor.

The mean values of different types of aphasic are shown in graphical representation in Figure 12.

Figure 12: Comparison of different types of aphasia:



Kohn & Goodglass (1985) examined the distribution of error types in picture naming 9 Broca's aphasics, 9 Wernicke's aphasics, 7 frontal Anomic aphasics and 9 posterior Anomic aphasics. They reported that anomic aphasics produced the fewest phonemic errors, and the most multiword circumlocutions which suggest that minimal word-production difficulty in anomic aphasia relative to other aphasia syndromes.

b) Word fluency

Table 27: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

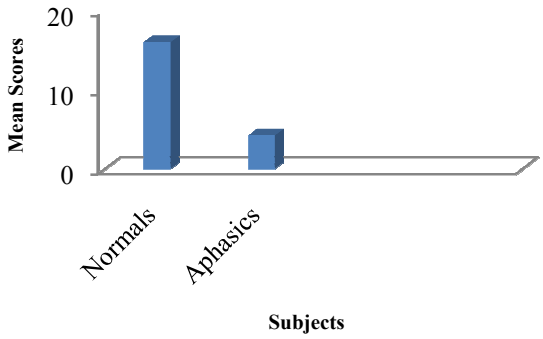
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	16.5	2.1	18.3	2.5	13	2.4	18.3	1.5
31-40	17.3	1.8	17.6	1.86	14	3	18	1.2
41-50	14.3	3.0	18.3	1.6	14	4.1	19	1.0
51-60	13.5	1.0	17.3	.81	10.5	2.2	17.6	.81
61-70	15.8	2.4	17	1.4	12.6	1.0	17.6	1.8

The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for Word fluency. This shows that there is a significant difference across the age groups 20-30, 31-40 female monolinguals and bilinguals and 41-60, 51-60 male and female monolinguals and 61-70 female monolinguals. There is no significant difference seen for the age groups 20-30, 31-40 and 61-70 male monolinguals and bilinguals. Duncan's test revealed a statistically significant difference in the 4^{th} groups (51-60 years.) The mean and standard deviation of overall normal and aphasics are given in table 25 and graphical representation of the means is shown in Figure-13.

Table 28: Mean and SD of Normal and aphasic:

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Word fluency	16.0	3.01	4.23	5.31

Figure 13: Mean scores of normal group and clinical group for Word fluency:



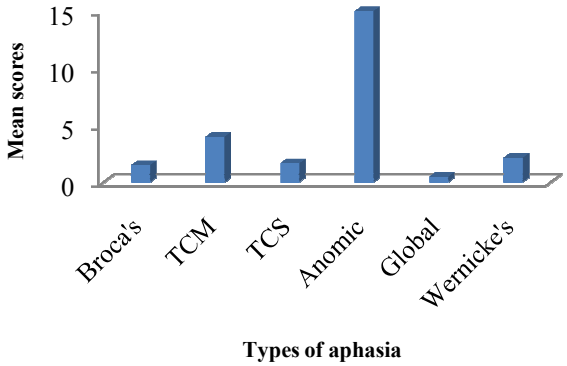
The above table shows that normal's performed better than aphasics in word fluency. Mean value (16, 3) was obtained in normals in comparison to aphasics with a mean value (4.23, 5.31). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows a significant difference between normal's and aphasics. The mean and SD of different types of aphasics are given in table 29.

Table 29: Mean and SD of aphasic subjects in word fluency:

Group	Word fluency		
	N	Mean	SD
Broca's	6	1.50	.547
TCM	6	4.00	1.09
TCS	6	1.66	.816
Anomic	7	15.0	1.82
Global	8	.50	.534
Wernicke's	6	2.16	1.16

The above table shows that the anomic performed better with a mean value15.0 followed by Transcortical Motor, Wernicke's, Transcortical Sensory, Broca's and Global with mean values of 4.00, 2.16,1.66,1.50,.50 respectively. The mean values of different types of aphasic are shown in graphical representation in Figure 14.

Figure 14: Comparison of different types of aphasia:



c) **Sentence completion**

Table 30: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

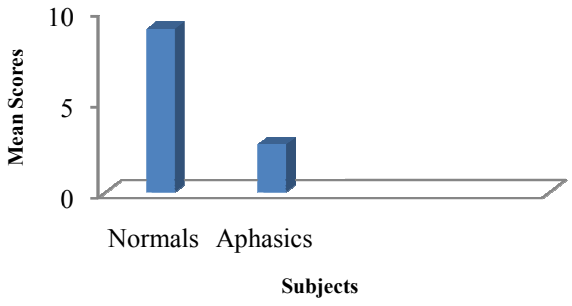
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	8.3	1.9	8.6	1.0	8.6	1.0	9.6	.81
31-40	8.33	.81	8.66	1.0	9.3	1.0	9.3	1.0
41-50	8.6	1.0	10	.00	8.6	1.0	9.6	.81
51-60	9	1.0	9.6	.81	7.6	.81	9.3	1.0
61-70	9.3	1.0	9.3	1.0	8.33	1.5	9.3	1.0

The above table shows that the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for sentence completion. This shows that there is no significant difference across all the age groups for male and female monolingual and bilingual. The mean and standard deviation of overall normal and aphasics are given in table 31 and graphical representation of the means is shown in Figure-15.

Table 31: Mean and SD of Normal and aphasic:

Tasks	Normal		Aphasic	
	Mean	SD	Mean	SD
Sentence completion	9.0	1.13	2.64	2.96

Figure 15: Mean scores of normal group and clinical group for sentence completion:



The above table shows that normal's performed better than aphasics in sentence completion task with a mean (9, 1.13) in comparison to aphasics with a mean (2.64, 2.96).

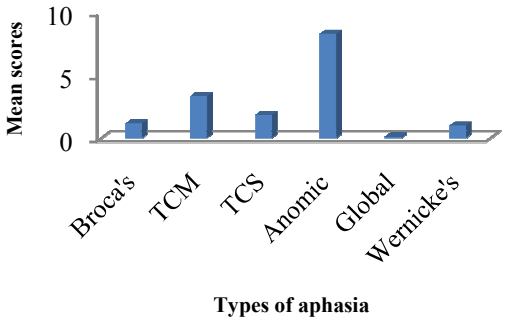
Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. The mean and SD of different types of aphasics are given in table 29.

Table 29: Mean and SD of aphasic subjects in Sentence completion:

Group	Sentence completion		
	N	Mean	SD
Broca's	6	1.16	0.4
TCM	6	3.33	1
TCS	6	1.83	1.16
Anomic	7	8.28	0.75
Global	8	0.12	0.35
Wernicke's	6	1.00	1.09

The above table shows that in sentence completion task person with anomic aphasia performed better with mean (8.28) followed by Transcortical Motor, Transcortical Sensory, Broca's, Wernickes and Global aphasics with mean (3.33, 1.83, 1.16,1, 0.12). The mean values of different types of aphasic are shown in graphical representation in Figure 16.

Figure16: Comparison of different types of aphasia:



d) Responsive naming:

Table32: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age group:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	9	1	10	0	9.6	0.81	10	0
31-40	10.0	0	9.6	0.81	10	0	9.3	1
41-50	10	0	10	0	10	0	10	0
51-60	9	1	9.6	0.81	8.3	0.81	9.6	0.81
61-70	8.3	1.5	9.3	1.0	8.3	1.96	9.3	1

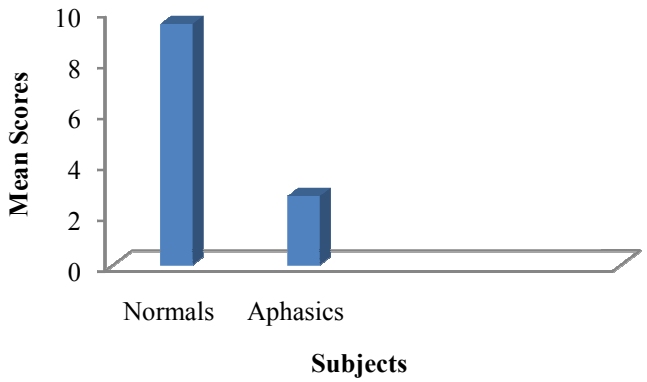
The above table shows the mean and SD scores of normal monolinguals and bilinguals across the gender in different age groups for sentence completion. This shows that

there is no significant difference across all the age groups for male and female monolingual and bilingual except for 51-60 female monolinguals and bilinguals. Duncan's test revealed a statistically significant difference in the 4th and 5th groups (51-60 and 61-70 years.)The mean and SD of overall normal and aphasics are given in table 31 and graphical representation of the means is shown in Figure-17.

Table 33: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Responsive naming	9.48	.987	2.71	2.78

Figure 17: Mean scores of normal group and clinical group for Responsive naming:



As it can be seen from table it was noticed that normal's performed better than aphasics in responsive naming task with mean (9.48, 0.98) for normals in comparison to aphasics with a mean (2.71, 2.78). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. The mean and standard deviation of different types of aphasics are given in table 34.

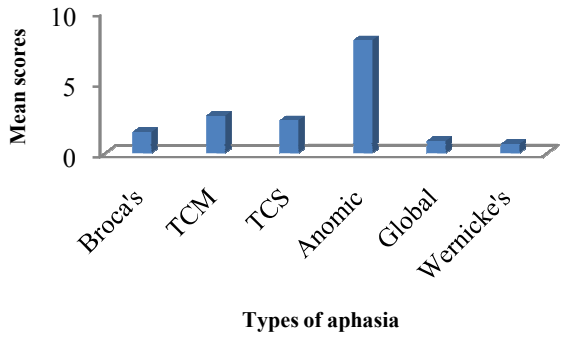
Table 34: Mean and SD of aphasic subjects in Responsive naming:

Group	Responsive naming		
	N	Mean	SD
Broca's	6	1.50	0.55
TCM	6	2.66	1
TCS	6	2.33	1.36
Anomic	7	8	1.15
Global	8	0.87	1
Wernicke's	6	0.66	1

The table shows that in responsive naming anomic performed better with a mean score of 8.00 followed by Transcortical Motor with mean (2.66), Transcortical Sensory, Broca's, Wernicke's with means (2.33, 1.50, .66, and 0.87).

The mean values of different types of aphasic are shown in graphical representation in Figure 18.

Figure 18: Comparison of different types of aphasia:



Aphasia Quotient:

The summary of the entire subtests provide the Aphasia Quotient (AQ). Kertesz (1979), described additional tests for reading, writing and nonverbal functions, from which he derived the performance quotient (PQ). The score is derived from all subtests is the cortical quotient (CQ). C.Q. =A.Q. + P.Q.

A.Q. < 93.8 indicates aphasia which is used in research studies (Kertesz, 1979). In normal's, A.Q. is considered as 98.4 (or) 99.6 (mean A.Q).

Table 35: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

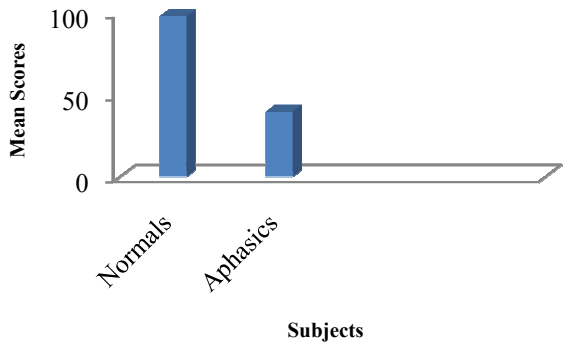
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	97.1	1.2	99.1	0.68	96.7	1.0	99.6	0.25
31-40	96.7	0.62	99	0.57	96.5	0.82	98.9	0.4
41-50	96.3	0.96	99.6	0.45	96.9	1.4	99.6	0.3
51-60	96.7	1.2	99.2	0.33	95.1	1.2	98.9	0.5
61-70	96.1	0.81	98.9	0.20	95.9	1.0	99.2	0.3

The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for aphasia quotient. This shows that there is significant difference between male and female monolinguals and bilinguals across different age groups. The mean and standard deviation of overall normal and aphasics are given in table 36 and graphical representation of the means is shown in Figure-19.

Table 36: Mean and SD of Normal's and aphasics:

Aphasia Quotient	Normal's		Aphasics	
	Mean	SD	Mean	SD
	97.8	1.65	39.7	24.4

Figure 19: Mean scores of normal group and clinical group for Aphasic Quotien:



The table shows that normal's performed better than aphasics. In normal's mean Aphasia Quotient (97.8, 1.65) were obtained in comparison to aphasics with a mean Aphasic Quotient (39.7, 24.4). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows a significant difference between normal's and aphasics.

Sri Pallavi. M & Shyamala Chengappa (2010) developed and standardized Western Aphasia Battery in Telugu (WAB-T) based on the adaptation of Western Aphasia Battery (Kertesz, 1979) to assess the language abilities of aphasic subjects. When considering the AQ of normal subjects, all the age groups have scored above the AQ score of 93.8, the cut off

score which was given by Kertesz (1979). AQ scores for the aphasics are less when compared to the cut off score (93.8), similar results were obtained in the present study.

Shyamala, Vijayshree and Ravi Kumar (2008) studied Standardization of WAB-K by considering 150 clients with Kannada as mother tongue with different types of aphasia participated in the study. 30 normal subjects who were native speakers of Kannada are also included in the study. Results revealed that normal clients showed similar performance across language contexts for all parameters on WAB-K. Aphasics showed significant variation in their performance across language context for different parameters, which was in support to the present study.

Ravi Kumar (2008) reported that there was no significant effect with respect to age and gender. But significant variation was found in normal and different categories of aphasics within themselves in all parameters of WAB (Spontaneous speech, repetition, comprehension, and naming) which is in support to the present study. The mean and standard deviation of different types of aphasics are given in table 37.

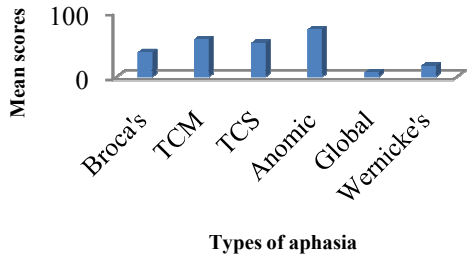
Table 37: Mean and SD of aphasic quotient:

Group	Aphasic Quotient		
	N	Mean	SD
Broca's	6	37.7	1.35
TCM	6	57.8	4.74
TCS	6	51.9	1.87

Anomic	7	73.0	.849
Global	8	6.63	.848
Wernicke's	6	16.6	3.20

The above table shows that it was depicted that anomic obtained highest aphasic quotient of 73.0 followed by Transcortical Motor, Transcortical Sensory, Broca's, Wernicke's, and Global with mean values of 57.8, 51.9, 37.7, 16.6 and 6.63 respectively. The mean values of different types of aphasic are graphically represented in Figure 20.

Figure 20: Comparison of different types of aphasics:



Reading

Reading includes various tasks like **a) Reading comprehension of sentences**: This task includes eight sentences with multiple-choice. These sentences range in complexity from three words to small paragraphs of two sentences. **b) Reading commands**: It consists of 6 commands which are increasing in length and complexity. **C) Written word stimulus**-object choice matching: Here the objects are placed in a random order before the patient. The patient is asked to point to the object that corresponds to the word presented on cards **d)**

Written word stimulus- picture-choice matching: The card with pictures on it is placed before the patient should point to the picture that matches the word that is presented. The words are presented individually on cards **e) Picture stimulus- written word choice matching**: The card which has the words listed on it is placed before the patient. The patient should point to the word that is same as the picture. The pictures are presented individually on cards. **F) Spoken word- written word choice matching**: The patient is presented with the cards and asked to select the orally presented target word from a choice of 5 items. **g) Letter discrimination**: six individuals letters are spoken by the examiner and the patient is asked to choose from the printed choice of six letters. **h) Spelled Word Recognition**: The patient is asked to name the word that is spelled orally by the examiner. **i) Spelling**: Six common stimulus words are spoken in 2-7 letters in length. The patient is asked to spell each of them.

Table 38: mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

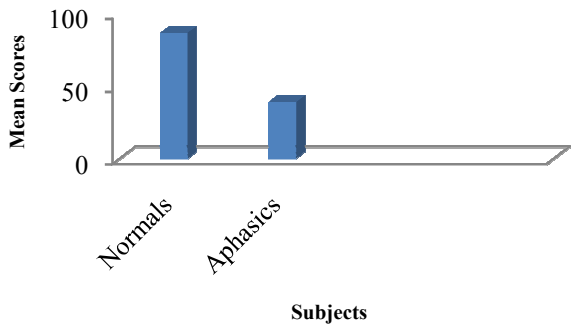
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	85	8.3	100	.00	72	3.5	100	.00
31-40	89.3	8.2	94.6	8.26	89.6	8.0	97.3	6.53
41-50	76	10.4	97.3	6.5	85.3	2.0	94.6	8.26
51-60	85.3	14.6	94.6	8.2	14	3.4	95.3	7.3
61-70	84	.00	94.6	8.2	86	7.0	94.6	8.2

The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for reading task. This shows that there is a significant difference across the age groups 20-30 male and female monolinguals and bilinguals, 41-60 male monolinguals and bilinguals, 51-60 female monolinguals and bilinguals, 61-70 male monolinguals and bilinguals. There is no significant difference for 31-40 male and female monolinguals and bilinguals, 41-50 female monolinguals and bilinguals, 51-60 male monolinguals and bilinguals and 61-70 female monolingual and bilingual. Duncan's test revealed a statistically significant difference in the 4^{th} groups (51-60 years). The mean and standard deviation of overall normal and aphasics are given in table 39 and graphically represented in Figure-21.

Table 39: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Reading	86.5	21.95	39.07	38.54

Figure 21: Mean scores of normal group and clinical group for reading:



The above table shows that normal's performed better than aphasics in reading task with mean value (86.5, 21.95) in comparison to aphasics with a mean value (39, 38.5). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics.

The mean and standard deviation of different types of aphasics are given in table 40.

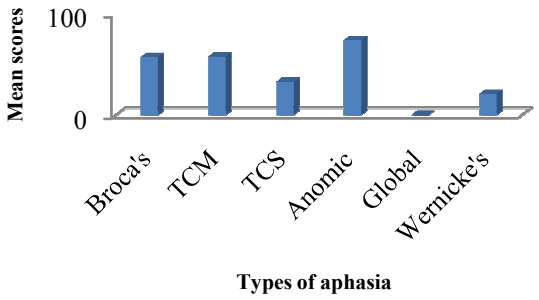
Table 40: Mean and SD of reading task:

Group	Reading		
	N	Mean	SD
Broca's	6	57.0	44.15
TCM	6	57.5	44.5
TCS	6	32.6	26.3

Anomic	7	73.7	32.5
Global	8	0	0
Wernicke's	6	20.8	4.91

The above table shows that anomics performed better with a mean (73.7) followed by transcortical motor, Broca's, Wernicke's, transcortical sensory and global with mean (57.5 ,57, 32.6, 21, 0) respectively. The mean values of different types of aphasic are graphically represented in Figure 22.

Figure 22: Comparison of different types of aphasics:



Writing

Writing includes various tasks like **Writing on request**: The patient is asked to write his name and address. Unlined paper labeled with the name of the patient and the date of the examination was used for this purpose. **b) Written output**: picture card which was used for the spontaneous speech was given and the patient is asked to "write a story about what is going on in the picture". Time limit of 3 minutes is given for the patient. Encourage the patient to write in sentences if it appears that he or she is going to list words. **c) Writing to**

dictation: The patient is asked to write the sentence dictated by the examiner. The sentence may be broken up if the patient cannot remember it and parts repeated once. **d) Writing of Dictated or Visually Presented Words**: The patient is asked to write the words dictated by the examiner. If the patient does not understand the instructions real object and gesture to the patient to write the name of the word was provided. . If the patient fails (unrecognizable word or not written at all), spell the word orally, and if the patient still fails, provide cut-out letters with 2 extra letters. **e) Alphabets and Numbers:** The patient is asked to write alphabets and serial number from 0 to 20. **f) Dictated Letters and Numbers**: six letters and six numbers are dictated and the patient is asked to write each of the following dictated letters and numbers. **g) Copying of words of a sentence:** The test sentences printed on the card is presented and patient is asked to copy it.

Writing difficulties are typically one of the major symptoms of persons with aphasia. Earlier research, based on studies of the spelling of single words and analyses of texts and text production has yielded interesting results. Substitution, transposition, deletion and addition errors of graphemes need to be attended in the written output of an aphasic. However, these linguistic errors can be language specific since the writing system of a given language may influence the error patterns.

Table 41: mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD

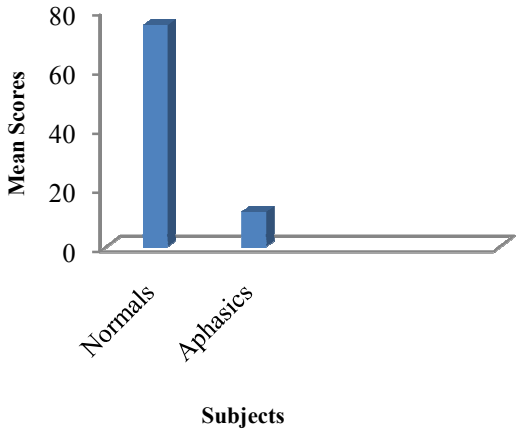
20-30	74.3	20.6	98.3	1.8	57.2	31.0	93.6	7.7
31-40	69.1	20.4	95	0	58.7	12.9	91.5	4.1
41-50	59.6	18.2	92.5	2.7	50.6	12.9	93.1	5.84
51-60	88	5.2	95.8	3.7	15	36.7	94.1	5.8
61-70	65	34.7	91.6	5.1	18.3	28.5	94.1	5.8

The above table the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for writing task are were given, which shows that there is a significant difference in male and female monolinguals across different age groups. Duncan's test revealed a statistically significant difference in the 4th group (51-60 years). The mean and standard deviation of overall normal and aphasics are given in table 42 and graphically represented in Figure-23.

Table 42: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Writing	74.8	29.5	11.7	15.19

Figure 23: Mean scores of normal group and clinical group for writing:



The above table was illustrated that normal's performed better than aphasics in writing task with mean (74.8, 29.5) was obtained in comparison to aphasics with a mean (11.7, 15.19). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. The mean and SD of different types of aphasics are given in table 43.

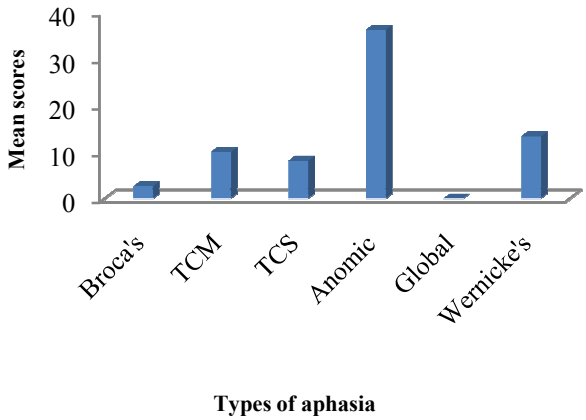
Table 43: Mean and SD of writing task:

Group	Writing		
	N	Mean	SD
Broca's	6	2.7	6.5
TCM	6	10.0	8.2
TCS	6	8.1	6.5

Anomic	7	36.2	18.2
Global	8	0	0
Wernicke's	6	13.3	4.0

The above table was illustrated that anomic obtained a mean (36.2) performed better followed by Transcortical Motor, Transcortical Sensory, Wernicke's, Broca's and Global with mean (10, 8.1, 13.3, 2.7, 0) respectively. The mean values of different types of aphasic are graphically represented in Figure 24.

Figure 24: shows the comparison of different types of aphasics:



Apraxia

Twenty commands are given for upper limb, buccofacial, instrumental and complex performances. And the patient was asked to do the commands. If the patient fails to perform the command well, imitate the action. If this also fails, then the patient is given real object, where applicable (asterisks). Variations in normal performances are allowed.

Table 44: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

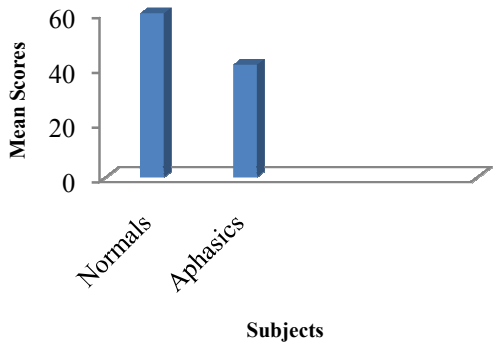
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	60	0	60	0	60	0	60	0
31-40	60	0	60	0	60	0	60	0
41-50	60	0	60	0	60	0	60	0
51-60	60	0	60	0	60	0	60	0
61-70	60	0	60	0	60	0	60	0

The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for apraxia. This shows that there is no significant difference between male and female monolinguals and bilinguals across different age groups. The mean and standard deviation of overall normal and aphasics are given in table 45 and graphically represented in Figure-25.

Table 45: shows the mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Apraxia	60.0	0	41.2	25.54

Figure 25: Mean scores of normal group and clinical group for apraxia:



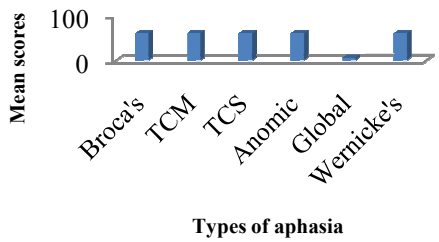
The above table shows that normal's performed better than aphasics in apraxia with a mean value 60 and SD of 0.00 in comparison to aphasics with a mean value 41.2 and SD of 25.54. Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. The mean and SD of different types of aphasics are given in table 46.

Table 46: Mean and SD of apraxia:

Group	Apraxia		
	N	Mean	SD
Broca's	6	60	0
TCM	6	60	0
TCS	6	60	0
Anomic	7	60	0
Global	8	5.75	3.53
Wernicke's	6	60	0

The above table shows that except global aphasia all the aphasics performed equally to that of normals. The mean values of different types of aphasic are graphically represented in Figure 26.

Figure 26: Comparison of different types of aphasics:



Drawing

The subject is asked to free handedly draw the circle, square, glass, house, tree, clock, and person, also to bisect a line (to quantitative visuospatial neglect) on a separate sheet of paper. Completion of the figure is encouraged by saying "Is that as complete as you can make it?" If the patient appears to have a comprehension problem, then he/she may be shown examples for 10 seconds.

Table 47: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males						Females	
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	23.5	5	28	1.2	22.4	9.9	28.6	1.86
31-40	25	1.7	28.6	1.5	23.8	6.3	24.6	3.5
41-50	23.8	3.9	29	2	21.3	9.5	28.8	2.0
51-60	24.6	5.0	27.6	1.75	9.3	10.9	29.1	0.75
61-70	22.8	9.4	26.3	1.5	17.3	6.02	28.6	1.50

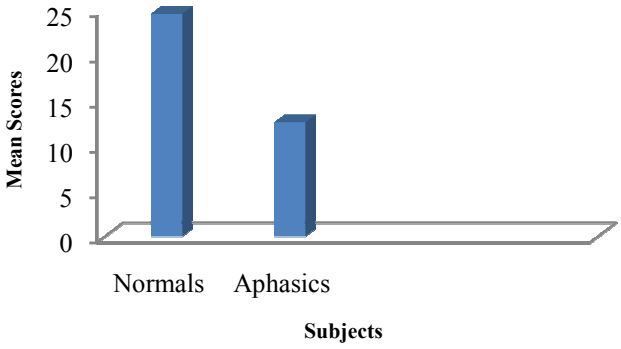
The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for drawing test. This shows that there is significant difference for 31-40, 41-50 male monolinguals and bilinguals, 51-60 and 61-70 female monolinguals and bilinguals. There is no significant difference for 20-30 male and female

monolinguals and bilinguals, 31-40 and 41-50 male and female monolinguals and bilinguals, 51-60 and 61-70 male and female monolinguals and bilinguals. Duncan's test revealed a statistically significant difference in the 2nd group (31-40 years). The mean and standard deviation of overall normal and aphasics are given in table 48 and graphically represented in Figure-27.

Table 48: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Drawing	24.6	6.82	12.6	8.99

Figure 27: Mean scores of normal group and clinical group in drawing:



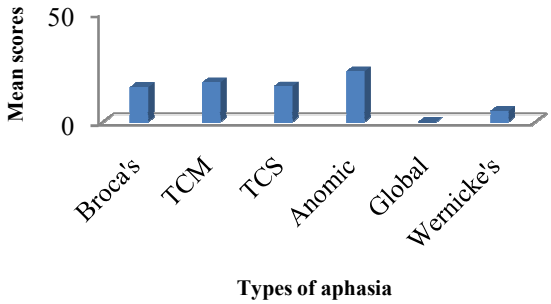
The above table shows that normal's performed better than aphasics in drawing task with mean (24.6, 6.82) in comparison to aphasics with a mean (12.6, 8.99). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. The mean and standard deviation of different types of aphasics are given in table 49.

Table 49: Mean and SD of drawing task:

Group	Drawing		
	N	Mean	SD
Broca's	6	15.8	3.76
TCM	6	18.1	4.91
TCS	6	16.3	3.82
Anomic	7	23.1	1.86
Global	8	0	0
Wernicke's	6	4.83	2.99

The above table shows that it was illustrated that anomic aphasics performed better with a mean (23.1, 1.86) followed by transcortical motor with a mean (18.1, 4.91), transcortical sensory with a mean (16.3, 3.82), Broca's with a mean (15.8, 3.76), Wernickes with a mean (4.83, 2.99) and global with mean (0). The mean values of different types of aphasic are graphically represented in Figure 28.

Figure 28: Comparison of different types of aphasics:



Block design:

Four blocks were placed before the patient and they are all alike on some sides, and they are all red, on some all-white and on some, half red and half white. And the patient is instructed to see the picture which was given and do the same. Demonstrations to the patient is given by doing an example, then mixing the blocks and make the patient to do it, using the same blocks. If she/he fails to do in 90 seconds, mix up the blocks and have him or her try again. If the patient fails on the second attempt, go on and show the next picture. Mix up blocks after each design. Except for the example the patient is not shown how to do it or given a second attempt.

Table 50: mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

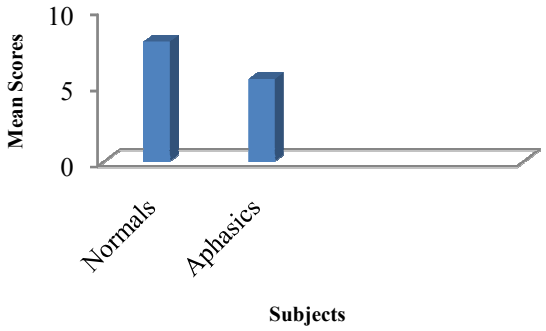
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	7	3	9	0	7.5	3.6	9	0
31-40	8	2.4	9	0	9	0	9	0
41-50	7	3	9	0	6	4.6	9	0
51-60	7.5	1.6	8	1.5	4.5	3.2	8.5	1.22
61-70	7.3	2.6	8.6	.51	6.1	2.7	8.5	.54

The table shows the mean and SD scores of normal monolinguals and bilinguals across the gender in different age groups for Block design .This shows that there is no significant difference for male and female monolinguals and bilinguals across all the age groups except for 51-60 females' monolinguals and bilinguals. The mean and standard deviation of overall normal and aphasics are given in table 51 and graphical representation of the means is shown in Figure-29.

Table 51: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Block design	7.88	2.32	5.41	3.94

Figure 29: Mean scores of normal group and clinical group in Block design:



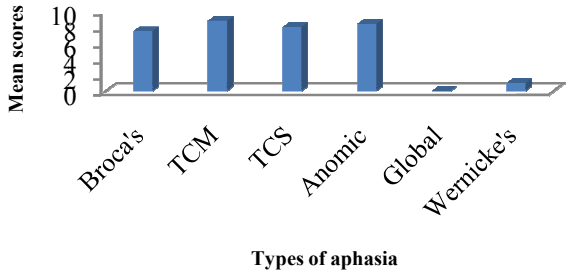
The table shows that the normal's performed better than aphasics in Block design task with mean value (7.88, 2.32) in comparison to aphasics with a mean (5.41, 3.94). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. The mean and standard deviation of different types of aphasics are given in table 52.

Table 52: Mean and SD of Block design task:

Group	Block design		
	N	Mean	Standard deviation
Broca's	6	7.5	1.64
TCM	6	8.8	0.4
TCS	6	8.0	1.54
Anomic	7	8.4	1.13
Global	8	0	0
Wernicke's	6	1.0	1.09

The above table shows that the transcortical motor, anomic, transcortical sensory performed better with mean (8.8, 8.4, 8) followed by Wernicke's with a mean (1) and global with a mean (0). The mean values of different types of aphasic are graphically represented in Figure 30.

Figure 30: shows the comparison of different types of aphasics:



Calculation:

The calculation task utilizes one or two digit numbers. Three items for each of addition, subtraction, multiplication and division, these tasks were presented visually on cards as well as the examiner speaking the numbers and requested arithmetical operations.

Table 53: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

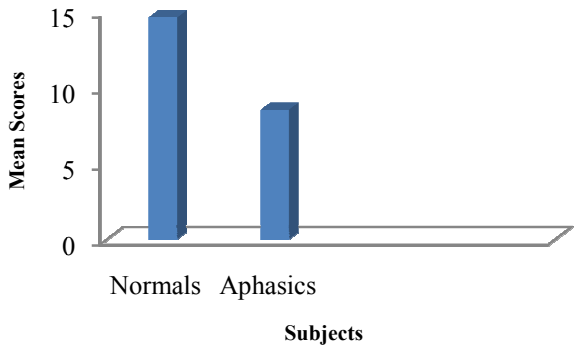
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	12	3.4	16	2.3	10.8	6.1	18.8	2
31-40	12.5	2.4	16.6	1.7	12.8	3.1	18.1	1.4
41-50	13.5	2.6	21.3	1.3	6.1	7.2	20.3	2.5
51-60	12.6	2.7	20	2	5.5	8.9	21.3	2.3
61-70	12.3	7.5	18.5	3	2.8	4.6	19.5	2.7

The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for calculation. This shows that there is significant difference across different age groups for male and female monolinguals and bilinguals except for 20-30 and 61-70 male monolingual and bilingual. Duncan's test revealed a statistically significant difference in the 2nd groups (31-40 years).The mean and standard deviation of overall normal and aphasics are given in table 54 and graphically represented in Figure-31.

Table 54: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
Calculation	14.6	6.53	8.53	7.35

Figure 31: Mean scores of normal group and clinical group in calculation:



The above table, was depicted that normal's performed better than aphasics in Calculation task with mean (14.6, 6.53) in comparison to aphasics with a mean (5.41, 3.94). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics.

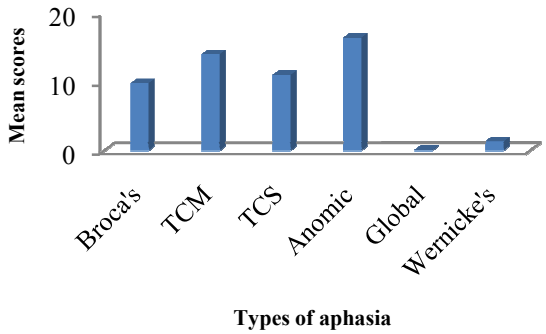
The mean and standard deviation of different types of aphasics are given in table 55.

Table 55: Mean and SD of Calculation task:

Group	Calculation		
	N	Mean	SD
Broca's	6	9.8	5.84
TCM	6	14.0	3.94
TCS	6	11.0	4.64
Anomic	7	16.4	4.89
Global	8	.12	.35
Wernicke's	6	1.33	1.63

The above table shows that persons with anomic aphasia performed better with a mean value 16.4 followed by persons with Transcortical Motor aphasia with a mean (14), Transcortical Sensory with a mean (11), Broca's with a mean (9.8), Wernicke's and Global performed poorly. The mean values of different types of aphasic are graphically represented in Figure 32.

Figure 32: shows the comparison of different types of aphasics:



Colored Progressive Matrices: Designed for younger children, the elderly, and people with moderate or severe learning difficulties, this test contains sets A and B from the standard matrices, with a further set of 12 items inserted between the two, as set AB. Most items are presented on a colored background to make the test visually stimulating for participants. However the very last few items in set B are presented as black-on-white; in this way, if a subject exceeds the tester's expectations, transition to sets C, D, and E of the standard matrices is eased. Administer the test as indicated in its manual. The maximum score is 37.

Table 56: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	24.8	7.8	28.5	3.6	28.6	4.2	33.6	2.1

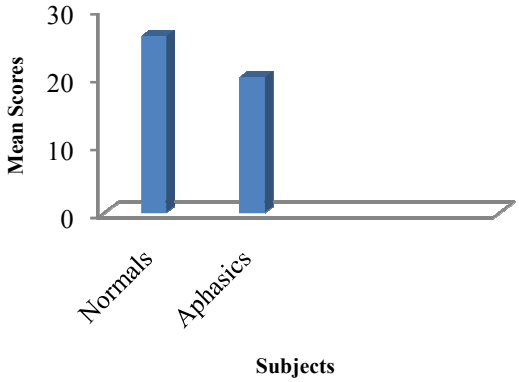
31-40	25.8	3.9	28.6	3.9	22.6	5.35	32.6	1.5
41-50	23.1	2.7	31	5.2	24.8	7.44	30.1	3.3
51-60	21.1	6.55	28	3.2	16	8.17	25.1	4.2
61-70	20.8	8.5	28.8	2.1	17.5	5.9	28.1	2.9

The above table shows the mean and SD of normal monolinguals and bilinguals across the gender in different age groups for RCPM. This shows that there is significant difference across different age groups 20-30, 31-40, 51-60 male and female bilinguals, 41-50 male monolingual and bilingual and 61-70 male and female monolingual and bilingual. And there is no significant difference across 20-30, 31-40, 51-60 male monolingual and bilingual and 41-50 female monolingual and bilingual. Duncan's test revealed a statistically significant difference in the 5^{th} and 6^{th} groups (51-60 and 61-70 years.)The mean and standard deviation of overall normal and aphasics are given in table 57 and graphical representation of the means is shown in Figure-33.

Table 57: Mean and SD of Normal's and aphasics:

Tasks	Normal's		Aphasics	
	Mean	SD	Mean	SD
RCPM	26.0	6.59	20.0	10.41

Figure 33: Mean scores of normal group and clinical group in RCPM:



As it can be seen from table it was depicted that normal's performed better than aphasics in RCPM with a mean (26.0, 6.59) in comparison to aphasics with a mean (20, 10.41). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics. Duncan's test revealed a statistically significant difference in the 4^{th} and 5^{th} groups (51-60 and 61-70 years). The mean and standard deviation of different types of aphasics are given in table 58.

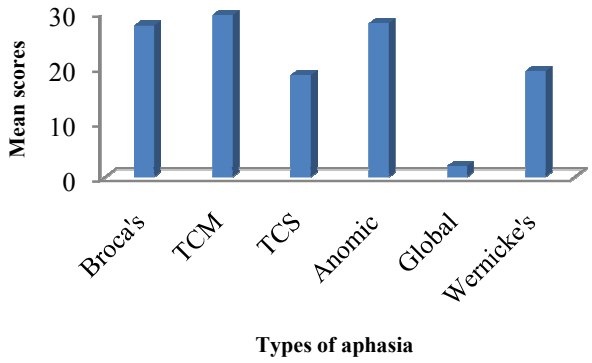
Table 58: Mean and SD of RCPM:

Group	Ravens colored progressive matrix		
	N	Mean	SD
Broca's	6	6	1.6
TCM	6	6	1.76
TCS	6	6	1.96

Anomic	7	7	3.51
Global	8	8	2.13
Wernicke's	6	6	2.16

As it can be seen from table 52 it was observed that Transcortical Motor, Anomic, Broca's performed better with a mean value of 29.5,28,27.6 followed by Wernicke's and Transcortical sensory with mean values of 19.3,18.6 and global performed poorly with a mean of 2.0. The mean values of different types of aphasic are shown in graphical representation in Figure 34.

Figure 34: shows the comparison of different types of aphasic:



Cortical Quotient:

Kertesz (1979) described additional tests for reading, writing and nonverbal functions, from which he derived the performance quotient (PQ). The score is derived from all subtests is the cortical quotient (CQ).

$$C.Q. = A.Q. + P.Q.$$

Cortical quotient is based on the language and non language subtests of WAB (Kertesz, 1979). The Cortical quotient is presented as an indicator of the patient's cognitive functioning.

Table 59: Mean and SD for the comparison of normal monolinguals and bilinguals across the gender in different age groups:

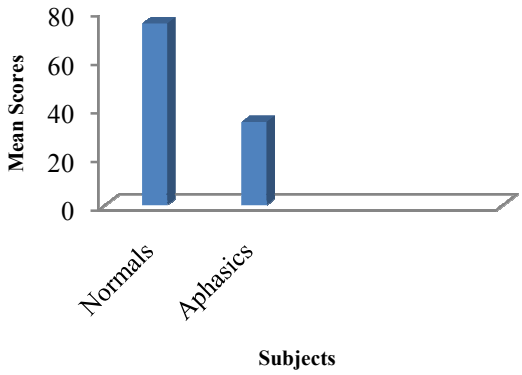
Age	Males				Females			
	Monolinguals		Bilinguals		Monolinguals		Bilinguals	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20-30	74.8	2.1	78.5	0.54	73.1	4.82	78.9	0.38
31-40	74.8	1.2	78.1	0.74	74	1.2	78.1	o.6
41-50	73.2	1.7	78.8	0.32	73.1	1.79	78.6	0.76
51-60	74.8	2.5	78.3	0.67	64.7	3.4	66.4	28.7
61-70	73.3	2.7	77.9	0.47	70	1.3	78.3	0.47

As it can be seen from table the mean and standard deviation scores of normal monolinguals and bilinguals across the gender in different age groups for cortical quotient. This shows that there is significant difference between male and female monolinguals and bilinguals across different age groups. The mean and SD of overall normal and aphasics are given in table 60 and graphical representation of the means is shown in Figure-35.

Table 60: Mean and SD of Normal's and aphasics:

Cortical Quotient	Normal's		Aphasics		Sig.(p)	Significance
	Mean	SD	Mean	SD		
	74.9	7.33	34.3	21.20	.000	S

Figure 35: Mean scores of normal group and clinical group in cortical quotient



As it can be seen from table it was observed that normal's obtained Cortical Quotient mean (74.9, 7.3) better in comparison to aphasics with a mean (34.3, 0). Non-parametric test (Mann-Whitney test) was administered in order to obtain the level of significance in normal's and aphasics, which shows that there is a significant difference between normal's and aphasics.

Table 60: Mean and SD of Cortical Quotient:

Group	Cortical quotient		
	N	Mean	SD
Broca's	6	39.5	3.8
TCM	6	49.9	3.15
TCS	6	43.3	2.33
Anomic	7	60.8	3
Global	8	4.31	0.74
Wernicke's	6	13.5	2.5

As it can be seen from table it was depicted that anomic performed better with a mean (60.8) followed by transcortical motor, transcortical sensory, Broca's with mean (49.9, 43.3, 39.5,) Wernicke's and global obtained a poorer cortical quotients 13.5, 4.31.

Table 61: Comparison of education in normal's across different tasks (*represents significant difference between the groups):

Tasks	df	F	Sig. (p)
Spontaneous speech	3	33	0.00*
Yes/no	3	1	0.3

Auditory word recognition	3	5	0.003*
Sequential commands	3	5	0.002*
Repetition	3	14	0.00*
Word fluency	3	23	0.00*
Sentence completion	3	4	0.006*
Responsive naming	3	1	0.3
Aphasia quotient	3	107	0.00*
Reading	3	27	0.00*
Writing	3	48	0.00*
Apraxia	3	12	0.00*
Block design	3	6	0.00*
Calculation	3	40	0.00*
Ravens colored progressive matrix	3	16	0.00*
Cortical Quotient	3	3	0.021*

Table 62: Mean, SD and significant difference for the comparison on aphasic monolinguals# and aphasic bilinguals# across different tasks (*represents significant difference between the groups).

Tasks	ML & BL#	N	Mean	SD	Significance
Spontaneous speech	ML	12	4.58	2.23	0.39
	BL	27	5.48	2.76	
Yes/no	ML	12	43.3	20.9	0.72
	BL	27	37.8	24.6	
Auditory word recognition	ML	12	42.5	25.3	0.8
	BL	27	36.4	26.4	
Sequential commands	ML	12	54	32	0.72
	BL	27	45.7	35.7	
Repetition	ML	12	55.3	40.2	0.96
	BL	27	51	43.1	
Object naming	ML	12	20.1	15.1	0.93
	BL	27	21.2	16.6	
Word fluency	ML	12	2.5	3.2	0.28
	BL	27	5	5.9	

Sentence completion	ML	12	1.8	2.2	0.39
	BL	27	3	3.1	
Responsive naming	ML	12	2.2	1.6	0.98
	BL	27	2.9	3.1	
Aphasia quotient	ML	12	39.5	22.1	0.68
	BL	27	39.7	25.8	
Reading	ML	12	11.7	28.2	**0.001***
	BL	27	51.2	36.5	
Writing	ML	12	.83	2.88	**0.00***
	BL	27	16.6	15.9	
Apraxia	ML	12	47	23.5	0.41
	BL	27	38.6	26.4	
Drawing	ML	12	12.4	8.5	0.7
	BL	27	12.7	9.3	
Block design	ML	12	5.5	3.5	0.73
	BL	27	5.3	4.1	
Calculation	ML	12	6.6	5.1	0.3
	BL	27	9.3	8	

Ravens colored progressive matrix	ML	12	18.4	11.7	0.49
	BL	27	20.8	9.9	
Cortical quotient	ML	12	33.6	18.2	0.63
	BL	27	34.6	22.6	

The above table shows that there is a significant difference between monolinguals and bilinguals across all the tasks, except for the tasks reading and writing significant difference is not noticed.

SUMMARY AND CONCLUSION

In the present study, an attempt has been made to standardize Western Aphasia Battery in Telugu (WAB-T) for Telugu monolinguals and Telugu-English bilingual population (T-E). Western Aphasia Battery in Telugu (WAB-T) which was developed by Sri Pallavi. M & Shyamala Chengappa, (2010) was used in the present study. Two groups of subjects were taken, group A consisting of one hundred and twenty normal adults who were native speakers of Telugu (Monolingual/Bilingual/Multilingual) and were categorized into five age groups: 20-30, 31-40, 41-50, 51-60 and 61-70 years with 12 monolinguals (6 male monolinguals, 6 female monolinguals) and 12 bilinguals (6 male bilinguals, 6 female bilingual), and group B consists of thirty nine persons who were diagnosed with different types of aphasia participated in the study. The participants were diagnosed based on the neurological findings obtained from the neurologist. All the participants were matched for their age, sex, handedness and education level. Western aphasia battery was administered to all the participants in the groups.

Quantitative analysis was done by using SPSS 17.0 version in which MANOVA was done to compare the performance across normals Vs aphasics, monolingual and bilingual subjects, males Vs females and also the educational performance. The nonparametric Mann Whitney U test was performed to determine if there was significant difference in performance between normal's and aphasics for each task in Western Aphasia Battery. Mann Whitney U test was also employed to delineate the significant difference in performance between male and female monolinguals and bilinguals across various age groups. Results revealed that there was significant difference between normals and aphasics in all the tasks. Normal's performed better than aphasics in all the tasks. Following are the comparisons of normal monolinguals and bilinguals across the gender in different age groups for all the tasks:

1) **Spontaneous speech -** There is a significant difference in male and female monolinguals and bilinguals across the age groups 20-30, 31-40, 41-50 years for the task spontaneous speech, and there is no significant difference for male and female bilinguals in the age group 51-60 and 61-70 years.
2) **Auditory Verbal comprehension**
    a) **Performance on Yes/no -** There is no significant difference between male and female monolinguals and bilinguals.
    b) **Performance on Auditory word recognition -** There is no significant difference between male and female monolinguals and bilinguals. But significant difference is seen in female monolinguals and bilinguals in the age range of 51-60 years.
    c) **Performance on Sequential commands –** That there is no significant difference between male and female monolinguals and bilinguals. But significant difference is noticed for male monolinguals and bilinguals in the age range of 61-70 yrs years.
3) **Repetition -** There is a significant difference across the age groups 41-50, 51-60 male monolinguals and bilinguals, 31-40 years male monolinguals and bilinguals and 20-30 years female monolinguals and bilinguals. There is no significant difference seen for the age group 31-40, 61-70 years male and female monolinguals and bilinguals and 41-50 years female monolinguals and bilinguals.
4) **Naming**
    a) **Object naming -** There is no significant difference between male and female monolinguals and bilinguals across the different age groups.
    b) **Word fluency -** There is a significant difference across the age groups 20-30, 31-40 years female monolinguals and bilinguals and 41-60, 51-60

years male and female monolinguals and 61-70 years female monolinguals. There is no significant difference seen for the age groups 20-30, 31-40 and 61-70 years male monolinguals and bilinguals.

c) **Sentence completion -** That there is no significant difference across all the age groups for male and female monolingual and bilingual.

d) **Responsive naming -** There is no significant difference across all the age groups for male and female monolingual and bilingual except for 51-60 years female monolinguals and bilinguals.

Aphasia quotient: There is a significant difference between male and female monolinguals and bilinguals across different age groups.

5) **Reading -** There is a significant difference across the age groups 20-30 years male and female monolinguals and bilinguals, 41-60 years male monolinguals and bilinguals, 51-60 years female monolinguals and bilinguals, 61-70 years male monolinguals and bilinguals. There is no significant difference for 31-40 years male and female monolinguals and bilinguals, 41-50 years female monolinguals and bilinguals, 51-60 years male monolinguals and bilinguals and 61-70 years female monolingual and bilingual.
6) **Writing -** There is a significant difference in male and female monolinguals across different age groups.
7) **Apraxia -** There is no significant difference between male and female monolinguals and bilinguals across different age groups.
8) **Drawing -** There is significant difference for 31-40, 41-50 years male monolinguals and bilinguals, 51-60 and 61-70 years female monolinguals and

bilinguals. There is no significant difference for 20-30 years male and female monolinguals and bilinguals, 31-40 and 41-50 years male and female monolinguals and bilinguals, 51-60 and 61-70 years male and female monolinguals and bilinguals.

9) **Block design -** There is no significant difference for male and female monolinguals and bilinguals across all the age groups except for 51-60 years female's monolinguals and bilinguals.
10) **Calculation -** There is significant difference across different age groups for male and female monolingual and bilingual except for 20-30 and 61-70 years male monolingual and bilingual.
11) **Ravens colored progressive matrix -** there is a significant difference across different age groups 20-30, 31-40, 51-60 years male and female bilinguals, 41-50 years male monolingual and bilingual and 61-70 years male and female monolingual and bilingual. And there is no significant difference across 20-30, 31-40, 51-60 years male monolingual and bilingual and 41-50 years female monolingual and bilingual.

Cortical quotient: There is significant difference between male and female monolinguals and bilinguals across different age groups.

Comparison of normal monolinguals and aphasic monolinguals across different tasks has been carried out, which revealed that there was a significant difference between normal monolinguals and aphasics monolinguals across all the tasks except for the nonverbal tasks like Block design, Calculation and Ravens Colored Progressive Matrix. Comparison of normal bilinguals and aphasic bilinguals across different tasks has also been done which depicted that there was a significant difference between normal bilinguals and aphasics bilinguals across all the tasks.

Comparison of gender across different tasks with in aphasics has also been done, which revealed that there was no significant difference between genders with in aphasics across different tasks. Education in normal's across different tasks has also been compared, which revealed that there was a significant difference across all the tasks except for yes/no, responsive naming and cortical quotient. Comparison of different types of aphasics across all the tasks has also been carried out which revealed there was a significant variation in the scores of aphasics in respect to different tasks. Comparison of aphasic monolinguals and aphasic bilinguals across all the tasks has also been carried out, which revealed that there is no significant difference noticed across all the tasks for monolingual and bilingual aphasics except for the reading and writing tasks.

Implications of the project

- This test can be used as an objective assessment tool for assessing individuals with aphasia in Telugu language.
- The WAB –T provides cultural specific norms pertaining to the Indian monolinguals (T) and bilinguals (T-E) these can be used for comparative purposes with western norms.
- This test battery can be used to classify various aphasic syndromes.
- It can be used to plan therapy programs for individuals with aphasia.
- It will add to the clinical utility of the standardized tests providing norms.

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APPENDIX – 1

WESTERN APHASIA BATTERY

TEST BOOKLET

(Telugu Version)

ALL INDIA INSTITUTE OF SPEECH AND HEARING

Manasagangotri, Mysore -570006

PATIENT DATA

Name Age Birth date

Address

Languages

Handedness Writing Throwing Cutting Drawing Spoon Brush

Education (Number of standards)

Occupation

Present Illness

	Hemiplegia			Side		
Signs	Severe	Moderate	Mild	Recovered	Hemianopia	Sensory Loss

			Lesion	
Investigations:	Date	Size	Side	Location
E.E.G.				
Isotope Scan				
C.T. Scan				
Arteriograms				
Operation Data				
Autopsy Data				

Date File Number

Institution

Examiner

Referred By

I .Spontaneous Speech

Record patient's speech on paper and tape. Subtract similar questions if necessary or appropriate .Score fluency and information content according to criteria on page 3

1. ఈ రోజు మీరు ఎలా ఉన్నారు?

2. మీరు ఇంతకు ముందు ఇక్కడికి వచ్చారా?

3. మీ పేరేమిటి?

4. మీ చిరునామా ఏమిటి?

5. మీరు ఏపని చేస్తారు?

6. మీరు ఇక్కడికి ఎందుకు వచ్చారో కొంచెం వివరంగా చెప్పండి?

7. ఈ చిత్రంలో ఏమి జరుగుతుందో చెప్పండి.

Present test picture (card 1) and say: "Tell me what you see" "Encourage the patient to pay attention to all aspects of the picture. Move the picture towards the patient's intact visual field .Ask for more complete response if only a few words are produced .

Maximum score 20
Patient's score ----

SCORING OF SPONTANEOUS SPEECH

A. Information Content

(0) No Information

(1) Incomplete responses only, e.g., first name or last name only.

(2) Correct responses to any 1 item

(3) Correct responses to any 2 items.

(4) Correct responses to any 3 items.

(5) Correct response to any 3 of the first 6 items plus some response to the picture.

(6) Correct response to any 4 of the first 6 items plus some response to the picture.

(7) Correct response to any of the first 6 items on page 2 and a mention of at least 6 of items in the picture.

(8) Correct responses to 5 of the first 6 items and an incomplete description of the picture .Recognizable phonemic paraphasias are to be counted as correct.

(9) Correct responses to all 6 items on page 2.An almost complete description of the picture: at least 10 people, objects, or actions should be named Circumlocution may be present.

(10) Correct response to all 6 on page 2 and to the picture. Sentences of normal length and complexity, referring to most of the items and activities. A reasonably complete description of the picture.

B. Fluency, Grammatical Competences, and paraphasias

(0) No words, or short, meaningless utterances.

(1) Recurrent stereotypic utterances with varied intonation, conveying some meaning.

(2) Single words, often paraphasias , effortful and hesitant .

(3) Fluent recurrent utterances or mumbling, very low volume jargon.

(4) Halting, telegraphic speech .Mostly single words, often paraphasic but with occasional verbs or prepositional phrases. Automatic sentences only, e.g., "Oh I don't know".

(5) Often telegraphic but more fluent speech with some grammatical organization .Paraphasias may be prominent .Few prepositional sentences

(6) More complete prepositional sentences. Normal syntactic pattern may be present.Paraphasias may be present.

(7) Phonemic jargon with resemblance to English syntax and rhythm with varied phonemes and neologisms May be valuable: must be fluent.

(8) Circumlocutory, fluent speech .Marked word finding difficulty .Verbal paraphasias .May have semantic jargon .The sentences are often complete but may be irrelevant.

(9) Mostly complete, relevant sentences; occasional hesitation and/ or paraphasias . Some word finding difficulty. May have some articulatory errors.

(10) Sentences of normal length and complexity, without definite slowing, halting or articulatory difficulty. No paraphasias.

II. Auditory Verbal Comprehension

A. Yes/No Questions.

Explain to the patient that you are going to ask some questions and that the answers should be either "Yes"or "No". If it is difficult to establish a consistent verbal or gestural or yes/no response, then eye closure for "yes" should be established .The instructions should be repeated, if necessary, during the test. Reinforce the patient when he or she gets into the set of answering as requested, but avoid nodding or commenting on specific items! If patient self-corrects, the last answer is scored. If patient gives an ambiguous or confabulatory response, repeat the instructions and the question and score accordingly. If the response is still ambiguous, score 0. Score 3 points for each correct answer. Record response in the appropriate column: verbal, gestural or eye blink.

	Verbal	Gestural	Eye Blink
1. మీ పేరు సుబ్బారావేనా? ("కాదు" సరైన సమాధానం)			
2. మీ పేరు రామాకృష్ణేనా? ("కాదు" సరైన సమాధానం)			
3. మీ పేరు--------? (అసలైన పేరు)			
4. మీరు బెంగళూరులో ఉంటారా? ("కాదు" సరైన సమాధానం)			
5. మీరు------ లో ఉంటారా? (అసలైన ఊరు)			
6. మీరు విజయవాడలో ఉంటారా? ("కాదు" సరైన సమాధానం)			
7. మీరు స్త్రీనా/పురుషుడా? ("అవును" సరైన సమాధానం)			
8. మీరు డాక్టరా? ("కాదు" సరైన సమాధానం)			
9. నేను స్త్రీనా/పురుషుడా? ("అవును" సరైన సమాధానం)			
10. ఈ గదిలోని లైట్లు వెలుగుతున్నాయా? ("అవును" సరైన సమాధానం)			
11. ఈ గది తలుపు మూసి ఉందా? ("అవును" సరైన సమాధానం)			
12. ఇది హోటలా?			
13. ఇది.....?			
14. మీరు ఎరుపు రంగు బట్టలు వేసుకున్నారా ?("కాదు" సరైన సమాధానం)			
15. కాగితం నిప్పుతో కాలుతుందా?			
16. మార్చి నెల జూన్ నెలకంటే ముందు వస్తుందా ?			
17. అరటిపండు తొక్క తియ్యకుండా తింటారా?			
18. జులై నెలలో వర్షం వస్తుందా?			
19 . కుక్క కన్నా గుర్రం పెద్దదా?			
20. మీరు గడ్డిని గొడ్డలితో కోస్తారా ?			

Maximum Score 60

Patient's Score -------

B. Auditory Word Recognition

Place the real objects in a random cluster making sure that they are within the patient's intact field if hemianopsia is present .Present cards of the pictured objects, forms, letters, numbers, and colors. Ask the patient to point to the furniture, his or her body parts, and fingers, in the order listed. Ask the patient to point to each item, by saying, "point to the------, or, show me the--------." One repetition of each command is allowed. If he patient points to more than one item, score 0, unless it is clear that the patient recognizes his or her error and corrects it. For the seven items requiring left-right discrimination ,the patient must get both the side and the body part correct to receive credit .If the room does not have certain furniture, substitute comparable items

Real objects	Drawn objects	Forms	Letters	Numbers
కప్పు	అగ్గిపెట్టె	చతురస్రం	అ	5
అగ్గిపెట్టె	కప్పు	త్రిభుజం	ప	61
పెన్సిల్	దువ్వెన	వృతం	బ	500
పువ్వు	చాకు	బాణం	క	1867
దువ్వెన	పెన్సిల్	క్రాస్	మ	32
చాకు	పువ్వు	అర్ధచంద్రాకారం	డ	5000

Colors	Furniture	Body parts	Fingers	Right –Left
నీలం	కిటికి	చెవి	బొటనవేలు	కుడి భుజం
తెలుపు	కుర్చి	ముక్కు	ఉంగరపువేలు	ఎడమ మోకాలు
ఎరుపు	టెబుల్	కన్ను	చూపుడువేలు	ఎడమ మడమ
ఆకుపచ్చ	లైటు	ఛాతి	చిటికెనవేలు	కుడి తొడ
పసుపు	తలుపు	మెడ	మధ్యవేలు	ఎడమ మోచెయ్యి
నలుపు	గోడ	మదురు	కుడి చెవి	కుడి బుగ్గ

Maximum Score 60

Patient's Score --------

Sequential Commands

Score for partial execution of the commands according to the numbers above each segment that is correctly executed .If the patient requests repetition or looks confused; repeat the command as a full sentence. On the table before the patient line up the pen, comb, and book in this respective order and label each, verbally: "see the pen, the comb, and the book ? I will ask you to point to them and do things with them, just as I say. Are you ready ? "If the patient does not seem to understand the task, point with the comb to the pen to demonstrate, and start again.

	Scores
చెయ్యి ఎత్తండి	2
కళ్ళు మూసుకోండి	2
కుర్చీని చూపించండి	2
2 2 కిటికీని చూపించి తర్వాత తలుపుని చూపించండి	4
2 2 పెన్ను మరియు పుస్తకాన్ని చూపించండి	4
4 4 పెన్నుతో పుస్తకాన్ని చూపించండి	8
4 4 పుస్తకంతో పెన్నుని చూపించండి	8
4 4 పెన్నుతో దుప్పెనను చూపించండి	8
4 4 పుస్తకంతో దుప్పెనను చూపించండి	8
4 6 4 పెన్నును పుస్తకంపై పెట్టిన తర్వాత నాకివ్వండి	14
5 5 5 5 పెన్ను వక్కన దుప్పెన ఉంచండి మరియు పుస్తకాని తిప్పండి	20

Maximum Score 80
Patient's Score-------

III. Repetition

Ask the patient to repeat the words listed below; then record the responses. You may repeat items once, if the patient asks or does not seem to hear .If incompletely repeated, score 2 points for each recognizable word. Minor dysarthric errors or colloquial pronunciation are scored as corrected. Take 1 point off for errors in order of word sequence or for each literal paraphasia (phonemic errors) .

	Maximum Score
1. చెయ్యి	2
2. ముక్కు	2
3. మంచం	2
4. కిటికి	2
5. అరటి పండు	2
6. ఇంద్ర ధనుస్సు	4
7. నలభై అయిదు	4
8. తొంభై అయిదు శాతం	6
9. అరపై రెండున్నర	10
10. రైతు దున్నుతున్నాడు	8
11. అతను పెనక్కి రావడంలేదు	10

12. మెరిసేదంతా బంగారం కాదు 10

13. భారతదేశపు మొదటి రాష్ట్రపతి 8

14. అయితే, ఇంకా లేదా కాని అనేవి లేవు 10

15. నా బండిని రెండు డజన్ల బియ్యం బస్తాలతో నింపండి 20

Maximum Score 100
Patient's Score --------

IV. Naming

A. Object Naming

Present objects in the order listed below .If no or incorrect responses to visual stimulus, let the patient touch the stimulus .If still no or incorrect responses, present a phonemic or, If a composite word, a semantic cue (the first half of the word). Allow a maximum of 20seconds for each item .Score 3 points if named correctly or with minor articulatory error, 2 points for a recognizable phonemic paraphasia, and 1 point if a phonemic or tactile cue is required.

Stimulus	Response	Tactile Cue	Phonemic Cue	Score
పైసా				
బంతి				
కత్తి				
కప్పు				
పిన్నిసు				
అద్దం				
టూత్ బ్రష్				
పుస్తకం				
తాళం				
పెన్సిల్				

కత్తెం				
తాళంచెవి				
సూది				
గాజు				
దువ్వెన				
వాచీ				
చెంచా				
పువ్వు				
పళ్లెం				
అగ్గిపెట్టె				

Maximum Score 60
Patient's Score ------

B. Word Fluency
Ask the patient to name as many animals as he or she can in 1 minute .The patient may be helped if hesitant: "Think of a domestic animal, like the horse, or a wild animal, like the tiger". The patient may be prompted at 30 seconds. Score 1 point for each animal named (except for those in the example), even if distorted by literal paraphasia.

Maximum Score 20
Patient's Score ------

C. Sentence Completion
Ask patient to complete what you say .Provide an example, such as "ice is (cold)". Score 2 points for correct response and 1 point for phonemic paraphasias. Accept reasonable alternatives,
e.g.; sugar is … (fattening) but not grass is… .. (brown)

1. గడ్డి ఏ రంగులో---- ఉంటుంది ? (ఆక్కుపచ్చ)
2. చక్కెర/పంచదార ఎలా---------ఉంటుంది? (తీయగా/తెలుపు)
3. గులాబి పువ్వు ఎర్రగా ఉంటుండి,మల్లె పువ్వు ------ఉంటుంది? (తెలుపు)
4. వాళ్ళు కుక్క ------- లాగా కొట్లాడుతుంటారు ? (పిల్లి)
5. భారత స్వాతంత్ర దినోత్సవం-----నెలలో జరుపుకుంటారు? (ఆగస్ట్)

Maximum Score 10
Patient's Score------

D .Responsive Naming
Score 2 points for acceptable responses ,1 point for phonemic paraphasias

1. మీరు దేనితో రాస్తారు? (పెన్, పెన్సిల్)
2. పాలు ఏ రంగులో ఉంటాయి? (తెలుపు)
3. వారంలో ఎన్ని రోజులు ఉంటాయి?(ఏడు)
4. డాక్టర్లు ఎక్కడ పనిచేస్తారు? (హాస్పిటల్)
5. మీకు స్టాంపులు ఎక్కడ దొరుకుతాయి? (పొస్టాఫీస్, స్టేషనరీ షాపు)

Maximum Score 10
Patient's Score------

V. Reading

A .Reading comprehension of Sentences
Present test sentences, one per card .Instruct the patient to: "Read these sentences and point to the missing word. Choose the best from those." The oral instructions should be accompanied by gesture and by pointing to the words missing and the choice of answers. The instructions may be repeated if the patient does not seem to understand. Ask the patient to do the examples .If the patient does not do it correctly, point to the correct answer and say: "See, this is the missing word, e.g. the tree has…." (Wheels, leaves, grass, or fire)

	Score
1.వర్షం ------ గా ఉంటుంది నీలం తడి పొడి సముద్రం	2
2.సైనికుడు ----------ని ఉపొయోగిస్తాడు తుపాకి కాలుస్తాడు పఠాకి సరుకులు	2
3.సురేష్ కార్లు ట్రక్కులు రిపేర చేస్తాడు. అతను ఒక -------- టైలర్ యంత్రం మెకానిక్ బస్సు	4

4. జూన్ నెల తర్వాత ఉపాధ్యాయులు బడులు ప్రారంభిస్తారువారు కి--- పాఠాలు చెప్తారు 4

వర్షాల
పిల్లల
జనవరి
పుస్తకాల

5.ఉలులు రంపాలు సాధారణ పనిముట్లు.వాటిని-------తో చేస్తారు. 6

రైతు
అడవి
లోహం
కొయ్యడం

6. రైతులు తరచుగా ధాన్యం ,గోధుమలు మరియు ఇతర ధాన్యాలు పండిస్తారు. వారు ఇంకా---పండించగలుగుతారు. 6

బొగ్గు
ట్రాక్టర్లు
భూమి
కూరగాయలు

7. శక్తి చాలినంతా అందుబాటులో ఉంది.ఆయిల్ తగ్గిపోవడం వలన,చాలా దేశాల ---ఎంటి ఇతర ప్రత్యామ్నాయ వనరులపై ఆధారపడుతున్నాయి. 8

నీటిని మరిగించడం
బ్యాంకులు
సూర్యరశ్మి
ఆర్థవ్యవస్థ

8. టైటానిక్ ఒక అద్భుతమైన సముద్ర నౌక అది మునగడం అసంభవం అనుకున్నారంతా కాని అది 1912 లో ఒక మంచు ఖండాన్ని ఢీకొని మునిగిపోయింది, ఇంచుమించు పెయ్యిమందికి పైగా చనిపోయారు. ----- జరిగి ఉండకపోతే అది మునిగి ఉండేది కాదు. 8

దాని శక్తి కోల్పోవడం
బాగా పాడైపోవడం
ప్యాసింజర్లను తీసుకువెళ్ళడం
పడమటి పైపు వెళ్ళడం

Maximum Score 40
Patient's Score -----

B. **Reading commands**

Present each card and say, "I want you to read this aloud and then do what it says". Instructions may be repeated if the patient only does one or the other part of the task .Give a partial score if only part of the command is read or contains paraphasias or if only part of the command is performed

	Reading aloud	Performing
1. మీ చెయ్యివైకి ఎత్తండి	1	1
2. టాటా చెప్పండి	1	1
3. మీ కళ్ళు మూసుకోండి	1	1
4. మీ కాలితో ఒక చదరాన్ని గియ్యండి	2	2
5. కుర్చీని చూపించండి ,తర్వాత తలుపును చూపించండి	2	2
6. పెన్సిల్ తీసుకుని ,మూడుసార్లు కొట్టి,మరియు దానిని తిరిగి అక్కడ పెట్టండి	3	3

Maximum Score 20
Patient's score-----

If the combined score of A and B is 50 or more, discontinue reading tests and give full credit of 100 minus twice the difference from 60. Score = 100 - 2 (60 – patient's score). Continue with testing if combined score (A+B) is less than 50.

Prorated Score ------

C.written word stimulus--object choice matching

Place the objects in a random order before the patient .Ask the patient to point to the object that corresponds to the word presented on cards 22- 27 .Score 1 point for each correct response.

కప్పు

దువ్వెన

పెన్సిల్

పువ్వు

అగ్గిపెట్టె

చాకు

Maximum Score 6
Patient's score------

D.written word stimulus-picture choice matching
Card 2 with pictures on it is placed before the patient .Instruct the patient to point to the picture that matches the word that is presented .The words are presented individually on card 22-27. Score 1 point for each correct response.

పువ్వు

అగ్గిపెట్టె

కప్పు

చాకు

దువ్వెన

పెన్సిల్

Maximum Score 6
Patient's score------

E. Picture Stimulus – Written Word Choice Matching

Card 34.which has the words listed on it, is placed before the patient. The patient is then requested to point to the word that is the same as the picture. The pictures are presented individually on cards 28-33. Score 1 point for each correct response.

కప్పు

పెన్సిల్

చాకు

అగ్గిపెట్టె

పువ్వు

దువ్వెన

Maximum Score 6
Patient's score------

F. spoken word –written word choice matching

The patient is presented with the cards 35-38 and asked to select the orally presented target word from a choice of 5, e.g. "Show me the word flower". Score 1 point for each correct response.

నువ్వు పువ్వు నవ్వు తెలుపు ఎరుపు

నులక గిలక పలక కుర్చీ బలపం

ఆకు కత్తెర బాకు చాకు చెట్టు

కిటికి ఒకటి తలుపు గెలుపు నలుపు

Maximum Score 4
Patient's score------

G. **Letter Discrimination**
Use the score obtained on the letter identification section of the auditory word recognition subtest. If that score is 3 points or less, use a letter matching task by presenting single letters (cutouts) జ, వ, బ, క, మ, ద and have the patient point to the choice of letters on card 4

.
Maximum Score 6
Patient's score------

H. Spelled Word Recognition.

Ask the patient to name the word that is spelled orally by the examiner. If the patient does not understand the task, give an example not listed on the test .Score 1 point for each correct answer.

లే-దు

కు-క్క

ము- క్కు

ఊ-దా-రం-గు

టె-లి-ఫో-న్

Maximum Score 6
Patient's score------

I.Spelling

Ask the patient to spell each of the following words presented orally. Give an example, "కుక్క, కు-క్క " if the patient does not understand the task .Score 1 point for each correct answer.

పైకి

పిల్లి

కుంటు

ఇల్లు

పెన్సిల్

ప్రభుత్వం

Maximum Score 6
Patient's score----

VI. Writing

Use unlined paper, labeled with the name of the patient and the date of the examination.

A. Writing on Request

Ask the patient to write his/her name and address. Score 1 point for each recognizable word or number. Deduce ½ point for each spelling mistake or paraphasic error.

Maximum Score 6
Patient's score------

B. Written Output

Present the picture (card 1).Instruct the patient to "write a story about what is going on in the picture". Allow about 3 minutes .Encourage the patient to write in sentences if it appears that he or she is going to list words. Score 34 points for a full description, 8 points for each complete sentence with 6 words or more, 1 point for each correct word in incomplete or short sentences. Deduce ½ point for each spelling mistake or paraphasic error. Score isolated words 1 point, to maximum of 10 points. Punctuation is not scored.

Maximum Score 34
Patient's score------

C. Writing to Dictation

Ask the patient to write the sentences that you will dictate "నా బండిని రెండు డజన్ల బియ్యం బస్తాలతో నింపండి".The sentence may be broken up if the patient cannot remember it and parts repeated once. Score 10 points for the complete sentence or 1 point for each correct word. Deduce ½ point for each spelling or paraphasic error.

Maximum Score 10
Patient's score------

Discontinue writing test if a score of 40 or more is reached on A, B, and C. .Enter as the score for writing: 2x patient's score.

Prorated score-----

D. Writing of Dictated or Visually Presented Words.

Ask the patient to write the following words as you dictate them. If the patient does not understand, show the real object and gesture to the patient to write its name. If the patient fails(unrecognizable word or not written at all), spell the word orally, and if the patient still fails, provide cut-out letters with 2 extra letters .Subtract ½ point for incorrect letters

		Full score for either		½ score for either	
		Written response Dictated	Written Response visual stimulus	Oral spelling	cut-out letters
ఆకు	1				
మంచం	2				
ముక్కు	1				
డబ్బులు	2				
పుస్తకము	2				
కొబ్బరికాయ	2				

Maximum Score 10
Patient's score-----

E .Alphabet And Numbers

Ask the patient to write the alphabet and then the numbers from 0 through 20.Score ½ point for each letter or number, even if it is out of order.

1. Alphabet : క నుంచి మ వరకు అక్షరాలను రాయండి
2. Numbers : 1 నుంచి 20 వరకు అంకెలను రాయండి

Maximum Score 12.5
Patient's score -------

Maximum Score 10
Patient's score -------

F .Dictated Letters and Numbers

Ask the patient to write each of the following dictated letters and Numbers .score ½ point each for correctly written letters and one for each complete number.

1. Dictated: డ, మ, జ, బ, ప
2. Dictated: 5, 61, 32, 700, 1867

Maximum Score 2.5
Patient's score -------

Maximum Score 5
Patient's score -------

G. Copying of Words of a Sentence
Present card 39 with the test sentence printed o it and ask the patient to copy it. The patient may print or write .Score 1 point for each correct word, 10 points for the complete sentence. Subtract ½ point for each incorrect letter.

Maximum Score 10
Patient's score -------

VII. Apraxia.

Tell the patient "I am going to ask you to do some things, try and do them at well as you can". If the patient fails to perform the command well, then show him or her how (imitate the action). If this fails .then give the patient the real object, where applicable (asterisks). Allow for variations in normal performances. Score 3 points for a good performance in the command column. Score 2 points for approximate performance or good performance on imitation only .score 1 point for approximate performance on imitation or if performed with the actual object. If the patient uses a body part for an object, score 2 points (e.g., fingers used as a comb through the hair)

Examples
"Whistle". If the patient purses his or her lips to blow, but there is no sound, score 2 points for an approximate performance. If the patient declares that he or she can not do it or purses his or her lips but does not blow, then demonstrate .Then if the patient purses his or her lips and blow, score 1 point for approximate performance on imitation ;if the patient fails to exhale then score 0(no points).

"Sniff". If the patient grimaces or inhales through mouth , score 1 point only . If Performance improves on imitation ,score 2 points .If the patient does it only with flower ,score 1point only .If the patient rubs the flower on his or her nose, score 0 (no points).

	Command	Imitated	With Object
Upper limb			
1. పిడికిలి బిగించండి			
2. దండం పెట్టండి			
3. టాటా చెప్పండి			
4. మీట్ తల గోక్కోండి			
5. చిటికెలు వెయ్యండి			

Facial

6.మీ నాలుకను బయట పెట్టండి

7. మీ కళ్ళు మూసుకోండి

8. ఈల వెయ్యండి

9. పువ్వు వాసన చూడండి.

10. అగ్గిపుల్లను ఆర్పండి

Instrumental

11.దువ్వెనను ఉపయోగించండి

12.టూత్ బ్రష్ ఉపయోగించండి

13. స్పూన్ తో తినండి

14. కత్తెరను ఉపయోగించండి

15. తాళంచెవిని ఉపయోగించండి

Complex

16. ఒక కారు నడుపుతున్నట్లు నటించండి

17. తలుపును తెరవమని అడిగి తలుపు తెరవండి

18. ఒక కాగితాన్ని మడతపెడుతున్నట్లు నటించండి

19. ఒక క్రొవ్వొత్తిని వెలిగిస్తున్నట్లు నటించండి

20. పిల్లనగ్రోవిని వాయిస్తున్నట్లు నటించండి

Maximum Score 60

Patient's score ---

VIII. Constructional, visuospatial, and calculation tasks

A .Drawing The subject is asked to freehandedly draw the figures listed below on a separate sheet of paper . Encourage completion by saying "Is that as complete as you can make it ? " . The scoring system is listed for each figure .

If the patient appears to have a comprehension problem , then he or she may be shown examples for 10 seconds .

1. వృతం (2)

Score 2 points for closed circle

Score 1 point for the curved segments

2. గ్లాసు (5)

Score 5 points for perspective and form Subtract 1 point for each in appropriate angle and missing circles

Score 1 point if both the lines and the two circles are shown

3. చతురస్రం (2)

Score 2 points for closed square

Score 1 point for the 4 lines

4. గడియారము (5)

Score 5 points for correct figure

Score 4 points if numbers are partially absent or wrong

Score 3 points for all numbers and no hands

Score 2 points if most numbers are absent or out of circle

Score 1 point for circle only

5. చెట్టు (3)

Score 3 points for quality

Score 2 points for symmetry

Score 1 point for symmetry

6. ఇల్లు (5)

Score 5 points for complete perspective

Subtract 1 point for lack of perspective

Subtract 1 point for missing detail

Score 2 points for an approximation

7. మనిషి బొమ్మ (5)

Score 5 points for complete ness and symmetry

Subtract 1 point for each body part missing

Score 1 point for an approximation

8. ఒక గీతగీసి దానిమధ్య ఒక చుక్క పెట్టండి (3)

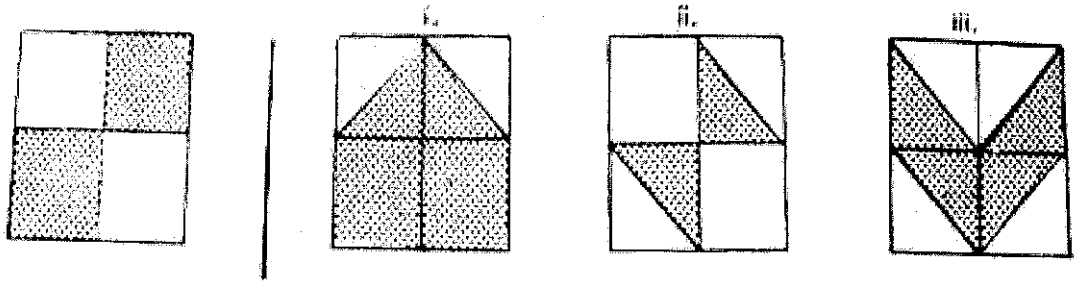
Instruct the patient to place a mark at the middle (or center) of the line. Deduct ½ point for each 5 m.m deviation

Maximum score 30

Patient's score -----

D. **Block design**

Place four blocks before the patient. Say "you see these blocks, they are all alike. On some sides, they are all red, on some all white and on some, half red and half white. I am going to put the blocks together to make them look like this picture .Watch me first. Now, look at the picture and make one just like it with the blocks". Demonstrate how to do the example, moving slowly, then mix up the blocks and have the patient to do it, using the same blocks .If he or she fails to do it in 90nseconds, mix up the blocks and have him or her try again. If the patient fails on the second attempt, go on and show the next picture .Mix up the blocks after each design .Except for the example, the patient is not shown how to do it or given a second attempt .Score 3 points for correct design, completed in 60 seconds; score 2 points for correct design, with extra time allowed (2minutes) .score 1 point for blocks put together.



Practice
Score 3 points for correct design within 60 seconds
Score 2 points for correct design with extra time
Score 1 point for 4 blocks put together.

Maximum score 9
Patient's score ------

B. Calculations

Present the card with the first calculation on it and say to he patient, "I would like you to add. What is -------? "Then, "I would like you to subtract, what is ----------? "etc. continue with oral stimuli and allow the patient to look at the card at the same time(combined oral and visual stimulation) . Score 2 points for each correct response. The patient may respond orally or point to the correct answer. There is no practical score given.

1. Addition	5 + 4	9 20 1 8	6 + 2	4 12 8 3	4 + 3	6 12 7 4
2. Subtraction	6 - 2	8 4 12 3	9 - 7	16 2 5 63	8 - 3	5 3 24 11
3. Multiplication	4 X 2	7 2 8 6	5 X 3	6 2 8 15	6 X 7	2 11 42 25
4. Division	8 ÷ 4	12 2 32 4	64 ÷ 8	13 56 8 72	18 ÷ 3	4 21 15 6

Maximum score 24
Patient's score ------

C. Raven's Colored Progressive Matrices

Administer the RCPM .as indicated in its manual. The maximum score is 37, 1 point for each correct item and award 1 additional point for completion in 5 minutes or less.

Maximum score 37
Patient's score ------

WAB SCORE SHEET

	Maximum	*patient's score*	*Total for AQ*
Spontaneous speech Information content Fluency *Total*	 10 10 20		
Comprehension Yes/No Questions Auditory Word Recognition Sequential Commands *Total* (Divide by 20 for AQ) (Divide by 10 for CQ)	 60 60 80 10		
Repetition *Total* (Divide by 10)	100 10		
Naming Object Naming Word Fluency Sentence Completion Responsive Naming *Total* (Divide by 10)	 60 20 10 10 10		
Aphasia Quotient (Add totals and Multiply by 2 for AQ)			
Reading and Writing Reading Writing *Total* (Divide by 10)	 100 100 20		
Praxis *Total* (Divide by 6)	60 10		
Construction Drawing Block design Calculation Raven's score *Total* (Divide by 10)	 30 9 24 37 10		
Cortical Quotient *Add Totals*	100		