DEVELOPMENT OF BEDSIDE SCREENING TEST FOR APHASICS IN KANNADA

Ramya, H.Y

Register No: 09SLP025

A Dissertation Submitted in Part Fulfillment of Final Year

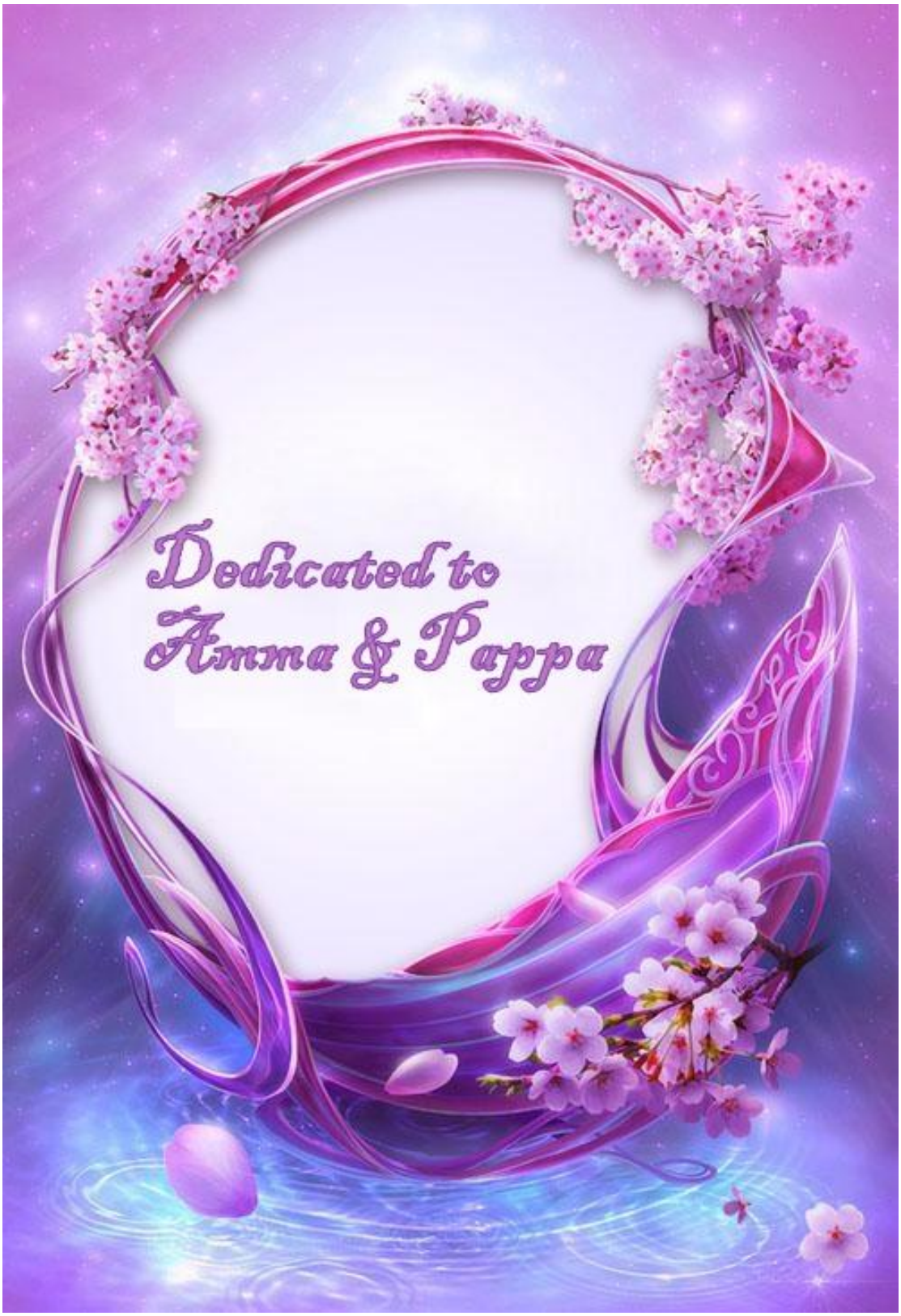
Master of Science (Speech- Language Pathology)

University of Mysore, Mysore

ALL INDIA INSTITUTE OF SPEECH AND HEARING,

MANASAGANGOTHRI, MYSORE – 570006

June 2011


Dedicated to
Amma & Pappa

CERTIFICATE

This is to certify that this dissertation entitled **Development of Bedside Screening Test for Aphasics in Kannada** is a bonafide work submitted in part fulfillment for the Degree of Master of Science (Speech-Language Pathology) of the student with Registration No. 09SLP025. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Prof. S.R. Savithri

Director

Mysore

June 2011

All India Institute of Speech and Hearing,

Manasagangothri, Mysore-570 006

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Mysore
June, 2011

Dr. S.P. Goswami
Guide
Reader & Head
Department of Clinical Services
All India Institute of Speech and Hearing
Manasagangothri, Mysore –570006

Declaration

This dissertation entitled **Development of Bedside Screening Test for Aphasics in Kannada** is the result of my own study under the guidance of Dr. S. P. Goswami, Reader and Head, Department of Clinical Services, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Mysore Registration No.09SLP025

June, 2011

ACKNOWLEDGEMENTS

"Learning is like rowing upstream: not to advance is to drop back"

I thank Almighty God for giving me all strength and courage to pursue all my endeavors.

The dream begins with a teacher who believes in you, who tugs and pushes and leads you to the next plateau, sometimes poking you with a sharp stick called "truth." I would like to sincerely thank my Guide ,Dr,S.P.Goswami,Reader and Head, Department of clinical services, for guiding me to improve my knowledge ,and mentoring me with unending support and patience. Thank you sir for your advices, valuable suggestions, patience and motivating me throughout the venture. Thanks a lot for your patience and support sir.

I would like to thank director Dr.S.R.Savithri, Director AIISH, for permitting me to carry out this dissertation.

I would like to thank all the persons with stroke and normal individuals who showed a good cooperation to complete the dissertation.

I would like to convey my sincere thanks to Ramya mam and Archana mam who guided me to pursue the work and spending your valuable time, patiently correcting the mistakes thank a lot mam

Families are like fudge - mostly sweet with a few nuts: A thanks is too small word for your unconditioned love, faith and support which made me what I am today, my dearest amma….wishing for you showers of blessing forever.

Heartfull thanks to my papa….thanks for your love, constant support and motivation in all my endeavors of life. Your decision at right time and confidence has pushed me to this level of what I am today. love you lots……

My dear sis thank you for always suppoting me and whatever you have been to me in my life.

I would like to take this opportunity to thank my artist Ms.Smitha Gupta for her beautiful drawings to my work.

I express my sincere gratitude to all my teachers who have imparted their knowledge and taught the right path in my life.

Friends are like stars and they always deserve a special mention. You don't always see them, but you know they are always there. Thank ***anjali*** *for being such a good friend forever.*

I would like to thank ***somi*** *for always being with me in all tough and happy times. I will never forget the time we spent together and all the fun times we had. Thanx a lot for your support dear….* ***Ranju, kruthi, Kanthima*** *thank you for being such wonderful pals…..Hope it continues the same way….*

Very special thanks to my batchmate Deepthi (DPT), for all your nice sayings which helped to boost my confidence in life which gave motivation in all ways. Thanx a lot dear….

Thanks to all my classmates for giving me a great company for two years , All the best to all of you for your future endeavors.

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CHAPTER I

INTRODUCTION

Humans are unique among animals that have a highly developed symbolic communication called as language. “Language may be spoken, written, or signed. Although all forms of language are used to communicate ideas, not all forms of communication involve language” (Elena Plante, 2004).Language is a socially shared code. Human communication using language is an exchange of ideas between sender (S) and receiver (R). It involves message transmission and response or feedback.

Any disruption in communication from the sender / receiver / in the path of transmit can result in language disorders. There are a host number of factors like stroke, trauma, tumor etc which can lead to acquired speech and language disorders. Romanul (1970) states that most commonly aphasia is caused by stroke. Cerebral disorders rank high in causing structural variations in the central nervous system which in turn results in aphasia. Among this, stroke (vascular diseases) is the common cause leading to aphasia (Tonkonogy, 1986), especially when stroke is in the region of language zone i.e. in the left hemisphere the risk is more for occurrences of language disorder.

The common etiologic factors for stroke are three types of cerebrovascular accident (CVA) – a) thrombosis, b) hemorrhage and c) embolism. The pathological location can be cortical, subcortical or mixed which significantly influences the verbal output of the person. Severity and type of language difficulties depend on the specific location and extent of the damage to the brain tissue. But in some cases they exhibit multiple areas of damage in which it becomes difficult to attribute language symptoms in specific.

Generally, aphasia is defined as a disorder of language where linguistic processing and linguistic knowledge is affected. Anterior lesions attribute to non-fluent aphasia which is seen more in young persons and posterior lesions in elderly individuals (Ferro & Madureira, 1997).The lesions impairs both expression and understanding of language, naming and difficulties in reading and writing. There are different views, opinions and approaches in defining aphasia in literature and some authors say as "general language disorder" Darley, Kertez (1979) and his collegues defined "Aphasia with adjectives" and Kreindler & Fradis (1968) described aphasia as "Impaired access, resource allocation and attention". There are many classifications of aphasia by different researchers from different angle of view and complement each other (Kertesz, 1979).

Assessment is an organized evaluation of multiple factors like environmental support, abilities that influence the persons language functioning. Assessment is an important aspect to assess the level of functioning in various domains and also in planning appropriate management strategies to improve the quality of life of persons with aphasia. Many instruments are currently available for the formal testing of aphasia. This includes both comprehensive test batteries and screening tools.

Few of the comprehensive test batteries include Western Aphasia Battery (WAB) (Kertesz, 1979, 1982), Boston Diagnostic Aphasic Examination (BDAE) (Goodglass and Kaplan, 1983) and Porch Index of Communicative Ability (PICA) (Porch, 1967). These tests are time consuming and needs the stroke individual to be present all throughout the examination.

Screening tools available in the western context are Frenchay Aphasia Screening Test (FAST), Sklar Aphasia Scale (SAS), Bedside Evaluation Screening

Test (BEST – 2), these tests can be used for bedside assessment for at risk individuals to identify for aphasia during the initial post- acute stages of recovery. The bedside screening is a clinical evaluation in the tradition of classical neurology (Krishner, 1995; Strub & Black, 1993). Historically, bedside examination has been a primary method for assessing aphasia and it remains a standard tool used by many other professionals such as Speech Language Pathologists and other allied professionals. The depth of the screening tool may range from unstructured conversation with the person with aphasia to a structured set of items, such as pointing, listing the days of week, etc.

The advantage of bedside screening test lies in its flexibility, brevity and suitability, since the professional conducts the examination at the bedside by quickly skipping across the areas of strength where there is no obvious impairment.

Need for the study

There are some screening tools available in western context but not suitable tools to use in Indian context. Thus, there is a limited availability of the test for assessing individuals in Indian context. Hence, the present study has been taken up to develop a screening tool for persons with stroke.

CHAPTER II

Review of Literature

Speech and language are the complicated functions that the human brain serves and they are considered as “higher cortical functions” that are specific to a localized area of brain. To express ones ideas, thoughts and emotions, language acts as a primary tool for communication. Language is defined as a shared code for representing concepts through the use of symbols and rule based combinations of symbols (Owens, Metz, & Haas 2003). It is influenced by person’s literacy and socio economic status.

Any disruption in the higher cortical functioning, the person displays ‘aphasia’ where there is a partial or complete loss of a number of linguistic processes. The behavioral impairment’s include deficits in comprehension, speech fluency, naming and repetition. The history of aphasia date back to the discoveries of Broca (1861 - 1865). Franz Joseph Gall, a Viennese physician, during early 1800s came up with the view that brain has separate organs located in the cerebral cortex and each of them sub serves a specific intellectual moral or spiritual faculty. He claimed that frontal lobe is important for language. Another school of thought views that, brain function as a unitary system where there is no one specific area that can be pin pointed for specific function. This debate between these two views continued for approximately a century. The current localizations view of brain and language relationship basically began with the anatomoclinical studies by Broca and his publication done in 1861 (Kann; 1950).

Broca (1863) did an extensive neuroanatomical study on the cadaver of eight people who were diagnosed as aphasia. All of them had lesion in the left frontal lobe.

He noted similar language deficits in all the eight persons with aphasia such as poor spontaneous speech, at times limited to single expression however comprehension was relatively intact. After comparing both clinical and neuroanatomical findings, Broca came up with a view stating that "we speak with the left hemisphere." This made him to conclude that the third frontal convolution acts as a warehouse of motor word images and the left hemisphere in governing for speech articulation. Later this area was named as "Broca's area". This flagged the way for the most important upheaval in medical and physiological thinking (Sarno, 1991).

The interest in aphasia grew rapidly after Broca's publication. In 1874, Wernicke published a monograph stating that the anterior parts of brain are responsible for motor function and posterior regions for sensory function and subsequently the posterior region was called as Wernicke's area. Following this, research in the field of aphasia went with a great spurt. Many research studies were carried out and came up with different schools of thought regarding the neuroanatomy and neurophysiology of the language function, etiology and different clinical manifestations, depending on the site of lesion grouping of the aphasic syndrome under different names and also depending on the overt clinical features and development of various assessment tools and different therapy programs.

The brain damaged individual's exhibit difference in site of lesion and the nature of the disorder can also vary among these individuals. Hence, the clinician should be competent enough in assessing and treating variety of restricted and broad linguistic deficits. For example, the person with aphasia having a small focal stroke in the left parietal lobe would present only a reading deficit due to impaired access to the orthographic input lexicon. On the other side, person with aphasia with a diffused

lesion in the cortical and sub cortical areas in both the hemispheres would have problems with the expression, understanding and reading and writing.

The primary cause for aphasia in brain damage individuals is mainly due to stroke, cerebrovascular accident (CVA) or disrupted blood flow, other neurological causes such as trauma, brain tumors, infections and other conditions like migraine, metabolic or deficiency disorder or poisoning and infectious disease that affect the brain (Recht, McCarthy, O'Donnell, Cohen & Drachman, 1989). Among these, stroke is a major cause. Approximately, it has been estimated that 21 – 38 % of stroke victims result in having aphasia (Berthier, 2005).The cerebrovascular accident may be due to any cerebral thrombosis (blood clot), embolism (blockage caused due to any moving foreign particle in the blood vessel), and intracranial hemorrhage (blood vessel extravasations). Head trauma may be caused by any fall, blows, or due to a road traffic accident. The acquired loss may result in reduction in language comprehension, production and deficits in the other related areas of language resulting in aphasia (Brust, Shafer, Ritcher & Brunner 1976).

Hence, aphasia is a language disorder where the people have intact language prior to brain damage and later have language obscurity. From centuries, aphasia has fascinated the researchers because of its appearance without other neurological symptoms and also because of localization of area for language in the brain, can co - occur with other speech disorders like dysarthria, apraxia of speech (Hall, Jordan & Robin, 1993). Thus, an accurate assessment criterion is needed during both diagnosis and treatment of aphasic syndromes.

Aphasia is multimodality disorder where different modalities of language are affected in different degrees. In some persons with aphasia comprehension is more

impaired than production or vice versa and in some reading and writing is more impaired than comprehension and production (Davis, 2007; Duffy & Ulrich, 1976).Linguistic analysis of the speech samples of person with aphasia reveals deficits in the following domains.

a) *Expressive language,*

The damage to the anterior areas of the cortex mainly contributes to greater difficulties in expressive language. It is characterized by decreased output, increased effort accompanied by dysarthria. Speech output is of decreased pharse length (Goodglass, Quadfasel, & Timberlake, 1964) and prosodic features like melody, intonation, incompetently varied verbal output (Monrad - Krohn, 1947).Person with aphasia omits syntactically specific language structures (prepositions, articles, adverbs) and have difficulty in using relational words (Goodglass & Berko, 1960).However, quantity of expressive language is better in posterior lesions than anterior damage to the cortex. The speech output is characterized by frequent pauses, circumlocutions and errors in use of grammatical structures of language (paragrammatism) and substitution of words within language (paraphasia) (Lecours, A, R., Lhermitte, F., Bryans, B. 1983; Pick, 1913; Goodglass, 1993; Ryalls, Valdois, & Lecours, 1988).

b) *Comprehension of spoken language,*

Comprehension difficulties in person with aphasia might be due to semantic processing difficulties. Davis (2007), states that comprehension difficulties beyond word level are impaired. These difficulties may vary from understanding narrative speech to simple words (Helm-Estabrooks & Albert, 2004). Deficits in verbal short

term memory may also contribute to comprehension difficulties (Albert, 1976; Burgio & Basso, 1997). Location of the damage also has an effect on auditory processing abilities of the person. Damage to the temporal lobe areas affects auditory comprehension abilities (Auther et al., Wertz., Miller., & Kirshner, 2000).Comprehension involves both cognitive (attention, visual search, selection and verbal memory) and linguistic skills (Helm-Estabrooks & Albert, 2004). Allocation in working memory is necessary for linguistic processing which is impaired in persons with stroke, in turn affecting both sustained and selective attention in these individuals (Csepe, Osman-Sagi, J., Molnar, M., & Gosy, M, 2001; Caplan & waters, 1999;Rothenberger, Szirtes, J & Jurgens R, 1982).

*C) Repetition of spoken language***,**

Persons with aphasia exhibit repetition difficulties even at the rudimentary level. Difficulties in repetition reveal problems of verbal output or language comprehension. For some individuals with aphasia, repetition is more difficult when compared to other language problems (Berndt, 1988).Errors in repetition is usually seen in all types of brain damage but more predominantly associated with damage in perisylvian areas. They vary both qualitatively and quantitatively. Damage to arcuate fasciculus results in repetition difficulties (Wernicke, 1874; & Geschwind, 1965). In the literature, studies report that loss of connection between anterior and posterior areas of brain affects the conversion of auditory speech code into motor speech production resulting in repetition difficulties. Limitation in working memory has an effect on linguistic processing (Caspari et al., 1998; Conner, MacKay, & White, 2000; Dick et al., 2001; Friedmann & Gvion, 2003; Martin, 2000; Murray, 2004; Wright et

al., 2003; Yasuda & Nakamura, 2000). Persons with stroke have difficulty in automatic speech tasks like digit backward and digit forward tasks. It has been reported that persons with impaired language have significant shorter verbal span on digit forward test (De Renzi & Nichelli, 1975). Digit backward is a complex task which depends on working memory processing (Black & Strub, 1978).

d) Naming,

Persons with aphasia have difficulty in naming, word - finding (Goodglass & Geschwind, 1976). Naming difficulties are exhibited in the form of paraphasias (phonemic) or circumlocutions. The individual experiences 'tip of tongue' problems indicating the awareness of phonological characteristics of word (Benson, 1979; 1988). If there is any deficit in the processes such as decoding, storage, selection, retrieval or encoding will result in naming problems. Several authors report that site of lesion plays an important role in naming and functional neuroimaging studies also revealed that during naming left perisylvian and extrasylvian cortex get activated (Howard *et al*., 1992; Hirsch *et al*, 2001; Abrahams et al., 2003; 2003; Grabowski *et al*., 2003; Martin *et al*., 2005; Harrington; *et al*., 2006; Price *et al*., 2005, 2006; Kemeny *et al*., 2006; Saccuman *et al*., 2006). Semantic errors in naming are the result of semantic processing deficits (Hilis, 1990).

e) Reading,

The most common residual deficits seen after partial recovery from stroke is alexia and agraphia (Beeson et al., 2005). It is also reported that if stroke involves left posterior cerebral artery (PCA) territory or posterior watershed area between the left PCA and left middle cerebral artery (MCA) most evident clinical manifestation is

reading difficulty (Binder & Mohr, 1992; Cohen et al., 2004; Hillis et al., 2005).The conversion from grapheme to phoneme an essential process during reading. Functional imaging study by Dehaene et al. (2002) and Leff et al, (2006), identified left fusiform gyrus as a critical region for processing orthographic stimuli.

f) Writing,

It is said that other than speech, writing skill is acquired later which requires formal training (Feder & Majnemer, 2007). Grossberg and Paine, (2000) in their model of writing suggested that writing is dependent on feedback from the polysensory areas (visual and somatosensory). It is reported that contralateral superior parietal cortex is involved in writing (Nakamura et al., 2000; Menon & Desmond, 2001; Beeson et al., 2003; Sugihara et al. 2006).The only manifestation of stroke is writing in the territory of the superior division of the left Middle cerebral artery (Hillis et al., 1999; 2004).

Thus, from the review of literature it is evident that person with aphasia can exhibit varied language processing difficulties. Hence, a clinician should possess the skills and tools/tests to make an accurate diagnosis and design an effective treatment plan. A thorough evaluation/assessment of a person with aphasia should be team based. It includes a speech language pathologist, neurologist, physical therapist, occupational therapist and the family member as the core of team .

The examiner should draw conclusions from the person with brain damage by analyzing the quality of person's response. As stated by Darley (1982) that what we find in testing will come logically from what we expect to find, or "how we ask questions". The tools used in language assessment help in quantification and delineation of aphasic behavior. It is necessary to determine whether the language

problems exhibited, characterizes the linguistic features seen in person with stroke is displaying is aphasia or not. After diagnosing it as aphasia the clinician should determine the type and severity. The functional communication abilities of the person should be taken into account during the assessment in order to gain a reasonable basis for planning the treatment program.

Assessment of language deficits in aphasic syndromes should be strictly tailored in such a way that it should tap those language deficits by emphasizing on various procedures and tools which gives a qualitative and quantitative outline of the linguistic deficits (World Health organization (WHO) 2001). According to Murray and Chappey (2001), purpose of assessment include (1) quantifying and qualifying communication strengths and weaknesses (2) identifying the presence and possible influence of concomitant disorders (3) establishing treatment goals (4) providing information to predict the recovery and treatment outcome. Spreen and Risser (2003) state that, the way the clinician conceptualizes the language disturbance has a direct influence on the way they design the test. Depending upon the availability of resources to the clinician, a kind of setting where they conduct the assessment and the current needs and abilities of person with stroke decides the kind of assessment the clinician can carry out.

The type of assessment varies depending on the clinical set up (Murray & Clark, 2006). For ex: in a hospital set up, mostly a screening procedure is important whereas, in an institutional set up a detailed assessment procedure is followed. The type of test that is constructed is influenced by the way the disorder or the language disturbances of that disorder are visualized, like in aphasia whether it is a specific disorder (unitary in nature) of selected abilities or as a pervasive disturbance (consists

of subtypes) of communication. Spreen and Risser, (2003) state that while choosing any assessment method the following considerations should be made:-

a) Psychometric adequacy of a test.

b) Portability of the test material.

c) Time requirements.

According to Spreen and Risser, (2003) assessment of aphasia can be broadly classified into six general types, They are:

1) Screening Procedures.
2) Diagnostic assessment.
3) Descriptive testing in rehabilitation and counseling.
4) Progress evaluation.
5) Assessment of functional or pragmatic communication.
6) Assessment of related disorders.

Screening tests are the tools which can be used in a brief manner and with a quick examination of the person with aphasia to detect the presence of disorder. It is done in situations like acute health care setting or when there is less time to assess or when only a general overview is needed about the person with aphasia s' language functioning.

Diagnostic assessment, where a thorough examination of person's language performance is carried out in order to make a diagnostic impression and to describe the strengths and weakness in linguistic and cognitive abilities. Some of diagnostic tests available are Multilingual Aphasia Examination (MAE, Benton, Hamsher, Rey

& Sivan ,1994),Boston Diagnostic Aphasia Examination (BDAE, 3rd Ed., Goodglass & Kaplan,2000), Aphasia Diagnostic Profile (ADP, Helm Estabrooks,1992), Porch index of communication Ability (PICA, Porch 1967),Discourse Comprehension Test (DCT, Brookshire & Nicholas,1997),Neurosensory Center Comprehensive Examination for Aphasia (NCCEA, Spreen & Benton,1997),Psycholinguistic assessment of Language Processing for Aphasia(PALPA,Kay,1992), Minnesota Test for Differential Diagnosis of Aphasia (MTDDA,Schuell,1955,1965,1973), Western Aphasia Battery(WAB,Kertesz,1979,1982).

Descriptive evaluation is useful for the purpose of rehabilitation and counseling. In this type of assessment, information gathered is more regarding the functional strengths of the person. In rehabilitation setting, it helps in making predictions of recovery, ability to process, learn, and remember new material, fine-tuning treatment tasks and tactics.

Evaluation with respect to spontaneous recovery of the person is carried out in a follow up manner where the progress evaluation is conducted. The ability of person to relearn or to compensate for what they have lost is part of progress evaluation.

Functional and Pragmatic assessment of the person is conducted to determine how efficient the person to communicate despite of the presence of disorder is. These methods may vary from bedside observation to rating scales to formal tests, (Manochiopinig, Sheard, & Reed, 1992). These include Pragmatics Protocol (Prutting & Kirshner, 1987); The Profile of communicative Appropriateness (Penn, 1983); The Communicative Activities in Daily Living, 2nd ed (Holland & Thompson, 1998) and the ASHA – FACS (Frattali, 1995).

Aphasia can co -occur with other disorders which include the examination of dysarthria (articulation), aprosodia of speech (includes effective and non -effective prosody), apraxia of speech (oral and limb apraxia).The sensory skills like visual perception, stereognosis and the auditory abilities of the person should be assessed (Lecours, 1987). The examination of the person ability to use gestural communication needs to be done (Beatty & Shovelton, 1999; Goldin-Meadow, 1999; Morford, 1996).

Compared to all the procedures of assessment, screening tools are considered as the quickest and easiest ones to make outline of person's language ability in brain damaged individuals.

There are three types of screening procedures for aphasia.

1) The bedside clinical examination which is traditionally used in clinical neurology for clinical evaluation (Kirshner, 1995; Strub & Black, 1993).It ranges from unstructured way to structured test. It has been used as a standard tool by physicians, neurologists and speech language pathologists.

2) Screening tests per se; where the tests are constructed in standardized ways which are relatively brief and highly sensitive. E g: Halstead – Reitan test Battery (Reitan, 1991; Wheeler & Reitan, 1962).

3) Tests of specific aspects of language functioning that are sensitive to the presence of aphasia. E.g. The Token Test (De Renzi & Vignolo, 1962).

During the initial post-acute stages of recovery, assessment is predicted observably on the person's mental and physical status. Person with stroke usually exhibit poor attention and mental vigilance or experiences weakness to participate for more than few minutes of brief examination. Hence, in these conditions it becomes

difficult on the part of the examiner either to diagnose or to predict the strength and weakness of the person for further language rehabilitation. Therefore, bedside screening tests can be used competently to establish the presence or absence of language disorder, to decide whether further detailed assessment is needed and helps in adapting treatment (Al-Khawaja, Wade, & Collin, 1996). Bedside screening tools play a role as valuable indicators of cognitive status, which includes responsiveness, communicative ability and the ability to be stimulated .The examiner should remember that the screening tools give only narrow range language functions and it will not give a complete language profile of the person.

Apart from detailed comprehensive examinations, historically bedside examination has evolved as a primary method from which the formal and standardized tests developed. It still remains as a standard tool, especially for neurologists, although speech language pathologists or neuropsychologists and other allied professionals use it in primary care or in a non-ambulatory condition. It aides the clinician with the method of examination that they can individually tailor to their own decision – making and helps them to organize next steps in person with aphasia care (Davis, 1993).

In the field of classical neurology, bedside screening is considered as a clinical evaluation method (Kirshner, 1995; Strub & Black, 1993). The strength of the screening tool may range from unstructured conversation with the person with aphasia to a structured set of items, such as pointing, listing the days of week etc.

There are various screening protocol used in various clinical setups. Most of the professionals use commercially available screening tools where as some use self developed informal tools for a quick screen together with the case history. The

strength of such informal protocol is that it can reflect the specific needs of the person with aphasia and also the clinician can add or delete various domains depending on the present need of the person with aphasia. On the other hand, it fails to produce a good valid and reliable data. This is because, the clinicians have not established observation or measurement consistency within and across clinicians over time (Peach, 2001).

To overcome these problems, one may use standardized aphasia screening tools so that it will be helpful to chart the recovery both qualitatively and quantatively. Formal screening tools aids in research studies as they have strong psychometric properties (Davis, 2000).

Ideally, the professionals can use any of the formal assessment tools and they can comment on the additional information about the person with aphasia so that it gives a complete picture on a quick review. Accuracy of screening devices is approximately 80% (Spreen & Benton, 1965). For example, one can easily identify a motor aphasia by looking for a hemiplegia and one can get a clue for sensory aphasia by examining for hemianopsia. The presence of any sensory or motor skill deficit also can be considered while planning for the treatment strategies. Underlined below in table 1 are the details of the tools available in the western context (Table 1).

Other screening instruments which are of limited use are Examining for Aphasia (EFA -3; Eisenson, 1993) and Orzeck Aphasia evaluation (Orzeck, 1964). Studies have been conducted to compare the performance of persons with brain damage or aphasia on different screening tools available in western context.

There are screening tools which are the shortened versions of comprehensive batteries. This can be procured individually or along with the comprehensive test

battery. The shorter versions of aphasia batteries like Minnesota Test for Differential Diagnosis of Aphasia (Powell, Bailey, & Clark, 1980) and the Porch Index of Communicative Ability (Holtzapple, Pohlman, LaPointe, & Graham, 1989) are available. Likewise shorter version of Boston Diagnostic Aphasia Examination (BDAE-3; Goodglass & Kaplan, 2000) is also available. The short form is a condensed that assesses spoken and written language production and comprehension skills in 30 to 45 minutes (Spreen & Risser, 2003).

Barth, Macciocchi, Giordani, Berent & Boll, (1984) conducted a study on the inter - rater reliability and prediction of verbal and spatial functioning with a modified scoring system on the Reitan-Indiana Aphasia Screening Examination (ASE).It was administered on 50 seizure persons with aphasia of mean age 16.8 years. To find out the effect of most specific scoring criteria and interrater reliability, authors administered five raters on each individual. They observed a higher interrater reliability with minimal training in the new scoring method. Verbal IQ, education and verbal scores of the ASE showed a significant relationship. On the other side, the performance IQ, education and the verbal score of ASE showed a significant relationship. Even the performance score and the spatial scores showed a significant relationship. Results suggested that the interpretation of ASE scores is depended on the qualitative assessment of the type and pattern of errors obtained.

Snow (1987) conducted a study using Aphasia Screening test (AST) of the Halstead-Reitan Neuropsychological Test Battery on 36 lateralized stroke persons with aphasia and 14 tumor persons with aphasia. Here right hemisphere damaged and left hemisphere damaged differed only in one item and they showed significant difference among 33 items. The items were categorized according to the task type

(spelling, reading, and calculation) and the results showed that only one out of nine comparisons were significant. This study pointed the significant flaw in the AST and recommended to modify AST.

Crarya, Haakb and Malinskyc (1989) did a preliminary psychometric evaluation of ‘acute aphasic screening tool’. They compared the results of the Acute Aphasia Screening Protocol (AASP) and Western Aphasia Battery for concurrent validity. They also compared the content and construct validity with other existing aphasia batteries and obtained a good correlation. The results showed that AASP is a useful clinical tool for aphasic assessment for its specific purposes.

O'Neill, Cheadle, Wyatt, McGuffog, and Fullerton (1990), have tested 51 normal elderly people aged 69 to 90 years and in person with aphasia, out of which 19% of subjects failed in the screening. Later they administered the Frenchay Aphasia Screening Test (FAST) on 82 elderly people with aphasia with stroke having a mean age of 80 years and 35% persons with aphasia failed. The results indicate that sensitivity has increased and specificity is reduced.

Certain screening tools like Cognistat (Kiernan, Mueller, & Langston, 1995), has been standardized on a broad spectrum of neurogenic disorders.

Sabe, Courtis, Saavedra, Prodan, de Lujan, and Melian (2008) did a study on 121 aphasics 77 dysarthric persons with aphasia after brain injury using Bedside assessment of Language (BAL). The author assessed five areas such as spontaneous language, comprehension, repetition, writing and reading. Each domain has a maximum score of 5 points and a total score of 25.

Table 1. Details of western screening tests.

Name of the test and Authors	Test domains	Description	Time duration
Aphasia Language Performance scales. (ALPS) Keenan and Brassell. (1975).	Listening, Talking, Reading, and Writing.	Examiner has to utilize the objects in pockets for assessing comprehension and expression. Each of the domains has 10 items with increasing difficulty. Scoring: 0-1, 0 - Profoundly impaired, & 1- Insignificant impairment.	20- 30 minutes.
Halstead Wepman Aphasia Screening test.(AST) Reitan and Wolfson, (1985) Wheeler and Reitan, (1962).		Designed to identify simple tasks like naming and spelling the word.	20 minutes
Bedside Evaluation Screening Test, 2nd edn. (BEST – 2) West et al; (1998).		Responses can be verbal, gestural (pointing) depending upon subtest.	30 minutes.
***Sklar Aphasia* Scale – revised (SAS).** Sklar., (1983).		Each of these 4 subtests has 5 items in it. *Scoring:* 5 point rating scale with 0 – correct response to 4 – no response.	An hour
Frenchay Aphasia Screening Test.(FAST) Enderby et al., 1987	Comprehension, Verbal expression, Reading and Writing	Picture cards and shapes. Comprehension – pointing. Expression - verbal mode. Naming shapes are also included in the test.	3 to 10 minutes.
Mississippi Aphasia Screening Test Nakase et al.,	Expressive language Index Receptive language index.		

They concluded that the BAL has good internal consistency reliability and is very useful for the diagnosis of type of aphasia and is sensitive to the subsequent changes in the sub- acute stages of language impairment.

In 2008, Theaja Kuriakose developed a Screening test for Aphasics in Kannada, the adaptation of Frenchay Aphasia Screening Test (FAST) by Enderby et al. This test had taken three age groups which included 60 children, 30 normal adults and 20 persons with stroke. The Kannada version includes comprehension, expression, reading, writing, with repetition and naming were added in this version. Results report that:

- Test could identify aphasics from normals.
- The level of language ability in children of different age having different level of performance.
- Can be used to assess the language ability irrespective of literates and illiterates.

But the test has not been administered to brain damaged non aphasic individuals is the limitation of this test. Since the basis of screening is to screen for the presence or absence of the disorder. The screening tool has to be administered to all brain damaged individuals to identify at risk individuals for aphasic component. Thus, from the review of literature it can be stated that professionals do use screening tools and in research and in clinical setups. However, there are limited attempts to develop such tools in Indian context. Hence, the present study has been taken to develop a bedside screening test in Kannada language

CHAPTER III

METHOD

There are many tools available for assessing the linguistic deficits in aphasia, both for detail assessment and screening. Detailed examination is possible only when the person is physically stable and can attend to the examination for a long time. During the initial post-acute stages of recovery, screening tools play a very important role to predict whether the person is deviating from the normalcy. Since, majority of the screening tools are developed in western context it becomes difficult to apply it in Indian context due to large ethno cultural variation. Thus, in order to improve the quality of assessment and for the better understanding of person's strengths and weakness there is a demand for developing a test material in native language. Furthermore, the availability of the screening tools in Indian languages is limited, hence an attempt has been made to develop a bedside screening test in Kannada.

Aim of the study

To develop a bedside screening test in Kannada for persons with aphasia.

Procedure:

The development of the test was carried out in two phases.

a) Phase I: Development of the test material in Kannada.

b) Phase II: Test Administration on 30 normal participants and 7 persons with stroke.

Phase 1:

The first phase involved the development of test material in Kannada. The test was developed after taking input from various screening tools available in western

context and few tests which are translations of western test to Indian languages. While preparing the test materials syntactic and semantic aspects of Kannada language was kept in mind. Initially, ten test stimuli were formulated under each subsection. The prepared test stimuli were given to five speech language pathologists for familiarity rating who are native speakers of Kannada, proficient in reading and writing Kannada and who had at least two years of experience as a speech language pathologist. The rating of stimuli was carried out in two phases. The test stimuli were rated in the initial phase and in second phase the picture cards used in the test material were rated. The familiarity rating was done using the scale "Feedback questionnaire for aphasia treatment manuals" (Goswami, Shanbal, Samasthitha, & Navitha, 2010) **(Appendix I).**The various parameters included in the present study were simplicity, familiarity, presentation, volume, relevancy, complexity, accessibility, flexibility, stimulability, coverage of parameters, generalization etc. The pictures cards were rated with respect to size of the picture, color and appearance, arrangement and iconicity. While rating the raters were informed to keep in mind the assets of persons with stroke during the initial post-acute stages of recovery. The picture cards were drawn by a professional artist.

Description of the test

The test **(Appendix II)** includes a total of six subtests with six subsections in one subtest and three subsections in two subtests. Each of these subsections consisted of five test stimuli. Based on familiarity rating given by the professionals, a percentage was calculated for each stimulus. The stimuli which had a familiarity rating of 80% and above were considered for the final test material. The stimuli were arranged on the increasing order of complexity. Each subsection has been provided

with the instructions to be followed while administering the tool. Appropriate objects and or picture cards have been provided for the various sub-sections.

Phase II: Administration of the test.

The normal participants in the age group of 40 – 70 years were taken to form a baseline which was considered as normative for this test and bedside evaluation of seven persons with stroke was carried out. The test was administered in different seating positions for both the groups. Presentation of objects and picture cards varied with respect to task. Instructions were given verbally.

Participants:

The sensitiveness of bedside screening test was tested by administering on a group of population. The group includes both normal population and persons with stroke. The following Table (2 &3) includes the details of participants. The test was administered on all participants in both groups according to their availability in work station, home and or hospital.

Table 2. *Details of the participants of the study.*

Type of population	**Age range(In years)**	**Number**
Normal participants	40 - 50	10
	50 - 60	10
	60 - 70	10
Persons with stroke	20 - 60	7

Table 3. *Details of person with stroke.*

No	Age/Sex	Episode of stroke	Site of lesion
1.	35 years/M	10 months	Left cerebral vascular artery infarct with right side hemiplegia.
2.	50 years/F	4 days	Middle cerebral artery occlusion (major) with right sided hemiplegia
3.	45 years/M	4 months	Temporal lobe lesion with right sided hemiplegia
4.	48 years/M	6 months	Occlusion of medial cerebral artery.
5.	40 years/M	4 months	Temporal lobe infarct with right sided paralysis
6.	56 years/ M	6 months	Cerebrovascular accident
7.	40 years/M	3 months	Diffuse lesion

Ethical Consideration.

Ethical issues were taken into consideration during the selection of participants for the study. For the persons, with stroke the participant and family member /caretaker were explained regarding the purpose and procedure of the study. The selection was random on the basis of inclusionary criteria.

Inclusionary criteria.

The participants in the present study were divided into 2 groups:

Group 1: Includes control group (normal participants).

Group 2: Includes persons with Stroke.

Group 1

a) The participants included were native speakers of Kannada.

b) Age range considered was 40 – 70 years were considered.

c) The participants had no history of sensory, speech, language and cognitive problems. This was ensured using informal testing of the participants for sensory speech, language and cognitive impairment.

d) Participants had no pre morbid neurological / psychological history or any known obvious structural deficits as informed through history.

e) The participants had no known history of alcoholism and or drugs.

Group 2

a) The persons with stroke were diagnosed by a neurologist or physician in local hospitals, were included.

b) Age range considered was 18 years and above.

c) Participants with sensory deficits were excluded.

d) Native speakers of Kannada were considered.

Procedure followed in test administration.

Arrangement and placement

For participants in group 1 the picture cards and objects were placed on the standard table in front of the participant one after the other in the order of presentation. For participants in group 2 the picture cards and objects were placed at a distance where the person with stroke was comfortable to visualize. The picture cards and objects which are not required during the administration of particular subtest were kept out of visual field of the participant.

Seating

The participants of Group 1 were made to sit comfortably in front of the table where it was easy for him / her to reach or pick up the objects or the cards that were presented. The examiner sat by the side of the participant out of his /her working area to avoid any visual distractions.

Since the participants of group 2 were examined in a bedside condition the examination was done with person's comfortability and preferred seating during the administration.

TEST INSTRUCTIONS AND PARAMETERS

Initially the task to be performed by the participant was explained in detail to them. They were instructed to point to picture cards or objects and to perform actions with objects placed on the table according to examiners instructions. Prior to the actual testing pretest instructions were given to make sure whether the person was familiar with the task to be performed and the items that were used in the test. If the participant did not perform any part of the test trial correctly, instructions were repeated. The instructions were repeated at comfortable listening level and prosodic features of speech such as rate, intonation, stress and juncture were maintained.

Pretest Instructions

To confirm whether the participant understood the type of task to be performed by him/her pre – test instructions were given.

"I will be administering a test to you now. I will ask you certain questions in which for some of them you need to answer verbally and some of them requires pointing /name the object / picture card (Flash card) which is kept in front of you. Wherever you feel confused or need repetition please stop me and I will repeat the instructions again".

Introduction to subsections

After the pretest instructions the participant as asked "Are you clear now with task you have to do" / "Shall we start the test"/ "Are you ready". Then the examiner administered subsection in the test.

Subsection 1: Spontaneous speech

General conversation was carried out with the participant and the examiner observed and made a note of person's speech and language with respect to fluency and content which includes any effort during speech production, decreased phrase length, word finding pauses, rate of speech, circumlocutions or hesitations and paraphasias (phonemic / literal, neologistic, semantic,) and any semantic or syntactic errors respectively . No scoring was considered for this domain, only qualitative description of person's speech and language was done. The person's mode of communication, whether it was verbal or nonverbal was noted.

Subsection 2: Auditory verbal comprehension

a) Yes / No questions.

Step 1: The questions were asked to the participant and the response expected was either yes / no. E.g. "Are you playing now" answer should be only "No".

a) Pointing Task.

Step 1: The picture cards were kept in front of the participant.

Step 2: Picture cards were shown and the participant has to point to the one told by the examiner. E.g.: "point to leg" the response should be "person pointing to his/ her leg".

b) Auditory Word Recognition.

Examiner presented words in order and the participant was instructed to recognize the word and respond either by eye movement towards that object or any gesture or pointing to it. For E.g.: If the examiner says "door" the response can be "looking

towards the door" or "pointing to it" or any "gestural response" which should convey that the person has recognized the word.

c) Verification Task.

Step 1: For this subtest 3 pictures which were drawn on a single card was presented. The cards were presented one after the other in the order of presentation.

Step 2: Instructions was to verify between the pictures that were presented and pointing to the one the examiner asks. For E.g. If the examiner asks to show "cat' the response should be pointing to "cat" by verifying between the pictures presented.

d) Sequential commands.

Step 1: Set of objects were arranged one after the other on the table.

Step 2: The participants were instructed to follow the commands and perform the actions with the objects that were placed in front of them. The participants were reminded to perform the actions sequentially according to the examiners command. For ex: if the examiner says "open your mouth" the response should be "opening his / her mouth".

Scoring: The maximum score of this domain is 50. Each subsection of this domain with a total of five questions carried a total score of 10. Each correct response, partial response and no response for the tasks in the subsections of this domain was given a score of 2 , 1 and 0 respectively.

Subsection 3: Repetition

a) Automatic Speech.

Participants were instructed to answer few questions which come in order. E.g.: If it was "alphabets" the response should be "Reciting alphabets".

b) Word

Instruction was to repeat words that were told by the examiner. E.g. If the examiner says “head” participant has to repeat just the word “head”.

c) Phrase

Participants were instructed to repeat the phrases that were told by the examiner. E.g.: If the examiner says “come here” participant has to repeat just the phrase “come here”.

d) Sentence.

The participants were instructed to repeat the sentences in order that were told by the examiner. E.g. If the examiner says “I want this bag” participant has to repeat just the sentence “I want this bag”.

***Scoring*:** A maximum score of 40 was given for this domain. A score of 10 was given to each of the subsection with a total of five questions in each of them. The score of 0, 1, and 2 was given to no response, partially correct response and correct responses respectively.

Subsection 4: Naming

a) Confrontation Naming

Step 1: The picture cards were presented on the table in the order of presentation.

Step 2: The instruction was to name the picture that was presented by the examiner. For E.g. If the picture presented was “train” the participant should name it as “Train”.

b) Responsive Naming

The participants were instructed to answer the questions by naming with respect to the question. For E.g. If it was “what can you see in forest’ the participant should name “All possible things that he/she can see in forest”.

c) Lexical Generative Naming

The participants were instructed to name the things which come under one specific category that were told by the examiner. For E.g. If it was “list the vehicles” the participant should name “All possible vehicles that he/she can”.

Scoring: A maximum score of 30 was given for this domain. Each subsection with a total of five questions in each of them was given a score of 10. Each correct response, partial response and no response for the tasks in the subsections of this domain was given a score of 2, 1 and 0 respectively.

Subsection 5: Reading

The reading task was given here. The participant should read the text on the cards which was in the form of sentence, phrase, word, and a letter.

Scoring: The maximum score for this domain is 8 .Each correct response was given a score of 2 and a score of 1 and 0 for partially correct and no responses respectively.

Subsection 6: Writing

The writing task was given like to write few letters, their name and address etc…and basic calculations (addition, subtraction).

Scoring: The maximum score of 8 was given for this domain. Each correct response, partial and no responses was given a score of 2, 1, and 0 respectively.

Scoring pattern

The three point rating scale was used to score the responses which are shown in the table 4.

Table 4. *Scoring pattern of bedside screening test.*

Rating	Response
0	No response.
1	Partially correct /incomplete responses/frequent shifts from correct one to others.
2	Correct response.

Time constraints

The time taken to complete the test for persons with stroke was 20 minutes and for control group it was within 10 minutes.

Statistical Analysis

The raw scores obtained from the two groups of participants (normals and persons with stroke) were tabulated in SPSS software (Statistical Package for the Social Sciences package, version 17.0) and was subjected to statistical analysis. The following statistical measures were used to analyze the raw data:-

a) Mean and standard deviation, in order to arrive at the normative scores for each of the subsection namely auditory word comprehension, repetition, naming, reading and writing.

b) Mann Whitney U test, to analyze the significant difference between normal's and persons with stroke across the domains and subtests of domains.

c) Kruskal Wallis test, to analyze the difference in the performance within the normal group participants.

d) The upper bound and lower bound scores are obtained from the mean scores of normal group across the domains to arrive at the normative scores for the test.

The results are discussed in detail in Chapter IV.

CHAPTER IV

Results and Discussion

The main objective of the study was to develop a Bedside screening test for aphasics in Kannada language. The study aimed at developing a screening tool which is sensitive in identifying the persons with stroke in bedside condition for the presence or absence of aphasia. The study included two groups of participants.

- Normal participants (3 groups; age ranges 30 - 40, 40 -50, 50 -60 years).
- Persons with stroke (1 group; age range 20 and above).

The developed screening tool was administered on the participants**.** The raw scores obtained for the two groups of participants (normals and persons with stroke) were tabulated in SPSS software (version 17.0) and was subjected to statistical analysis. The descriptive analysis was carried out to find mean (M) and standard deviation (SD) scores for all the domains and subsections of the domains and was extracted by comparing the tabulated raw scores between the two groups. The raw data was further subjected to non-parametric tests like Mann- Whitney U-test and Kruskal Wallis test to notice whether there is any significant difference. Mann- Whitney U-test was used to identify the significant difference between normals and persons with stroke across the domains and subsections of the domains. The results revealed that there is a significant difference between the two groups. To see whether there is any difference between the normal participants of three age ranges (30-40, 40-50-, 50-60 years) Kruskal Wallis test was used. The scores revealed that there is no significant difference between the three age groups.

The "test stimuli and pictures" for the test were selected from the ratings on 'Feedback questionnaire' given by five speech language pathologists. The parameters considered were like simplicity, familiarity, presentation, volume, arrangement and iconicity etc. The ratings of the SLP using feedback questionnaire revealed that:

- ***Parameters concerned with respect to the selection of the stimuli of the test***: (Simplicity, familiarity, presentation, complexity etc.).SLPs rated the test stimuli keeping in mind the syntactic and semantic aspects of Kannada language. The ratings for the stimuli on these parameters were 'good', 'very good' and 'excellent'. This indicates that the test stimuli selected for the present study is appropriate to assess the targeted linguistic skills and is also acceptable as per the cultural dimensions of the considered participants for the study.
- ***Parameters concerned with respect to the selection of picture stimuli of the test* (**size of the picture, color and appearance, arrangement and iconicity): Based on ratings of the SLPs on these five parameters, it was seen that the picture stimuli were iconic, culturally acceptable and clear representations of the intended object.
- ***Parameters concerned with respect to the test Structure:*** The SLPs rated the following parameters volume, relevancy, complexity, accessibility, flexibility, and stimulability as 'good', indicating that the test can serve its purpose.
- ***Parameters concerned with respect to the output of the test:*** The sub-sections of the questionnaire considered were with respect to the parameters, scope of practice, generalization, and scoring pattern. For these parameters the ratings given by the speech language pathologists was 'good' indicating that the test

has implications in its suitability to assess the target population, practice, scoring pattern used. It also gives a base for predicting the type of aphasia and planning the goals for the treatment.

The bedside screening test includes six domains with subsections. The domains are spontaneous speech, auditory verbal comprehension, repetition, naming, reading and writing skills. Each section is further divided into subsections. The results obtained are described below:

Domain 1: Spontaneous speech.

This domain was not scored as it was assessed by direct observation of the person's sample. This domain includes two subsections namely, content and fluency. The data analyzed qualitatively both for normal and persons with stroke are discussed below in detail:

Normal:

All the participants in this group did not exhibit any difficulty in speech and language .Thus, it can be stated that speech and language characteristics of this group were clinically normal.

Persons with stroke:

A total of seven persons with stroke were examined. Each of the participants had stroke in different sites of lesion in the brain. The onset period varied from four days to ten months. All the participants were evaluated in hospital. The speech language skills were elicited by asking the following questions:

a) What is your name?
b) Where are you from?
c) Why are you here now?

d) Tell me about your native place.

e) Is she your daughter /son?

f) Where you were working?

The speech characteristics of each of the participants in this group are discussed in the Table 5.

Domain 2: Auditory verbal comprehension

Subtest 1: Yes – No question

This subsection includes five questions which were arranged in the increasing order of complexity. The response mode has either verbal or gestural. A score of 2 has given for each correct response and the maximum score that can be obtained in this sub-section has 10. The mean and standard deviation scores obtained from descriptive statistics for each group of participants is given in Table 6.

Table 6.*Mean and standard deviation of each group in Yes – No question subsection*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	0.00
Person with stroke	7	8.14	1.46

From the mean and standard deviation scores, it is evident that the performance of normal group (Mean: 10.0, SD: 0.00) was better compared to the persons with stroke (Mean: 8.14, SD: 1.46).The data was further analyzed using Mann-Whitney U test to see if, there is any difference among the two groups with respect to this subsection. It yielded a significant difference (/ Z / = .00) between the two groups.

Table 5. *Speech characteristics of each of the participants in spontaneous speech domain.*

SI No	Age/ Sex	Site of lesion	Response Mode	Speech and Language characteristics
1	35/M	Left cerebral vascular artery infarct with right side hemiplegia.	Verbal	Limited speech output with unclear utterances, increased effort while producing words, decreased phrase length, poor articulated speech, dysprodia, monotonous speech.
2	50/F	Middle cerebral artery occlusion (major) with right sided hemiplegia	Pointing, gestures and few verbal utterances.	Word level with jargon utterances, comprehension was poor, slow, effortful speech which was unclear (dysarthria) and prosodic features of speech were affected
3	45/M	Temporal lobe lesion with right sided hemiplegia	Verbal	Spared comprehension and limited speech output. Phrase level utterances, semantic and phonemic paraphasia, distortions with effortful utterances. Prosodic features affected. Circumlocutions.
4	48/M	Occlusion of medial cerebral artery.	Verbal	Neologisms, phonemic paraphasias and word finding difficulties. Utterances were unclear.
5	50/F	Temporal lobe infarct with right sided paralysis	Verbal	Sentence level expression, distortions, slow effortful speech, paraphasias and prosodic aspects affected. Severe word finding difficulties, circumlocutions, Severe retrieval problems.
6	40/M	Diffuse lesion	Verbal	Phrase level expression, jargon utterances, grammatical structures of language were affected, distortions, neologisms and paraphasias present .word finding difficulties, circumlocutions.
7	56/M	Cerebrovascular accident	Verbal	Jargon utterances with distortions, word level speech output, Effortful speech and dysprosody.

Subtest 2: Pointing task

This subsection includes five items. Flash cards/real objects were used for testing. The response mode was only pointing. A score of 2 was given for correct response and the maximum score of 10 was considered for this subsection. The mean (M) and standard deviation (SD) scores of each group of participants is given in Table 7.

Table 7. *Mean and standard deviation of each group in pointing task subsection.*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	0.00
Person with stroke	7	9.57	0.78

The mean (M) and standard deviation (SD) scores of normal participants and person with stroke were (10.00 and 0.00) and (9.57 and 0.78) respectively. From the above scores it is evident that the persons with stroke group showed poor performance compared to normals. Further the data was subjected to Mann Whitney U test, which revealed that there is a significant difference (/ Z / = .003) between the two groups.

Subtest 3: Auditory word recognition

This subsection had five items. The items were in the form of flash cards. The response mode was either eye blink / gestures / pointing. Each item carried a maximum score of 2 and the total score for this section was 10.The mean (M) and standard deviation (SD) scores for both the groups have been explained separately.

Table 8. *Mean and standard deviation of each group in auditory word recognition subsection*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	.00
Person with stroke	7	8.71	1.82

It is evident from the scores as shown in Table 8 that the performance of participants in the persons with stroke group (M: 8.71, SD: 1.82) is poorer compared to the participants in normal group (M: 10.00, SD: .00). Analysis of data using Mann Whitney U test showed a significant difference (/ Z / = 0.00) between the two groups.

Subtest 4: Verification task

This subsection includes five tasks. The picture cards were presented for all the five tasks. The response mode was in the form of gestures, eye movement, pointing or verbal. Each correct response was given a score of 2 and maximum score for this section was 10. The mean (M) and standard deviation (SD) scores for each group of the participants are given in Table 9.

Table 9. *Mean and standard deviation of each group in verification task subsection.*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	0.00
Person with stroke	7	6.14	2.60

It can be interpreted from Table 9, that the normals group scored (M: 10.00, SD: .00) higher compared to persons with stroke (M: 6.14, SD: 2.60). Further analysis of data using Mann Whitey U test showed significant difference (/Z / = 0.00) between the two groups.

Subtest 5: Sequential commands

This subsection had five questions which involves carrying out various actions. The commands stated in these questions were in the increasing order of complexity. Real objects were used. The response mode was nonverbal, mainly through performing actions. Each command carries a score of 2 for a correct response and a maximum score of 10 can be obtained in this subsection. The mean and standard deviation scores of each group of participants are in Table 10.

Table 10. *Mean and standard deviation scores of each group in Sequential commands subsection*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	0.00
Person with stroke	7	6.28	2.05

The performance of normals (M: 10.00; SD: 0.00) compared to persons with stroke group (M: 6.28; SD: 2.05) was better. When the data was further analyzed using Mann Whitney U test results reveal significant difference (/ Z/ = .00) between two groups.

Overall performance of the participants in auditory verbal comprehension

This domain included five subsections: yes–no questions, pointing task, auditory word recognition, verification task, sequential commands. The maximum score of this domain was 50. Descriptive statistics was done in order to arrive at the mean (M) and standard deviation (SD) scores. The data was further subjected to non-parametric statistical analysis (Mann-Whitney U Test) in order to find, if there was any significant between normal and persons with stroke for each of the sub-test.

Table 11. *Overall Mean and Standard deviation scores of auditory verbal comprehension domain*

Group	**N**	**Mean**	**SD**
Normal	30	50.00	0.00
Person with stroke	7	38.8	5.63

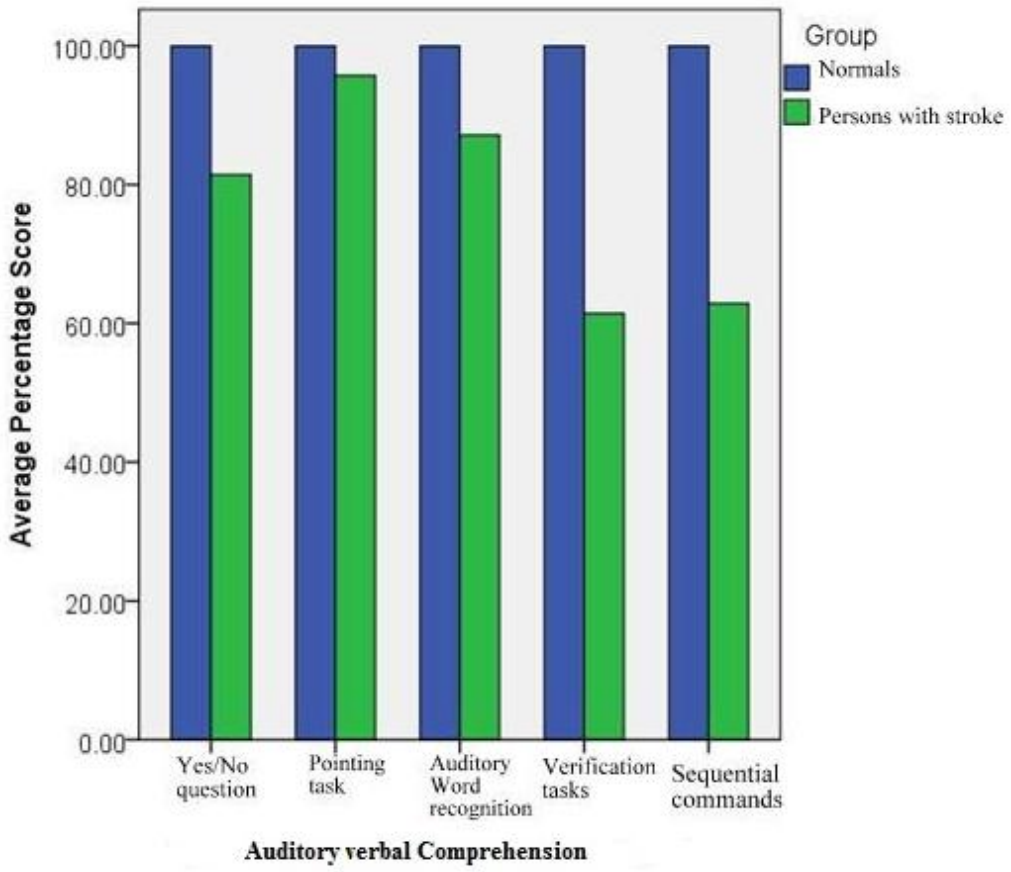
The Mann-Whitney U test revealed a significant difference (/ Z / = 0 .00) among the two groups. The normal group (Mean: 50.00, SD: 0.00) performed better compared to the persons with stroke (Mean: 38.8, SD: 5.63) in all the sub-sections of this domain. This finding is evident from the mean and standard deviation scores. From the Graph1, it can be noted that the performance of normal participants was similar among the subsections. In contrast, person with stroke performed the best in pointing tasks followed by auditory word recognition, yes/no question, sequential commands and verification tasks. Goodglass and Baker (1976) reported that comprehension deficits seen in persons with brain damage may be because of semantic processing difficulties.

It has been well documented in the literature that the auditory comprehension of spoken language is dependent on the sense of hearing and auditory perception. Higher level decoding of the perceived auditory information involves extracting the denotative and connotative meanings from individual words, sentences, phrases and discourse. For auditory comprehension tasks, the brain needs to operate as a whole with the combination of sensory and higher level cognitive and linguistic processes. During the initial post-acute stages of recovery there is a lack of functioning in certain areas of brain of the person with stroke. This result in poor vigilance and difficulties

in auditory processing which are in turn further, related to problems in attention was reported by (Rothenberger, Szirtes & Jurgens, 1982).

Rothenberger, Szirtes & Jurgens, (1982) also reported that they have problems in both sustained and selective attention. The findings of this sub-test are in accordance with Korda and Douglass, (1997) who reported that persons with stroke exhibit disturbances in processing both verbal and nonverbal material. Qualitative analysis of the responses revealed that participants in the persons with stroke group experience more difficulty in answering imaginative questions like “does car go in sky” and “does paper burn in fire”. Stroke impairs linguistic processing stated by Csepe et al., (2001).

Moreover Auther et al., (2000) identified that, if there is any damage to temporal areas of brain the person exhibits auditory processing difficulties which lead to poor performance in auditory comprehension. As a support there are many investigations in the literature correlating that the comprehension deficits to the disturbances in cognitive functioning is caused due to damage to the critical areas of the brain. Tanner (2000) in his study reports that any damage to the Wernicke’s area lead to difficulties in decoding phonological, grammatical, sensory perceptual and semantic features of language. Caplan and Waters,(1999) reports that allocation in the working memory is required for language processing. Limitation in working memory lead to comprehension deficits.



Graph 1. *Bar graphs showing mean scores of two groups in auditory verbal comprehension domain.*

Albert, (1976); Burgio and Basso, (1997); Caplan and Walters, (1999); DeDe, Caplan, Kemtes, and Waters, (2004); Hough, Vogel, Cannito, and Pierce, (1997); also report that deficits in verbal short term memory in conjunction with aging process may result in comprehension difficulties. If there is any difficulty in verbal decoding will in turn lead to comprehension deficits. Helm-Estabrooks and Albert, (2004); in their study stated that auditory comprehension includes linguistic skills along with attention, visual search and selection, and verbal memory. The persons with stroke in this study experienced difficulty in following commands of increased length and complex syntax. Several studies report that sentence length and complexity has an

effect on auditory comprehension. Goswami, (2004); stated that the difficulty in comprehension becomes obvious when the grammatical complexity of sentence increases.

Thus, the results obtained in the present study also revealed that the persons with stroke experienced difficulties in auditory verbal comprehension tasks which are an indicative of any cognitive or linguistic processing difficulties.

Domain 3: Repetition

Subtest 1: Automatic speech

This subsection included five tasks. The response mode was verbal. Each task was given a score of 2. The maximum score for this subsection has 10. The mean (M) and standard deviation (SD) scores for each group of participants are depicted in Table 12.

Table 12. *Mean and standard deviation scores of each group in Automatic speech subsection.*

Group	**N**	**Mean**	**SD**
Normal	30	9.43	0.67
Person with stroke	7	6.57	2.22

It can be seen from the Table 12, the mean and standard deviation scores of normals and persons with stroke is 9.43 (SD, 0.67) and 6.57 (SD, 2.22) respectively .This indicates a poor performance by the participants in the stroke group. Mann Whitney U test showed a significant difference (/ Z/ = 0 .002) between two groups.

Subtest 2: Word

This subsection includes five words. The expected response mode was verbal. Score of 2 was considered for each correct response. The maximum score for this subsection

was 10. The mean (M) and standard deviation (SD) scores for each group of participants is presented in Table 13.

Table 13. *Mean and standard deviation scores of each group in word subsection*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	0.00
Person with stroke	7	8.00	2.23

The mean and standard deviation scores of normals (M: 10.00; SD: .00) and persons with stroke (M: 8.00; SD: 2.23) shows that the persons with stroke group performed poorer than normals. The data was further subjected to Mann Whitney U test which revealed the significant difference (/ Z/ = 0 .00) between two groups.

Subtest 3: Phrase

This subsection included five phrases. The expected response mode was verbal. A score of 2 was given for a correct response. The maximum score of this section was 10. The mean (M) and standard deviation (SD) scores for each group of participants are tabulated in Table 14.

Table 14. *Mean and standard deviation scores of each group in phrase subsection*

Group	**N**	**Mean**	**SD**
Normal	30	10.00	0.00
Person with stroke	7	6.66	2.65

From the mean and standard deviation scores of normal (M: 10.00; SD: 0 .00) and persons with stroke (M: 6.66; SD: 2.65) it is evident that persons with stroke group performed poorer. Mann Whitney U test revealed a significant difference (/ Z / =.00).

Subtest 4: Sentence

This subsection included five sentences. The response mode was verbal. For each correct response a score of 2 was considered and maximum score for this subsection was 10. The mean (M) and standard deviation (SD) scores each group of participants is given in Table15.

Table 15. *Mean and standard deviation scores of each group in sentence subsection*

Group	**N**	**Mean**	**SD**
Normal	30	9.96	.18
Person with stroke	7	6.60	2.07

The normal participants obtained a mean score of 9.96 (SD: 0.18). However, persons with stroke had a lower mean score of 6.60 (SD: 2.07).From these scores, it is apparent that persons with stroke group showed poor performance. Further analysis of data using Mann Whitney test revealed a significant difference (/Z / =.00).

Overall performance of the participants in repetition domain

This domain had four subsections namely: automatic speech, word, phrase and sentence. The maximum score of this domain was 40.The raw scores were subjected to descriptive statistics to arrive at mean (M) and standard deviation (SD).The data of all the subsections of this domain were further subjected to nonparametric test (Mann – Whitney U test) to find whether there is any significant difference between the two groups (normals and persons with stroke group). The overall mean and standard deviation scores of two groups of participants are shown in the Table: 16.

Table 16. *Overall mean and standard deviation scores of repetition domain*

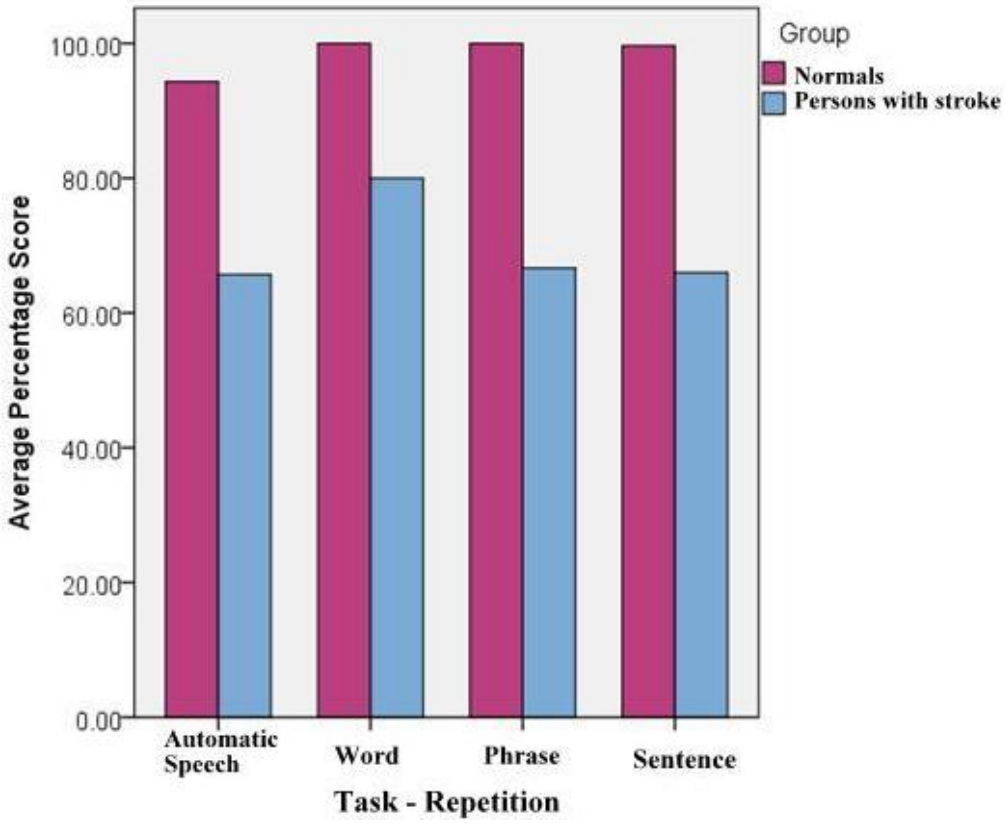
Group	**N**	**Mean**	**SD**
Normal	30	39.40	0.72
Person with stroke	7	25.00	10.14

All the persons with stroke (M: 25.00, SD: 10.14) performed poorer than normal (M: 39.40, SD: 0.72) in all the subsections of this domain. Mann Whitney U test revealed a significant difference (/ Z / = 0 .00) between two groups across subsections of this domain.

The findings of the present study are in concordance with study done by Wernicke, (1874); and Geschwind, (1965) they identified that repetition difficulties exist in persons with aphasia, if there is any structural damage to arcuate fasciculus. They also stated that disruption in the flow of information due to disconnection between anterior and posterior speech areas, where conversion of auditory speech code into motor speech production takes place.

The graphical representation (Fig 2) also shows a decreased performance in persons with stroke. They showed obvious difficulty while performing automatic speech task where it exerts requires demand on persons working memory as reported by The Psychological Corporation, (2002) and Wilde et al., (2004).Especially during digit forward and backward tasks there was a difficulty in stroke individuals. A similar finding has been reported by Ronnberg et al. (1996) and Ween, Verfaillie and Alexander (1996) a shorter digit span in aphasics. It is reported that in digit span

tasks depending on the degree of manipulation the phonological loop and central executive will get activated.



Graph 2. *Bar graphs showing mean scores of two groups in repetition domain*

The performance was better in word, with phrase and sentence repetition in the decreased line of order. Moser et al. (2009) states that inferior parietal lobe is very important in processing temporal order of speech syllables. The participants in stroke group of the present study had lesions in the various critical sites of the cortex which facilitates in the conversion of the auditory speech code to motor speech production, due to which there is a decreased performance in all the subsections of this domain.

The maintenance of speech monitoring based on the auditory speech code is also affected. Several researchers have stated that in some persons with aphasia find repetition as more difficult compared to other linguistic deficits. In literature, it is

reported that there are many mechanisms which underlie the deficits in repetition such as deficits in phoneme recognition, difficulties at phonological production level, limitation at auditory verbal short term memory and deficits in syntactic and semantic comprehension.

Some authors relate repetition deficits in person with aphasia to the deficits in cognition. This assumption has been supported by findings of Caspari et al., (1998); Conner, MacKay, & White, (2000); Dick et al.,(2001);Friedmann & Gvion, (2003); Martin, (2000); Murray, (2004); Wright et al., (2003); Yasuda & Nakamura, (2000); where limitations in working memory have a significant effect on the linguistic processing. Since person with stroke during the initial post - acute stages of recovery has poor vigilance and difficulties in auditory processing, which are in turn can be related to problems in attention has been reported by Rothenberger, Szirtes and Jurgens, (1982).

The upshots of the study also find support from Baddeley, (2003) and Murray, (2004) deduce that persons with aphasia has decreased working memory due to deficient phonological loop, which in turn has influence on language learning and performance. Individuals with stroke in present study exhibited more difficulty in repetition of sentences with increased complexity. These results are in correlation with the results of Bohland and Guenther, (2006) where they reported that increased syllable sequence complexity increases cortical activity in anterior and posterior lobes and if there is any damage to the somatosensory component, it would result in difficulties in repetition and spontaneous speech production.

Hence, from the results it is evident that persons with stroke in the present study encountered difficulty in all the four subsections of this domain which is the result of

any disassociation of circuits between different components of cognition or damage to the different areas of the brain.

Domain 4: Naming

Subtest 1: Confrontation Naming

This subsection comprised of five picture cards. The response mode was through pointing to picture cards. Each correct response carried a score of 2 and the maximum score was 10. The mean (M) and standard deviation (SD) scores each group is in the Table 17.

Table 17. *Mean and standard deviation scores of each group in confrontation naming subsection*

Group	**N**	**Mean**	**SD**
Normal	30	9.86	0.43
Person with stroke	7	8.57	2.14

On analyzing the data using SPSS, a significant difference was noted among the two groups with normals scoring mean and standard deviation of M: 9.86 & SD: 0.43 and persons with stroke with mean and standard deviation of M: 8.57 & SD: 2.14.A look into the scores gives an impression that normal person performed better than persons with stroke.

Subtest 2: Responsive Naming

This subsection consists of five questions which were arranged in the increasing order of complexity. The response mode was verbal. Correct response for each question was given a score of 2.The total score of this section was 10.The mean (M) and standard deviation (SD) score for each group of participants as in Table 18.

Table18. *Mean and standard deviation scores of each group in responsive naming subsection*

Group	**N**	**Mean**	**SD**
Normal	30	9.80	0.48
Person with stroke	7	5.28	2.13

Descriptive analysis of the scores revealed mean of 9.80 (SD: - 0.48) for normals and 5.28 (SD: 2.13) for stroke. Further analysis using Mann Whitney U test showed a significant difference (/ Z / = 0 .00) between the groups From these mean and standard deviation scores it is interpreted that persons with stroke group performance was poor compared to normals.

Subtest 3: Lexical generative naming

This subsection includes five questions which are in the increasing order of complexity. The response mode was verbal. Each correct response carried a score of 2 and a maximum score of 10 was considered for this section. The mean (M) and standard deviation (SD) scores each group of participants is given in Table 19.

Table19. *Mean and standard deviation of each group in Lexical generative naming subsection*

Group	**N**	**Mean**	**SD**
Normal	30	9.23	1.07
Person with stroke	7	3.85	1.57

Mann – Whitney U test revealed a significant difference (/Z/ = 0.00) among the two groups. In this subtest it can be seen that there was a wide gap in the

performance of normals (M: 9.23, SD: 1.07) and persons with stroke (M: 3.85, SD: 1.57).

Overall performance of the participants in naming domain

The ability to name and to produce the correct word of an object is considered as a simple task. It is so elementary that even young children learn to perform the task easily. However, aphasic person's demonstrate difficulties in naming and word finding (Goodglass & Geschwind, 1976).Hence, testing of word – finding ability is important in the aphasia evaluation.

This domain included three subsections namely: confrontation naming, responsive naming and Lexical generative naming. The maximum score of this domain was 30. Descriptive statistics was done to obtain normative scores and non-parametric analysis was used to compare the difference between the normal and persons with stroke.

From the mean (M) and standard deviation (SD) scores of normals (M: 28.90 SD: 1.49) and persons with stroke (M: 17.71 SD: 5.12) it is apparent that the persons with stroke found difficulty in performing the tasks under this domain. Whereas normal group scored better without any difficulty.

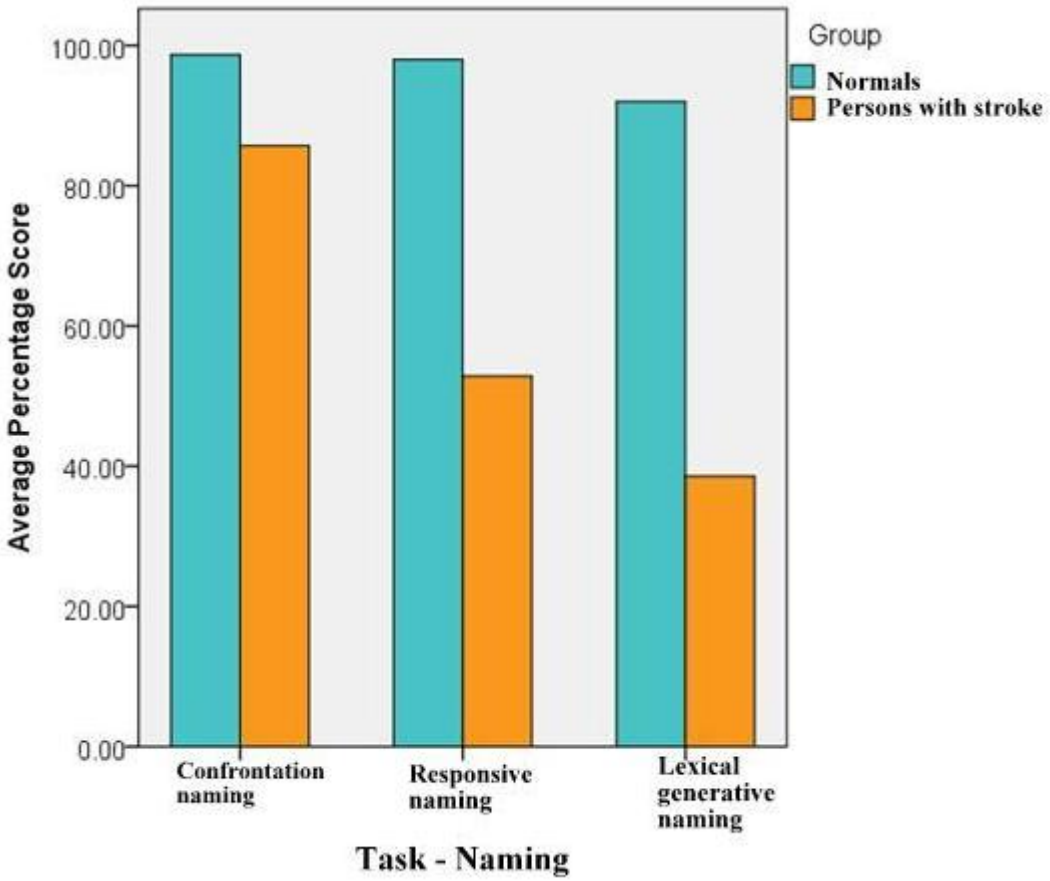
Table 20. *Overall mean and standard deviation scores of naming domain*

Group	**N**	**Mean**	**SD**
Normal	30	28.90	1.49
Person with stroke	7	17.71	5.12

Mann Whitney U test revealed a significant difference (/ Z / =.00) between the two groups (normals and persons with stroke) across subsections of this domain.

From graph 3, it is depicts that the performance of stroke individual is gradually decreased with increased complexity and it has also shown that stroke individuals performed better in confrontation naming task where the visual stimulus was present, but decreased performance is seen in both responsive and generative naming task. In contrast normal participants performed better in all the tasks of naming namely confrontation naming, responsive naming, and lexical generative naming.

Generally it is seen that in focal brain damage individuals the common deficit observed is the inability to retrieve phonological or orthographic word form from the intact knowledge. Luria, (1966, 1970) states that depending on the loci of impairment naming deficits are seen in person with aphasia. Since person with stroke in present study have lesion in different areas of brain where site of lesion might have an effect on naming difficulties seen in the participants. This notion is further supported by functional imaging studies of naming by Howard *et al* (1992); Hirsch *et al* (2001); Abrahams *et al* (2003) ; Grabowski *et al* (2003); Martin *et al* (2005); Harrington; *et al* (2006); Price *et al* (2005, 2006); Kemeny *et al* (2006); Saccuman *et al* (2006).These researchers have found the activation of left perisylvian and extrasylvian cortex during naming.



Graph 3. *Bar graph showing the mean scores of two groups in naming domain*

Goodglass et al & Wingfield (1993) state that impaired picture naming can be the result of insults to brain regions. Qualitative analysis of the responses revealed paraphasias, circumlocutions and retrieval problems while performing the naming tasks, Similar findings have been reported by Benson, (1979, 1988).The presence of phonemic paraphasias and circumlocutions encompasses naming difficulties and the individual with aphasia experiences 'Tip of tongue' phenomenon indicating the partial awareness of the phonological characteristics of word. These may also be due to disturbance of the internal structural representations (Kohn et al., 1996) or post lexical phonemic processes (Ellis et al., 1992). In phonemic paraphasia, deficits in sequencing and organizing phonemic information exist (Lesser, 1989).

Barton, Maruszewski and Urrea, (1969); Benson (1979); reports that deficits in perception (decoding), storage, selection retrieval or actual production of the word (encoding) will result in naming difficulties. Since language problems are the manifestations of cognitive deficits in stroke individuals, naming difficulties were also related to be the result of this. The findings from Ellsworth & Raymer (1998) (both semantic and phonological stages of lexical retrieval are affected in stroke individuals) and Hilis (1990) (semantic processing deficits result in semantic errors in naming and comprehension) the findings of current research. Another speculation that can be made for the presence of naming deficits is the disassociation between the semantic and phonological representation of the word forms.

A number of studies have been carried out in this area (Goodglass and Wingfield, 1997; Hart and Gordon, 1990; Hillis et al., 2001) reporting that in stroke individual's disruption of mechanisms in linking semantic representation to particular word form representation may result in naming difficulties.

Domain 5: **Reading**

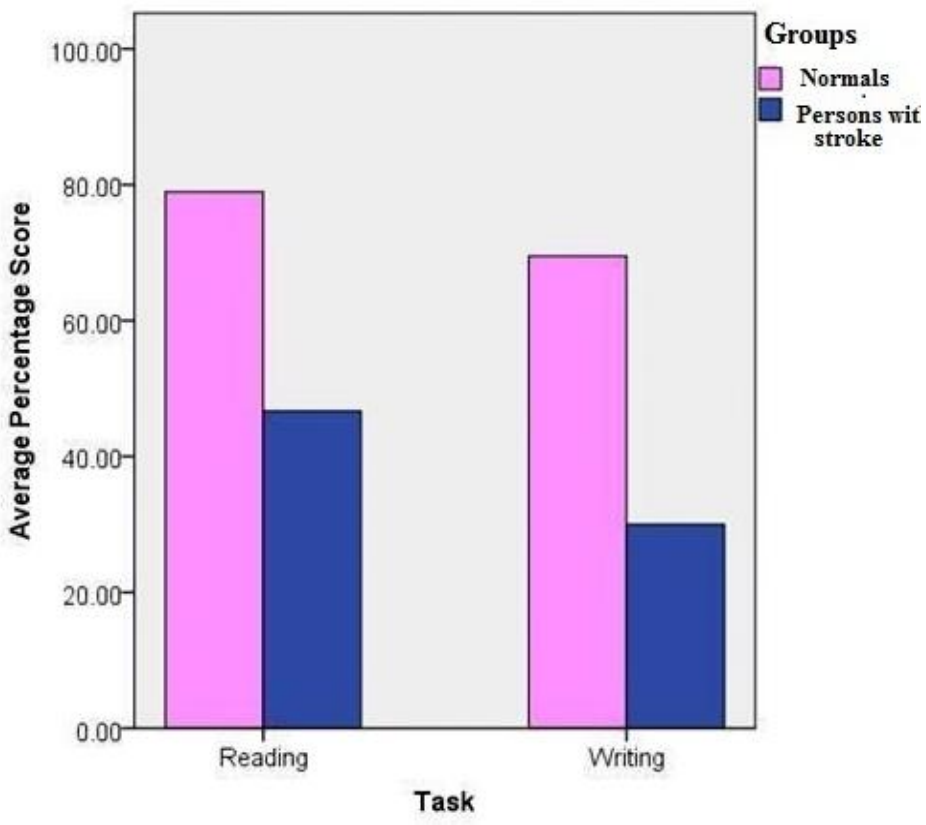
This domain includes four tasks. The response mode was verbal. Correct response for each task carried a score of 2. The maximum score considered for this domain is 8. The mean (M) and standard deviation (SD) scores of each group of participants is depicted in Table 21.

Table 21. *Mean and standard deviation scores of each group in Reading subsection*

Group	**N**	**Mean**	**SD**
Normal	19	7.89	.45
Person with stroke	3	4.66	2.88

From the group of 30 normals only 19 participants were literate, hence this task was administered on these literate participants. These literate participants scored a mean of 7.89 (SD: 0.45) .Out of seven participants with strokes only three were able to perform the task and scored a mean of 4.66 with a standard deviation of 2.88. A comparison across the groups using the Mann Whitney U test revealed a significant difference (/Z/ = 0.003) between the two.

From the graphical representation in Graph 4 it is evident that the performance of stroke individuals was poorer. Thus it is inferred that the areas affected would have contributed to the reduced scores. As,reading is a skill which takes place by the conversion from grapheme to phoneme. Some of the studies report that the activation of certain regions in the brain plays an important role in facilitating reading. Fiebach et al., (2002) and Binder et al. (2003) identified bilateral midfusiform gyrus activation in reading tasks (Lexical decision).Studies also suggest the involvement of left angular gyrus in orthography to phonology conversion in both word and sub word level. Coltheart, Patterson, & Marshall, (1980); Hatfield, (1983); Ellis, (1984) in 'dual route model' explain that reading and writing mainly occurs through two routes namely Lexical route (retrieval of word spelling stored in orthographic output lexicon) and phoneme grapheme conversion route(segmental translation from phonology to orthography).



Graph 4. *Bar graph showing the mean scores of two groups in reading and writing domains*

From the functional imaging and lesion studies it is reported that while reading, orthographic stimuli processing is located more in the left fusiform gyrus by Dehaene et al. (2002); Leff et al. (2006). The results from Foundas et al., (1998); Raymer et al., (1997) and Price and Devlin (2003) support the relevance of brain damage which disrupts the access to orthographic word forms which in turn result in difficulties in oral naming and reading.

Thus, due to the varied lesions in the areas of the brain and also due to cognitive limitation during the post-acute stages of recovery in the persons with stroke results in difficulties in accessing the stored word and orthography to phonology conversion.

Domain 6: Writing.

This domain encompasses four tasks. The response mode was writing. Flash cards are used. Each correct response was given a score of 2. Maximum score for this domain was 8.Values in Table 22 are the mean (M) and standard deviation (SD) scores of each group of participants.

A total of 30 participants in the normals group were included in which only 19 participants were literates and performed the task with mean score of 6.94 and standard deviation of 1.39.In persons with stroke group only 2 participants performed the task and they obtained a mean score of 3.00 and standard deviation score of 0.00.

Table 22. Mean and standard deviation scores of each group in writing domain

Group	**N**	**Mean**	**SD**
Normal	19	6.94	1.39
Person with stroke	2	3.00	0.00

Since the number of participants in the persons with stroke group were only 2, hence no statistical test was used to find the significant difference between the two groups. Corbetta & Shulman (2002), Castiello (2005) stated that writing is a skill dependent on the parietal lobe function where the controlled upper limb movements stresses on eye gaze, focused visual attention, and predictive representations of visual movement. This helps in grasping, pointing, reaching and analytical illustrations of visual movement. It is reported that majority of the activity of left and right parietal lobes are related to the writing execution on visual and somatosensory control. This notion is supported from Grossberg and Paine (2000) in models of writing reporting that skill of writing is dependent on feedback from polysensory areas that is from

visual and somatosensory areas. Studies report that writing process requires the flexibility of the working memory in order to perform. Since the limitations in the working memory may indirectly inhibit its flexibility which results in writing deficits. Caplan and Waters, (1999); stated allocation in the working memory is essential for language processing.

Due to the lesion present individuals with stroke, exhibit difficulties in upper limb movements where the feedback loop is affected in facilitating writing skill and also the motoric limitations due to hemiplegia.

Thus, from the results of the study it can be stated that the poor performance of stroke participants was evident using the developed bedside screening test in Kannada. It is evidently seen from both the tabulated scores and graphical representations that the performance of the participants in the normal group was significantly better than participants in the persons with stroke group. Across all the domains of the test, stroke individual's showed a lower mean and standard deviation scores. Due to the lesions in the brain stroke individual's exhibit difficulties in different modalities of speech and language. In order to identify the stroke individual who is having an aphasic component, it is very much essential to have a normative score across the domains. Hence, the tabular column depicting the lower and upper bound scores is given in **(Appendix III),** these values have been deducted based on the performance of persons with stroke and normal participants on the various tasks. These normative values can be used during the screening of persons with stroke for the speech language skills and these will indicate whether the persons following stroke shows any aphasic component or not. The score sheet that can be used to

document the performance of stroke individuals during the assessment is enclosed **(Appendix IV).**

CHAPTER V

SUMMARY AND CONCLUSION

The present study was taken up to develop a screening tool which could be used by speech language pathologists and other allied health professionals to screen for any speech and language disturbances during the initial post-acute stages of recovery following stroke . Review of literature has shown that screening tools are used as the primary methods of evaluation, as they are quick and easy for assessment and have good internal consistency and reliability.(Sabe.Courtis,Saavedra.Prodan,De Lujan,& Melian;2008)

The test was developed with an objective to provide a language specific screening tool in the Indian context for Kannada population. The present study was designed to develop the screening tool to identify the presence or absence of language disturbances in persons with stroke.

The test includes six domains namely, spontaneous speech, auditory verbal comprehension, repetition, naming, reading and writing with subsections within them. The materials used were in the form of picture cards /real objects in this test. A screening kit was prepared. The study was carried out on 30 normal individuals with three age groups ranging from 30-40, 40-50, and 50-60 years; and seven persons with stroke.

The objective of the study was to determine the overall performance of normal participants across various domains of the test and subsections following which the

performance of three age groups across domains and subsections of the test was taken up. To assess the sensitivity of the test, the study was also aimed at comparing the performance of normal and persons with stroke.

The raw scores obtained were tabulated for statistical analysis using SPSS (version 17.0) software package. These scores were converted into percentage values .Descriptive analysis of the raw scores yielded the mean (M) and standard deviation (SD) scores for participants of both the groups separately across each domain and their subsections. Statistical analysis of the data using non parametric tests namely, Kruskal Wallis test to identify the significant difference between three age groups within normals across the domains and subtests of the test and Mann- Whitney U test to identify the significant difference between two groups (normals and persons with stroke) across the domains and its subsections.

Results of the present study within the normal group of three age ranges (30 – 60 years) revealed that there is no significant difference between the three age groups across the subsections. Hence, all the three age ranges were considered as a single group. No obvious deficits were observed in the neuro typical group across all the domains of the test. From the total of 30 participants in the normal group only 19 participants were literates. Thus, the reading and writing domains were assessed on 19 participants.

Results of the present study with respect to the comparison of the performance of the two groups (normals and persons with stroke) revealed that there is a significant difference between the groups. The performance of the stroke participants was poor when compared with the normal participants. The stroke participants experienced difficulties in all the domains: comprehension, repetition, naming, reading and

writing. Damage to certain areas of the brain and poor cognitive skills would have contributed to the auditory processing difficulties in persons with stroke. The increased cognitive load in naming tasks especially in generative and responsive naming which exerts pressure on the cognitive processing components in retrieving from stored memory which might have been a additional causative factor for poor performance in the stroke individuals. Thereby, indicating that the test is suitable to differentiate between normal and pathological speech and language disturbances.

Implications of the study

1) This tool can be used for screening to assess speech and language skills in persons with stroke.

2) This screening tool is less time consuming and can quickly give an idea about the presence of any phasic deficit in persons with stroke.

3) This tool can help in planning appropriate management program for persons with aphasia

Limitations of the study

- This screening tool can be used only for Kannada population.
- Test was administered on less number of participants in both normal (30) and persons with stroke (7).
- Some of the variables like gender, education and site of lesion were not taken into consideration.

Future suggestions

- The screening tool can be adapted and standardized in other languages.
- The standardization of the tool on large number of controls on variables like gender and education can be taken up.

REFERENCES

Al-Khawaja, I., Wade, D. T., & Collin, C., F. (1996). Bedside screening for aphasia: a comparison of two methods. *Journal of Neurology, 243* (2), 201-204.

Auther, L.L., Wertz, R.T., Miller, T.A., & Kirshner, H.S. (2000). Relationships among the mismatch negativity (MMN) response, auditory comprehension, and site of lesion in aphasic adults. Aphasiology, 14, 461–70.

Abrahams, S., Goldstein, L.H., Simmons, A., Brammer, M.J., Williams, S.C., & Giampietro, V.P. (2003).Functional magnetic resonance imaging of verbal fluency and confrontation naming using compressed image acquisition to permit overt responses. Human Brain Mapping, 20, 29-40.

Albert, M. L., (1976). Short-term memory and aphasia. *Brain and Language*, *3*, 28-33.

Baddeley, A. (2003). Working memory and language: An overview. Journal of Communication Disorders, 36, 189–208.

Broca (1861- 1865). Cited in (Sarno, M., T. (1991). *Acquired aphasia* 2nd ed. San Diego, California: Academic Press, pp 23.

Baddeley, A. D. (2000). The episodic buffer: A new component of working memory? Trends in Cognitive Sciences, 4, 417–423.

Berthier ML. Poststroke aphasia: Epidemiology, path physiology and treatment..*Drugs in Aging* 2005;22: 163–182.

Baddeley, A. D., Hitch, G. J. (1974). Working memory. In G. H. Bower (Ed.), The psychology of learning and motivation: Advances in research and theory (pp. 647–667). New York: Academic Press.

Brookshire, R. H., & Nicholas, L. E. (1997). *Discourse Comprehension Test: Test manual* (revised edition). Minneapolis, MN: BRK Publishers.

Bohland, J.W., Guenther, F.H. *(*2006*)* .An fMRI investigation of syllable sequence production. *Neuroimage,* 32**,** 821–841.

Brust, J.C.M., Shafer, S.Q., Ritcher, R.W., & Brunn, B. (1976).Aphasia in acute stroke. *Stroke, 7, 167-173.*

Berndt, R. S. (1988). Category specific deficits in aphasia. *Aphasiology*, *2*(3/4*)*, 237-240.

Burgio, F., Basso, A. (1997). Memory and aphasia. *Neuropsychologia, 35*, 759-766.

Beeson, P.M., Magliore, J.G., & Robey. R.R. (2005) .Letter by Letter reading: Natural recovery and response to treatment. Behavior Neurology, 16, 191- 102.

Binder, J.R., Mohr, J.P., (1992) .The topography of callosal reading pathways. A case control analysis. Brain, 115, 1807 – 1826.

Cohen, L., Dehaene, S. (2004) .Specialization within the ventral stream .The case for the visual word from area. Neuroimage, 22, 466 – 476.

Caplan, D., Waters, G. S. (1999). Verbal working memory and sentence comprehension *Behavioral and Brain Sciences, 22*, 77-126.

Castiello, U. (2005). The neuroscience of grasping. Nat Rev Neurosci.6, 726 -736.

Corbetta, M., Shulman, G. (2002). Control of goal-directed and stimulus driven attention in the brain. Natural Review of Neuroscience. 3, 201—215.

Csepe, V., Osman-Sagi, J., Molnar, M., & Gosy, M. (2001). Impaired speech perception in aphasic patients: event-related potential and neuropsychological assessment. Neuropsychology, 39, 194–208.

Caspari, I., Parkinson, S., LaPointe, L., & Katz, R. (1998). Working memory and aphasia. Brain and Cognition, 37, 205–223.

Coltheart, M., Patterson, K., & Marshall, J. C., editors, (1980). Deep dyslexia. London: Routledge & Kegan Paul.

Conner, L., MacKay, A., & White, D. (2000). Working memory: A foundation for executive abilities and higher-order cognitive skills. Seminars in Speech and language, 21(2), 109–119.

Caramazza, A., & Hillis, A.E. (1990).where do semantic errors come from? Cortex, 26, 95 – 122.

Coltheart, M., Curtis, B., Atkins, P., & Haller, M. (1993). Models of reading aloud: dual-route and parallel-distributed-processing approaches. Psychological Review. 100, 589– 608.

Dick, F., Bates, E., Wolfec, B., Utman, J. A., Dronkers, N., & Gernsbacher, M. A. (2001). Language deficits, localization, and grammar: Evidence for a distributive model of language breakdown in aphasic patients and neurologically intact individuals. Psychological Review, 108(4), 759–788.

Darley, F., L. (1982). *Aphasia*. Philadelphia: W.B. Saunders. Cited in the: Davis, G., A. (2000). Aphasiaology: Disorders and clinical practice. Massachusetts. United States: Allyn & Bacon, Person Education Company. pp. 2.

Davis, A.G. (1993).A survey of Adult aphasia (2nd ed.).Englewood Cliffs, NJ: Prentice - Hall.

Davis, G. A. (2007). *Aphasiology - Disorders and Clinical Practice* (2nd Ed.). Boston: Pearson Education, Inc.

Duffy, R.J., Ulrich,S.R.(1976). A comparison of impairments in verbal comprehension, speech, reading and writing in adult aphasics. journal of speech hearing disorders.41,110 -119.

De Renzi, E., Vignolo, L. A. (1962) .The Token test: A sensitive test to detect receptive disturbances in aphasics .Brain, 85,665 – 678.

DeDe, G., Caplan, D., Kemtes, K., & Waters, G. (2004). The relationship between age, verbal working memory, and language comprehension. Psychology and Aging, 19, 601-616.

Dehaene, S., Le Clec, H.G., Poline, J.B., Le Bihan, D., & Cohen, L. (2002). The visual word form area: a prelexical representation of visual words in the fusiform gyrus. Neuroreport, 13,321- 325.

Ellis, A. W. (1984). Reading, writing and dyslexia: a cognitive analysis. Hillsdale, NJ: Lawrence Erlbaum Association.

Ellis, A.W., Kay, J., & Franklin, S. (1992). Anomia: Differentiating between phonological and semantic deficits. In D.I.Margolin (ed.), cognitive neuropsychology in clinical practice. New York: Oxford university press.

Eisenson, J. (1954). Examining for aphasia: A manual for the examination of aphasia and related disturbances, 3rd ed., (1993).San Antonio, TX: Psychological corporation.

Ellsworth, T.A., Raymer, A.M. (1998). Contrasting treatment for verb retrieval impairment in aphasia: A case study. ASHA Leader, 3(16), 84.

Enderby, P., Wood, v., and Wade, D. (1987) Frenchay Aphasia screening test. Windsor, England: NFER-Nelson.

Elena Plante., Beeson ,P,M. (2004) .Communication and Communication disorders: a clinical introduction,2nd Ed (pp 1 -18).Pearson Education, Inc ., Boston .

Frattali, C.M., Thompson, C.K., Holland, A., Wohl, C.B., & Ferketic, M.M. (1995) Functional Assessment of communication skills for adults. Administration and scoring manual .Rockville, MD: American speech language and hearing association.

Foundas AL, Eure KF, Luevano LF, Weinberger DR (1998) MRI Asymmetries of Broca's area: the pars triangularis and pars opercularis. *Brain and Language*. 64:282-296.

Ferro, J.M., & Madureira, S. (1997). Aphasia type, age and cerebral infarct localization. *Journal of Neurology*, 244, 505–9

Friedmann, N., & Gvion, A. (2003). Sentence comprehension and working memory limitation in aphasia: A dissociation between semantic-syntactic and phonological reactivation. Brain and Language, 86, 23–39.

Fiebach CJ, Schlesewsky M, Friederici AD (2002) Separating syntactic memory costs and syntactic integration costs during parsing: the processing of German WH questions. *Journal of Memory and Language.* 45:250–272.

Ferro, J.M., & Madureira, S. (1997). Aphasia type, age and cerebral infarct localization. *Journal of Neurol*ogy, 244, 505–9

Goswami, S. P. (2004). Comprehension deficits in aphasics. Unpublished Doctoral Thesis, University of Mysore, Mysore, India.

Goodglass, H., & Kaplan, E. (1983). The assessment of aphasia and related disorders. 2nd ed. Malvern, PA: Lea & Febiger.

Goswami, S. P., Shanbal, J. C., Samasthitha, S. & Navitha, U. (2010). *Field testing of Manual for Adult Non-fluent Aphasia therapy- Kannada (MANAT-K).* Research Project, All India Institute of Speech and Hearing Research Fund, Mysore, India.

Goodglass, H., & Baker, E. (1976).Semantic field, naming, auditory comprehension in aphasia .*Brain and Language*, 3,359 – 374.

Goodglass,H., & Berko,J.(1960).Agrammatism and inflectional morphology in English. Journal of speech and hearing research.3:257 – 267.

Goodglass, H., Quadfasel, F., Timberlake.(1964).Phrase length and the type and severity of aphasia. Cortex 1:133 – 153.

Goodglass, H., Kaplan, E., and Barresi, B. (2000). Boston Diagnostic Aphasia examination, 3rd ed. Philadelphia: Lippincott Williams & Wilkins.

Goodglass, H., & Wingfield, A. (1993). Selective preservation of a lexical category in aphasia: dissociations in comprehension of body parts and geographical place names following focal brain lesion. *Memory*, *1*(4), 313-28.

Geschwind, N. (1965*).* Disconnection syndromes in animals and man. *Brain* 88, 237–294.

Grossberg, S., Paine, R.W. (2000). A neural model of cortico-cerebellar interactions during attentive imitation and predictive learning of sequential handwriting movements. *Neural Network*. 13: 999 -1046.

Holland, A.L.,Thompson, C.K. (1998) Outcome measurement in aphasia. In: C.M.Frattali (Ed.), Measuring outcomes in speech – language pathology (pp.245 -266).New York: Thieme.

Harrington, G.H., Buonocore, M.H., & Faria, S.T. (*2006). Intrasubject reproducibility of functional MR imaging activation in language tasks. American Journal of Neuroradiology, 27,939-44.*

Helm-Estabrooks, N., & Albert, M. L. (2004). *Manual of aphasia and aphasia therapy*. Austin: PRO-ED.

Helm-Estabrooks, N. (1992). *Aphasia Diagnostic Profiles*. Chicago: Riverside Publishing.

Hough, M. S., Vogel, D., Cannito, M. P., & Pierce, R. S. (1997). Influence of prior pictorial context on sentence comprehension in older versus younger aphasic subjects. *Aphasiology, 11*, 235-247.

Hatfield, M. F. (1983). Aspects of acquired dysgraphia and implication for re-education. In C. Code, & D. J. Muller (Eds.), *Aphasia therapy* (pp. 157–170). London: Edward Arnold.

Hillis, A.E., Rapp, B.C., & Caramazza, A. (1999) .When a rose a rose in reading but tulip in writing. *Cortex* 35: 337-356.

Hillis, A.E., Chang, S., & Bresse, E., et al.(2004).The crucial role of posterior frontal regions in modality specific components of the spelling process. Neurocase, 10,157-187.

Holtzapple, P., Pohlman, K., LaPointe, L.L., & Graham, L.F. (1989) .Does SPICA mean PICA? *Clinical Aphasiology*, 18, 131 – 144.

Howard, D., Patterson, K.E., Wise, R., Brown, W.D., Friston, K., & Weiller, C, et al., *(1992). The cortical localization of the lexicons. Brain, 115, 1769-82.*

Hirsch, J., Moreno, D.R., & Kim, K.H. *(2001). Interconnected large-scale systems for three fundamental cognitive tasks revealed by functional MRI. Journal Cognition Neuroscience, 13:389-405*.

Hall, Jordan & Robin, (1993). Cited in: Spreen, O., & Risser, H. A. (2003). Assessment of aphasia. New York. United States: Oxford University press. pp .123-124.

Kemeny, S., Xu, J., Park, G.H., Hosey, L.A., Wettig, C.M., & Braun, A.R. *(2006). Temporal dissociation of early lexical access and articulation using a delayed naming task—an FMRI study. Cerebral Cortex, 16,587-95.*

Krishner, H.S. (1995) Introduction to aphasia.In:H.S.Krishner (Ed.), Handbook of neurological speech and language disorders (pp.1 – 21).New York: Marcel Dekker.

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

Kertesz, A. (1982). *Western Aphasia Battery*. New York: Grume and Stratton.

Kertesz, A. (1988). What do we learn from recovery of aphasia? *Advances in neurology, 47*, 277-292.

Kay, J., Lesser, R., & Coltheart, R. M. (1996). Psychological assessments of language processing in aphasia (PALPA): an Introduction. *Aphasiology, 10*, 159-180.

Korda, R.J., Douglas, J.M. (1997). Attention deficits in stroke patients with aphasia. *Journal of Clinical Experimental Neuropsychology*, 19,525–42.

Kohn,S.E., Smith,K.L., & Alexander, M.P. (1996).Differential recovery from impairment to the phonological lexicon. *Brain and language*, 52,129 -149.

Keenan, J.S. and Brassell, E.G. (1975) Aphasia Language performance scales (Spanish version).Murfreesboro, TN: Pinnacle press.

Leff, A.P., Spitsyna, G., Plant, G.T., & Wise, R.J. (2006). Structural anatomy of pure and hemianopic alexia. *Journal of Neurology Neurosurgery* Psychiatry. 77, 1004--1007.

Lecours, A, R., Lhermitte, F., Bryans, B. (1983). Aphasiology ,London: Bailliere – Tindall.

Martin, N. (2000). Word processing and verbal short-term memory: How are they connected and why do we want to know? *Brain and Language*, 71, 149–153.

Murray, L. L. (2004). Cognitive treatments for aphasia: Should we and can we help attention and working memory problems? *Journal of Medical Speech-Language Pathology*, 12(3), xxv–xl.

Manochiopinig, S., Reed,V.A., Sheard,C., & Choo,P.(1992).Pragmatic assessment in adult aphasia : A clinical review.Aphasiology,6,519-533..

Murray, L.L., & Chapey, R. (2001). Assessment of language disorders in adults .In R. Chapey (ED.), Language intervention strategies in adult aphasia (4th ed., pp.55 -126).New York: Lippincott, Williams &Wilkins.

Murray, L., L. & Clark, H., M. (2005). *Neurogenic Disorders of Language: Theory Driven Clinical Practice.* Clifton Park, Thomson Delmar Learning. NY. pp.: 84

Monrad – Krohn, G, H. (1947). Dysprosody or altered melody of language .*Brain*, 70: 405 – 415.

Nakase-Thompson, R., Manning, E., Sherer, M., Yablon, S. A. Vickery, C., Harris, C., Dickson, S. (2004). Mississippi Aphasia Screening Test. Cited in the:

Spreen, O., & Risser, H. A. (2003). *Assessment of aphasia*. New York. United States: Oxford University press. pp. 53-57.

Owens, R.E., Metz, D.E., & Hass, A. (2003).Introduction to communication disorders: A life span perspective.Boston:Allyn & Bacon.

Orzeck, A.Z. (1964). The orzeck Aphasia Evaluation .Los Angeles: Western Psychological services.

O'Neill, P. A., Cheadle, B., Wyatt, R., McGuffog, J., Fullerton, J., K (1990). The value of the Frenchay Aphasia Screening Test in screening for dysphasia: better than the clinician*? Clinical Rehabilitation*.4 (2). pp. 123-128

Ostrosky-Solis, F., & Lozano, A. (2006). Digit Span: Effect of education and culture. *International Journal of Psychology*, 41(5), 331–341.

Prutting, C.A. & Kirchner, D.M. (1987) A clinical appraisal of the pragmatic aspects of language .*Journal of speech and hearing disorders*, 52,105 – 119.

Pick, A. (1913) .Die Agrammatischen Sprachstorungen.Berlin: Springer.

Philipose, L. E., Alphs, A., Prabhakaran, V., & Hillis, A. E. (2007). Testing conclusions from functional imaging of working memory with data from acute stroke. *Behavioral Neurology*, 18, 37–43.

Penn, C. (1983) Syntactic and Pragmatic aspects of aphasia language .Unpublished Ph.D. Dissertation: University of Witwatersrand.

Porch, B. E. (1967). *Porch Index of Communicative Ability: Theory and development (Volume 1)*. Palo Alto, CA: Consulting Psychologists Press.

Peach, R.K. (2001).Further thoughts regarding management of acute aphasia following stroke. *American Journal of speech – Language Pathology*, 10, 29 – 36.

Powell, G.E., Bayley, S., and Clark, E. (1980) A very short from of the Minnesota Aphasia Test .British journal of social and clinical psychology, 19,189 – 194.

Price, C.J., McCrory, E., Noppeney, U., Mechelli, A., Moore, C.J., & Biggio, N., et al. *(2006). How reading differs from object naming at the neuronal level. Neuroimage, 29:643-8.*

Price, C.J., Devlin, J.T., (2003). The myth of the visual word form area. Neuro Image 19, 473– 481.

Price, C.J., Devlin, J.T., Moore, C.J., Morton, C., Laird, A.R. *(2005). Meta-analyses of object naming: effect of baseline. Human Brain Mapping, 25, 70-82.*

Ryalls, J., Valdois, S., Lecours, A, R.(1988). Paraphasia and jargon .Handbook of neuropsychology, Vol 1.Amsterdam: Elsevier, pp 367 – 376.

Recht,L.D., McCarthy,K.,O'Donnell,B.F.Cohen,R., & Drachman,D.A.(1989).Tumor – associated aphasia in left hemisphere primary brain tumors :The importance of age and tumor grade.Neurology,38,48-50.

Reitan, R.M. (1991) Aphasia screening Test.Tuscon, AZ: Reitan Neuropsychology Laboratory.

Romanul FCA.(1970) Examination of the brain and spinal cord. In CG Tedeschi (ed), Neuropathology. Boston: Little,Brown , pp 131 – 214.

Rothenberger, A., Szirtes, J., & Jürgens, R. (1982). Auditory evoked potentials to verbal stimuli in healthy, aphasic, and right hemisphere damaged subjects. Pathway effects and parallels to language processing and attention. Archiv Für Psychiatrie und Nervenkrankheiten, 231: 155–70.

Ronnberg, J., Larsson, C., Fogelsjoo, A., Nilsson, L. G., Lindberg, M., & Angquist, K. A. (1996). Memory dysfunction in mild aphasics. Scandinavian Journal of Psychology, 37(1), 46–61.

Spreen, O., Risser, A., H. (2003). *Assessment of aphasia*. New York. United States: Oxford University press. pp. 22.

Sabe, L., Courtis, M. J., Saavedra, M. M., Prodan, V., de Luján-Calcagno, M., & Melián, S. (2008). Development and validation of a short battery of tests for the assessment of aphasia: 'bedside assessment of language'. It's use in a rehabilitation centre. Revista de Neurologia. *46* (8), 454-60.

Spreen, O., & Benton, A.L. (1965) .Comparative studies of some psychological tests for cerebral damage .*Journal of nervous and mental disease*, 140,323 – 333.

Sklar, M. (1983) Sklar Aphasia scale – revised .Los Angeles: Western Psychological Services.

Saccuman, M.C., Cappa, S.F., Bates, E.A., Arevalo, A., Della Rosa, P., & Danna, M, et al.(2006). *The impact of semantic reference on word class: an fMRI study of action and object naming. Neuroimage, 32, 1865-78.*

Tanner, D. (2001).Hooray for Hollywood: communication disorders and the motion picture industry. ASHA leader, 6(6).

Tonkonogy ,J.M.(1986).Vascular Aphasia .Cambridge ,MA:MIT Press.

The Psychological Corporation. (2002). WAIS-III/WMS-III technical manual: Updated. San Antonio, TX: The Psychological Corporation.

Theaia kuriakose,T.(2008)Frenchay Aphasia screening test in Kannada.Dissertation.

Wheeler,L.,& Reitan ,R.M.(1962). The presence of laterality of brain damage predicted from responses to a short aphasia screening test. Perceptual and motor skills, 15,783 – 799.

Wernicke, C. (1874*)* Der aphasische Symptomencomplex: eine psychologische Studie auf anatomischer Basis: Cohn and Weigert.

Wright, H. H., Newhoff, M., Downey, R., & Austermann, S. (2003). Additional data on working memory in aphasia. *Journal of International Neuropsychological Society*, 9, 302.

Ween, J. E., Verfaellie, M., & Alexander, M. (1996). Verbal memory function in mild aphasia. *Neurology*, 47, 795–801.

Wilde, N. J., Strauss, E., & Tulsky, D. S. (2004). Memory span on the Wechsler scales. *Journal of Clinical and Experimental Neuropsychology*, 26(4), 539–549.

West,J.F., Sands,E.S., AND Ross – Swain,D.(1998) Bedside Evaluation Screening,2nd ed.(BEST -2).Austin,TX:Pro-Ed.

World Health Organization (2001).ICF: International classification of functioning, disability and health. Geneva, Switzerland; Author.

Yasuda, K., Nakamura, T. (2000). Comprehension and storage of four serially presented radio news stories by mild aphasic subjects. *Brain and Language*, 75, 399–415.

Zimmerman, I., Steiner ,V., & Pond ,R.(1992).Preschool language scale – 3.San Antonio,Tx:The psychological corporation.

APPENDIX I

Feedback questionnaire for Aphasia Treatment Manuals

SI No	Parameters	Very Poor	Poor	Fair	Good	Excellent
1	Simplicity					
2	Proverbiality					
3	Size of the picture					
4	Color and appearance					
5	Arrangement					
6	Presentation					
7	Volume					
8	Relevancy					
9	Complexity					
10	Iconicity					
11	Accessible					
12	Flexibility					
13	Trainability					
14	Stimulability					
15	Feasibility					
16	Generalization					
17	Scope of Practice					
18	Scoring Pattern					
19	Publications, Outcomes and Developers(Professional background)					
20	Coverage of parameters(repetition and expression)					

Put a (√) in the appropriate box.

Any other suggestions:-

Definitions of Parameters

1. ***Simplicity:*** Are the test stimuli comprehendible?

2. ***Proverbiality:*** Is the test material familiar to the user?

3. ***Size of the picture:*** Whether the picture stimuli are of appropriate size?

4. ***Color and Appearance:*** Are the picture stimuli appropriate in terms of color and dimension?

5. ***Arrangement:*** Whether the picture stimuli are within the visual field of the individual?

6. ***Presentation:*** Are the number of stimuli in each section placed appropriately?

7. ***Volume:*** Is the overall manual appropriate in size?

8. ***Relevancy:*** Whether the test material is culturally and ethically acceptable?

9. ***Complexity:*** Is the material arranged in the increasing order of difficulty?

10. ***Iconicity:*** Does the picture stimuli appear to be recognizable and representational?

11. ***Accessibility:*** Is the test material user-friendly?

12. ***Flexibility:*** Can the stimuli be easily modified?

13. ***Trainability:*** Can the stimuli be used for intervention purposes in different milieu?

14. ***Stimulability:*** Does the stimulus material elicit responses from the individuals?

15. ***Feasibility:*** Whether the test material is viable?

16. ***Generalization:*** Can the test material be generalized to any other adult language disorders and various settings?

17. ***Scope of Practice:*** Is the test material within the profession's scope of practice or within the personal scope of practice?

18. ***Scoring Pattern:*** Whether the scoring pattern followed in the resource material applicable?

19. ***Publications, Outcomes and Developers (Professional Background):*** Is there any other resource material similar to this test material which you are aware of?

20. ***Coverage of parameters (Reception & Expression):*** Does the resource material contain the essential language components to be treated?

APPENDIX II

BEDSIDE SCREENING TEST – KANNADA

Persons Name: Date:

Persons No: Age/Gender: Mother Tongue:

Education: Clinician:

1) **Spontaneous Speech.**

Mode of communication – Verbal / Non-verbal

a) Fluency – Observe and make a note of fluency / non-fluency in person's speech, effort to produce speech, Phrase length, word-finding pauses, hesitations or circumlocutions, Rate of speaking, any melody, intonation problems if present .

b) Content – Observe and make a note of paraphasias (Phonemic/literal, neologistic, semantic,) semantic or syntactic errors if present.

2) **Auditory verbal comprehension.**

a) **Yes – No questions**.

Instructions: Explain the person that you are going to ask few questions where the answers should be either "yes" or "no". Initially demonstrate like for ex: Are you in theatre? Answer should be "No". One repetition of each question is allowed, if the person looks confused/when asks for repetition/when there is any kind of disturbance in the stimulus presentation.

SI NO	Test Items	Response
1.	ನಿಮ್ಮ ಹೆಸರು ರಾಜುನ? Nimma hesaru Raajuna?	
2.	ನೀವು ಬಿಳಿಯ ಬಣ್ಣದ ಶರ್ಟು ಹಾಕಿದ್ದೀರ? Neevu biLiya baNNada Sharatu haakkiddira?	
3.	ಕಾರು ಆಕಾಶದಲ್ಲಿ ಚಲಿಸುತ್ತದೆಯ. Kaaru aakaaShadalli chalisuttadeya?	
4.	ನೀವು ಹಾಸಿಗೆ ಮೇಲೆ ಕುಳಿತ್ತಿದ್ದೀರ. Neevu haasige meele kuttidira?	
5.	ಕಾಗದವು ಬೆಂಕಿಯಲ್ಲಿ ಉರಿಯುತ್ತದೆಯ. Kaagadavu benkiyalli uriyuttadeya?	

Maximum score: 10 Persons score: -------

b) Pointing task.

Instructions: Explain the person that few objects/flash cards will be kept in front of him/her now and you are going to ask questions like for ex: “point to plate” and the answer should be through pointing to the items. Placing of the objects/flash cards should be within the person intact field if hemianopsia is present. One repetition of each command is allowed if the person looks confused/when asks for repetition/when there is any kind of disturbance in the stimulus presentation.

SI.NO	Test Items	Response
1.	ZÀªÀÄZÀ – /Chamacha/	
2.	ºÀ¸ÀÄ - /hasu/	
3.	¨É0Q¥ÀlÖt - /benkipattaNa/	
4.	¥É£ÀÄß - /Pennu /	
5.	PÀÄað - /kurchi/	

Maximum score: 10 Persons score: -------

c) Auditory word recognition.

Instructions: Instruct the person that you are going to present words and the person has to pay attention to the word, the response can be eye blink or gestures or pointing. One repetition of each word is allowed if the patient looks confused/when asks for repetition/when there is any kind of disturbance in the stimulus presentation.

SI. No	Test items	Response
1.	ಹೂವು - huuvu	
2.	ಕಣ್ಣು - kaNNu	
3.	¥sóÁå£ÀÄ – fyaanu.	
4.	ಚಾಕು - chaaku	
5.	ಹಾಸಿಗೆ - haasige	

Maximum score: 10 Persons score: -----

d) Verification task.

Instructions: Instruct the person that a picture card will be kept in front of them and he/she will be told to verify and identify one among the other pictures named. Response can be any gesture, eye movement, pointing or verbal. Ask the person for clarification that whether they understood the instructions, if he/she looks confused repeat once.

SI.No	Test Items	Response
1	vÀmÉÖ, ¯ÉÆÃl ,ZÀªÀÄZÀ. thaTTe,looTa,chamacha	
2	¨É0ZÀÄ, PÀÄað, ¸ÀÄÖ®Ä. Benchu,kurchi,stulu	
3	D¸ÀàvÉæ, gÉÊ®Ä ¤¯ÁÝt ,§¸ï ¤¯ÁÝt. aaspathre, railu nildaaNa, bassu nildaaNa	
4	£ÉUÉAiÀÄÄªÀÅzÀÄ, NqÀÄªÀÅzÀÄ, PÀÆgÀÄªÀÅzÀÄ. negeyuvudu,ooDuvudu,kuuruvudu.	
5	vÀgÀPÁj, ªÀ¸ÀÄÛ, ºÀtÄÚ. Tarakaari,vastu,haNNu.	

Maximum score: 10 Persons score: -----

e) Sequential commands.

Instructions: Explain the person that the few objects will be kept in front .Instruct that you are going to give few commands according to which the person should perform the actions and he/she may require to use one of the objects to perform the actions. Demonstrate for ex: “Turn your head to right” response should be “person turning his head to right”. Ask the person for clarification that whether he/she understood the instructions, if looks confused explain it once again with example

SI No	Test Items	Response
1	PÀtÄÚ ªÀÄÄaÑ. kaNNu muchhi.	
2	¤ªÀÄä §®PÉÊAiÀÄ£ÀÄß ªÉÄÃ®PÉÌ JwÛ. Nimma balakaiyannu meelakke ethhi.	
3	¥É£À£ÀÄß vÉUÉzÀÄ ¥ÀÄ¸ÀÛPÀ ºÀwÛgÀ Er. Pennannu thegedu pustaka hathhira eDi.	
4	ªÉÆzÀ®Ä ¥É£ÀÄß£ÀÄß PÉÆlÄÖ £À0vÀgÀ ¥ÀÄ¸ÀÛPÀªÀ£ÀÄß ªÀÄÄaÑ. modalu pennannu kottu nantara pustakavannu muchhi.	
5	¥É£ÀÄß£ÀÄß PÉÆlÖ £À0vÀgÀ ¯ÉÆÃl ªÀÄvÀÄÛ PÀ£ÀßrAiÀÄ£ÀÄß NnÖUÉ PÉÆr. Pennannu kotta nantara loota mattu kannaDiyannu oottige koDi.	

Maximum score: 10 Persons score: -------

3) Repetition.

a) Automatic speech.

Instructions: Instruct the person that you are going to ask few questions and the person has to answer it. Repeat the question once if the person looks confused/does not seems to hear. Sequential variation can be considered as correct.

SI.No	Test Items	Response
1	w0UÀ¼ÀÄUÀ¼À£ÀÄß ºÉ¸Àj¹ - /tingaLugaLannu hesarisi /	
2	1 j0zÀ 10 JtÂ¹ - /1 rinda 10 eNisi /	
3	ªÁgÀUÀ¼À£ÀÄß ºÉ¸Àj¹ - /vaaragaLannu hesarisi /	
4	ªÀµÀðzÀ gÀÄvÀÄUÀ¼À£ÀÄß ºÉ¸Àj¹ - /varshada ruthugaLannu hesaarisi/	
5	10 ri0zÀ »0zÀPÉÌ JtÂ¹ -/ 10 inda hindakke eNisi /	

Maximum score: 10 Persons score: -----

-

b) Word.

Instructions: Instruct the person to repeat words after you. Repeat the word once if the person looks confused/does not seems to hear.

SI No	Test items	Response
1	ಮನೆ – /mane /	
2	ಶಾಲೆ - /shale /	
3	ತಲೆ - /thale /	
4	ಗಾಜು - /gaaju/	
5	ಇಪ್ಪತ್ತೊಂದು - /eppathhondu/	

Maximum score: 10 Persons score: ------

c) **Phrase.**

Instructions: Instruct the person to repeat phrases after you. Repeat the phrase once if the looks confused/does not seems to hear.

SI .No	Test Items	Response
1	ºÀ¸ÀÄ ºÁ®£ÀÄß PÉÆqÀÄvÀÛzÉ - /Hasu haalannu koDuthade/ /	
2	ªÀÄ¼É §gÀÄvÀÛzÉ - /maLe baruthade /	
3	¨sÁgÀvÀ £À£Àß zÉÃ±À - /Baratha nanna deeSha /	
4	DPÁ±À ¤Ã° §tÚ - /aakaaSha neeli baNNa /	
5	CªÀjUÉ®è UÉÆvÀÄÛ - /Avarigella gothhu /	

Maximum score: 10 Persons score: -------

d) **Sentence.**

Instructions: Instruct the person to repeat simple sentences after you. Repeat the sentence once if the person looks confused/does not seems to hear.

SI.No	Test Items	Response
1	CªÀgÉ®è PÉ®¸ÀPÉÌ ºÉÆÃzÀgÀÄ. Avarella kelasakke hoodaru.	
2	¸ÀÆAiÀÄð ¨É½UÉÎ ºÀÄlÄÖvÁÛ£É. surya beLigge huttuthhane.	
3	F ¸ÀÜ¼À vÀÄ0§ ¸ÀÄ0zÀgÀªÁVzÉ. E sthaLa thumba sundaravaagide.	
4	²PÀêPÀgÀÄ ±Á¯ÉAiÀÄ°è ¥ÁoÀ ºÉÃ¼ÀÄvÁÛgÉ. ShikShakaru Shaleyalli paaTa heeLuthhare	
5	ºÉÆ¼ÉAiÀÄÄªÀÅzÉ®è a£Àß C®è. HooLeyuvudella china alla.	

Maximum score: 10 Persons score: -----

4) **Naming.**

a) Confrontation Naming:

Instructions: Instruct the person that flash cards will be shown and he/she has to name the picture which is presented. For ex: when you show the picture ask “what is

this "/can you name this". Response should be verbal. Dysarthric errors are scored as correct.

SI.No	Test Items	Response
1	¨ÉPÀÄÌ- /Bekku/	
2	©ÃUÀzÀ PÉÊ- /Beegada kai/	
3	ªÀÄgÀ - /mara /	
4	zÀÆgÀªÁtÂ- / duuravaaNi /	
5	§QÌlÄÖ - / Bakkettu /	

Maximum score: 10 Persons score: -----

b) Responsive naming.

Instructions: Instruct the person that a question will be asked and he/she has to answer appropriately. Repeat the questions once if the person looks confused/does not seems to hear. Response should be verbal. Dysarthric errors are scored as correct.

SI.No	Test Items	Response
1	¨Á¼É ºÀtÄÚ AiÀiÁªÀ §tÚ? baLe hannu yaava baNNa?	
2	¤ÃªÀÅ AiÀiÁªÀÅzÀj0zÀ ನೀರನ್ನು PÀÄrAiÀÄÄwÛÃj? neevu yaavudarinda nirannu kuDiyuthhiri?	
3	¤ÃªÀÅ CrUÉ ªÀÄ£ÉAiÀÄ°è K£ÀÄ £ÉÆÃqÀ§ºÀÄzÀÄ? Neevu aDige maneyalli Enu nooDabahudu?	
4	¤ªÀÄä ¸ÀÄvÀÛ FUÀ £ÉÆÃqÀ§ºÀÄzÁzÀ ªÀ¸ÀÄÛUÀ¼ÀÄ ? Nimma suthha eega nooDabahudaada vasthugaLanu hesarisi?	
5	¤ÃªÀÅ ªÀiÁgÀÄPÀmÉÖAiÀÄ°è J£À£ÀÄß £ÉÆÃqÀ§ºÀÄzÀÄ? Neevu maarukatteyalli enannu nooDabahudu?	

Maximum score: 10 Persons score: -----

c) Lexical Generative naming.

Instructions: Explain the person that a question will be asked and they have to answer according to the question with respect to number and category which is asked within the time which is told in question. For ex: if it is to name food items the person has to name in that category only. Repeat the commands once if the person looks confused/does not seems to hear. Dysarthric errors are scored as correct.

SI.No	**Test Items**	**Response**
1	vÀgÀPÁjUÀ¼À£ÀÄß ºÉ¸Àj¹. tharakaarigaLannu hesarisi.	
2	"ªÀÄ£É" AiÉÄ0§ ¥ÀzÀPÉÌ ¸À0¨sÀ0zÀ¥ÀlÖ0vÉ ¥ÀzÀUÀ¼À£ÀÄß ºÉÃ½. “mane” emba padakke sambhandapattanthe padagaLannu heeLi.	
3	PÉ0¥ÀÄ §tÚ EgÀÄªÀ ªÀ¸ÀÄÛUÀ¼À£ÀÄß ºÉ¸Àj¹. Kempu baNNa eruva vastugaLannu hesarisi.	
4	/PÀ/±À§Ý¢0zÀ §gÀÄªÀ ºÉ¸ÀgÀÄUÀ¼À£ÀÄß ºÉÃ½. /ka/ Shabdadinda baruva hesarugaLannu heeLi.	
5	/¸À/ ±À§Ý¢0zÀ 3 ºÀtÄÚUÀ¼À ºÉ¸ÀgÀÄ ªÀÄvÀÄÛ E°è £ÉÆÃqÀ§ºÀÄzÁzÀ 3 ªÀ¸ÀÄÛUÀ¼À£ÀÄß 1 ¤«ÄµÀzÀ°è ºÉ¸Àj¹. /sa/ Shabdadinda 3 haNNugaLa hesaru mathhu elli nooDabahudaada 3 vastugaLannu 1 nimishadalli hesarisi.	

Maximum score: 10 Persons score: -------

5) Reading

Instructions: Ask the person to identify the letters, words and numbers which are written on the cards from a choice of 4 cards. (Dysarthric errors are considered as correct).

SI.No	Test Items	Response
1	C - /a/	
2	zÀÆgÀªÁtÂ- / duravaaNi /	
3	ºÉÆ¼ÉAiÀÄÄªÀÅzÉ®è a£Àß C®è - / hooLeyuvudella china alla /	
4	106 - / Ondunuura aaru./	

Maximum score: 8 Persons score: ------

6) **Writing**

Instructions: Use an unlined paper with Demographic data (Name, age, case number, date of examination) of the person written before starting the task.

- Ask the person to write his /her Name, Address, immediate family member's name, occupation name.
- Ask the person to write few numbers, Days of week/Months of year etc for automatically sequential writing. (Sequential variation can be considered as correct).
- Ask the person to copy letters which are written on flash cards
- Ask the person to do simple calculations (addition, subtraction, multiplication etc.), symbols like (Circle, square, rectangle cube etc.).

Maximum score: 8 Persons score: ---

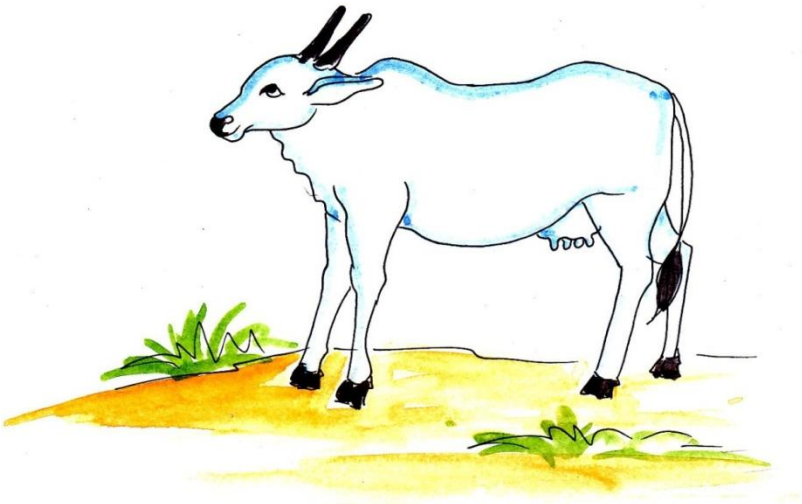
Scoring criteria:

Scoring	Responses
0	No response
1	Partially correct/incorrect response/frequent shifts from correct to incorrect
2	Correct response

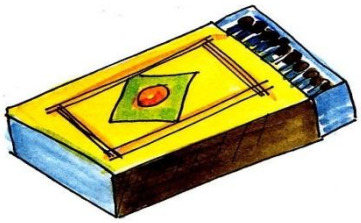
BEDSIDE SCREENING TEST IN KANNADA

(Picture cards used during administration)

Pointing task 1



Pointing task 2



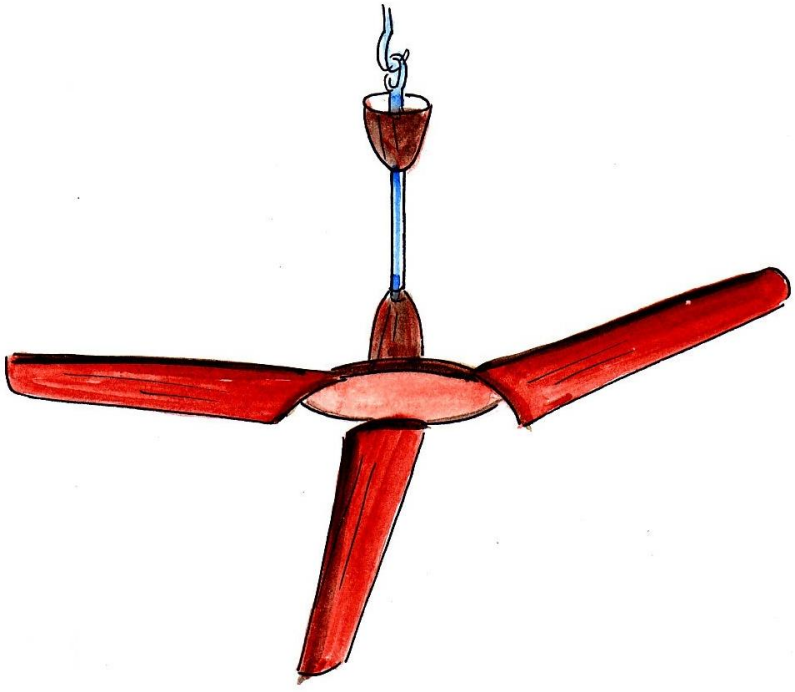
Pointing task 3

Pointing task 4

Pointing task 5

Auditory word recognition 1

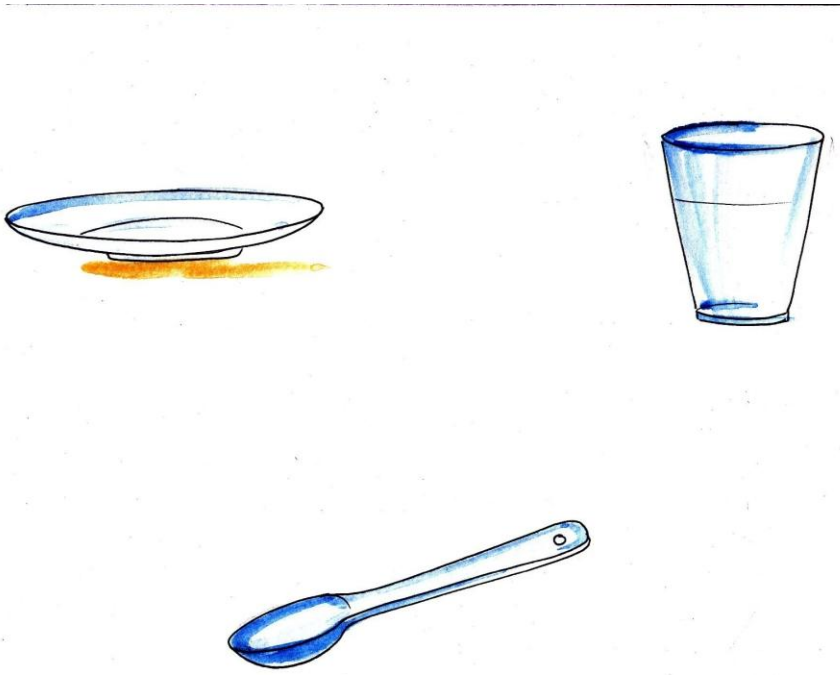
Auditory word recognition 2



Auditory word recognition 3

Auditory word recognition 4

Auditory word recognition 5



Verification task 1

Verification task 2

Verification task 3

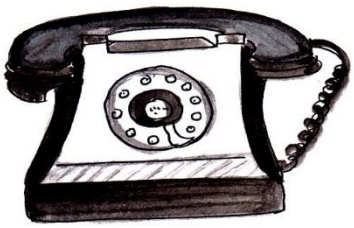
Verification task 4

Verification Task 5

Confrontation Naming 1

Confrontation Naming 2

Confrontation Naming 3



Confrontation naming 4

Confrontation naming 5

READING 1

C

READING 2

zÀÆgÀªÁtÂ

READING 3

ºÉÆ¼ÉAiÀÄÄªÀÅzÉ®è

a£Àß C®è

READING 4

106

WRITING 1

a

WRITING 2

gÀ

WRITING 3

aÀÅ

APPENDIX III

NORMATIVE SCORE SHEET

APPENDIX-IV

Domains of the test	Subtests	Lower bound score	Upper bound Score
Spontaneous speech	a) Content b) Fluency	No scoring is provided, to be carried out qualitatively.	
Auditory verbal comprehension	a) Yes – No questions	10	10
	b) Pointing	10	10
	c) Auditory word recognition	10	10
	d) Verification task	10	10
	e) Sequential commands	10	10
	Total	50	50
Repetition	a) Automatic speech	9.2	9.8
	b) Word	10	10
	c) Phrase	10	10
	d) Sentence	10	10
	Total	39.23	39.82
Naming	a) Confrontation naming	9.6	10.11
	b) Responsive naming	10	10
	c) Lexical generative naming	9.23	9.82
	Total	29.01	29.82
Reading		7.6	8.11
Writing		6.27	7.61
Total		132.7	134.8

SCORE SHEET

Persons Name: Date:

Age/ Gender: Persons No:

Mother Tongue: Clinician:

Education:

DOMAIN	**Subtests**	**Max Score**	**Patients score**	**Max score of the domain**	**Patients total score of the Domain**
Spontaneous speech	a) Content b) Fluency	No scoring			
Auditory verbal comprehension	Yes – No question	10		50	
	Pointing	10			
	Auditory word recognition	10			
	Verification	10			
	Sequential commands	10			
Repetition	Automatic speech	10		40	
	Word	10			
	Phrase	10			
	Sentence	10			
Naming	Confrontation naming.	10		30	
	Responsive naming.	10			
	Lexical generative naming.	10			
Reading		8		8	
Writing		8		8	
Total				136	

Provisional Diagnosis:

Signature of staff: **Signature of Clinician:**