ADAPTATION AND VALIDATION OF BEDSIDE WESTERN APHASIA BATTERY-REVISED IN KANNADA

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AUGUST 2022

CERTIFICATE

This is to certify that this dissertation entitled **"Adaptation and Validation of Bedside Western Aphasia Battery-Revised in Kannada"** is a Bonafide work submitted in part fulfilment for the degree of Master of Science (Speech-Language Pathology) of the student Registration number 20SLP025. This has been carried out under the guidance of a facultyof this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled **"Adaptation and Validation of Bedside Western Aphasia Battery-Revised in Kannada"** is the result of my own study under the guidance of Dr. Hema N, Assistant Professor, Department of Speech-Language Sciences, All India Institute of Speech and Hearing, Mysuru, and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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CHAPTER I

Introduction

Language refers to the words we use and how we use them to express ideas and get and convey what we want (American Speech and Hearing Association, 2021). A receptive language disorder is when you have trouble understanding what others say. An expressive language disorder occurs when we have difficulty conveying our thoughts, ideas, and feelings. It is conceivable to have a problem with both receptive and expressive language (American Speech and Hearing Association, 2021).

Aphasia is an impairment of language that disrupts an individual's communication ability. It is caused by damage to the brain areas responsible for understanding and producing speech, reading, and writing (Vickers & Hagge, 2014). Aphasia is a disorder of language that occurs when a person's brain is damaged. The brain is divided into two halves. Language difficulties may result from damage to one side of the brain. Language difficulties may result from damage to the left side of the brain, whereas attention and memory problems may result from damage to the right side of the brain. Aphasia can make it difficult to understand, speak, read, and write. It does not make people less intelligent or cause cognitive problems. Apart from aphasia, brain injury can result in other issues. Dysarthria is a term used to describe muscle weakness. Apraxia is a condition in which people have difficulty moving the muscles in their mouth in the correct way to utter words. Dysphagia, or difficulty swallowing, is another possibility (American Speech and Hearing Association, 2021).

There are various classification systems of aphasia; the most common system is based on the presence and absence of impairment in linguistic parameters such as fluency, comprehension, repetition, and naming (Davis, 2007; Goodglass & Kaplan, 1972). However, from a linguist's perspective, the levels of linguistic representation are phonology, morphology, semantics, syntax, and pragmatics. Phonology deals with the speech sound system of a given language. It includes the governing rules to combine and use these sounds. Morphology is related to how minimal meaningful (morphemes) units of a given language are combined to form words. Syntax deals with how words are combined to formulate a variety of sentences of a given language. Semantics is related to the meanings of words and their combinations in a language. Pragmatics deals with how an individual uses language in a social context (Wilson et al., 2019). These levels of linguistic representation differ from the clinical taxonomy used to classify aphasia disorders. Thus, deficits at several levels of linguistic representations are observed in an individual with aphasia (Clark, 2011).

According to stroke data, the developed world's incidence of aphasia ranges between 0.02-0.06 percent, with a prevalence of 0.1-0.4 percent (Code & Petheram, 2011). Up to 42% of stroke survivors suffer from aphasia (Ryglewicz D et al., 2000). According to stroke studies, between 15% and 42% of patients with an acute stroke have speech disturbances (Inatomi Y et al., 2008). Stroke has a high global burden; in 2013, the stroke prevalence was 25.7 million, with 10.3 million people experiencing their first stroke. With a global incidence of 10.3 million new strokes per year, these various epidemiological statistics have significant global implications, affecting 1.5 to 4 million people per year (Feigin, 2017). Aphasia affects 21-38 percent of patients with acute stroke and is associated with significant short- and long-term morbidity, mortality, and cost (Berthier, 2005).

Symptomatology of the aphasia varies across individuals, depending partially or entirely on the speaking situation in which the production occurs. Signs and symptoms may vary in terms of severity and level of disruption to communication. However, the most common symptoms are reduction in oral expression, spoken language comprehension, disturbances of written expression, and written language comprehension. Clinical signs of aphasia are numerous and varied (Lecours, Lhermitte & Bryans, 1983).

Assessment is an important aspect to describe language behaviors, identifying the level of existing problems in various domains, and also in planning appropriate management strategies and defining factors to facilitate retrieval of language to improve the quality of life of persons with aphasia. It can be carried out using comprehensive test batteries and screening tools. Comprehensive test batteries are time-consuming and need the persons with stroke to be present throughout the examination. For example, Western Aphasia Battery- Revised (Kertesz, 1979, 1982, 2006), Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1983), Porch Index of Communicative Ability (Porch, 1967)

There have been tools available in India such as Western Aphasia Battery, Linguistic profile test, and Bilingual aphasia test to assess the various skills in persons with aphasia. The assessment tools can be broadly classified as screening, diagnostic and performance tests. Screening refers to a brief and cursory examination to detect the presence of a disorder. a) Bedside clinical examination, b) Screening tests per se., and c) Tests of specific aspects of language functioning are the three types of screening procedures relevant to aphasia.

Bedside examination has been widely used traditionally for the assessment of aphasia (Kirshner, 1995; Strub & Black 1993). The purpose of bedside screening is to determine whether language function is affected. It is a standard tool used by professionals such as Speech-Language Pathologists and other allied professionals, the depth of the screening tool may range from an unstructured conversation with the person with aphasia to a structured set of items. Because the professional examines the bedside by quickly skipping across areas of strength where there is no obvious impairment, a bedside screening test provides the clinician with a lot of flexibility, conciseness, and suitability. Professionals used various screening tools to evaluate the performance of stroke patients in the literature.

1.1 Need for the study

Kannada is a Dravidian language spoken primarily by Karnataka residents in India's southwest. Kannadigas living in other countries speak the language, as do linguistic minorities in Maharashtra, Andhra Pradesh, Tamil Nadu, Telangana, Kerala, and Goa. According to the 2011 census, there were approximately 43 million native speakers of the language. Kannada is also spoken as a second and third language by over 12.9 million non-native Karnataka residents, bringing the total number of speakers to 56.9 million (Language Census of India, 2011). As a result, it has been designated as one of India's official languages.

Stroke is one of the leading causes of death and disability in India, and its prevalence is expected to rise significantly by 2030; it is also a common cause of aphasia. Aphasia affects between 8,000 and 10,000 people in India each year. Because there is no single reporting agency for aphasia and stroke, this figure is significantly lower than the actual number of patients in the country (Aphasia and Stroke Association of India, 2013). Aphasia affects approximately one in every 240 people or 0.37 percent of the population in India. The extrapolated prevalence is 3,915,700, with a population estimate of 1,065,070,607 (Kaur, 2018). Banerjee and colleagues (2006) estimated

1.154 strokes per thousand people in Karnataka between 1993 and 1995. Therefore, there is a very clear increase in the prevalence rate of Aphasia in the past decades, and the literature suggests there is a high prevalence of stroke in Karnataka.

Bedside screening tools are fast and efficient ways of screening for a patient with aphasia, they also serve as a baseline for further assessment and management of persons with aphasia. There are limited reports in the literature to develop such tools in the Indian context, especially in Kannada. For the Kannada population, there have just been three screening tools for aphasia that have been developed which include the Screening Test for Aphasia in Kannada (Kuriakose, 2008), Frenchay Aphasia Screening Test- Kannada (Paplikar et. al., 2016) and Bedside Test for Aphasia (Ramya, 2011). Frenchay Aphasia Screening Test- Kannada (FAST-K) only assesses 4 domains and does not include spontaneous speech, naming, and repetition which are important skills to be assessed for Aphasia. The Bedside Test for Aphasia (BTA-K) has a total of 66 items (excluding reading and writing) and spontaneous speech whereas the bedside version of WAB-R has 44 (excluding reading and writing). Items for spontaneous speech have not been given in BTA-K, whereas the questions and scoring have properly been mentioned in the Bedside version of WAB-R. The bedside record form of WAB-R includes a section to screen for Apraxia and gives the Classification of types of aphasia, Bedside aphasia score, and Bedside language Score which is not provided by the other three tests. Screening Test for Aphasia in Kannada (STA-K) was developed in 2008, and BTA-K was developed in 2011, there is a requirement for a newer bedside tool to screen aphasia and classify it in a shorter period of time and effectively with the classification of aphasia at the level of screening. The above comparisons show that the Bedside WAB-R is an extensive screening tool, it gives us the Classification of Aphasia and Bedside scores with a limited amount of test items and time. Hence, there is a need to adapt the Bedside WAB-R in the Kannada language and validate it for the Kannada population.

1.2 Aim of the study

To Adapt and develop the Bedside WAB-R in Kannada and validate the Bedside WAB-R in Kannada on persons with aphasia.

1.3 Objectives of the study

1. To develop Bedside WAB-R in Kannada by adapting from WAB-R Bedside Record Form in English (Kertesz, 2006).
2. To determine the content validity of the constructed screening tool by administering it to neurotypicals and persons with aphasia.

CHAPTER II

Review of Literature

Human beings are thought to have the most elaborate, complex, adaptable, and creative means of communication, which is made possible by their more sophisticated neurophysiologic system. Language is a type of social behavior and is regarded as the major mode of communication. Additionally, language is a system of codes and symbols used by humans to express their ideas, desires, and feelings in a way that is more successful than other means of communication. Humans are able to make associations between basic arbitrary representations and experiences. This is regarded as one of the "unique" characteristics that exclusively apply to humans.

Language as a code is a way of representing information by using language rules to form words or sentences. Content (semantics), form (phonology, morphology, and syntax), and use (pragmatics) are the three major components of language (Bloom & Lahey, 1978). Aphasia is caused by injury to specific brain areas that are specialized for specific functions (language functions). Aphasia is defined as a disturbance of any or all spoken and written language skills, associations, and habits caused by cerebrovascular accidents in specific brain areas (Goodglass et al. 2001). Communication disturbances caused by paralysis or incoordination of the musculature of speech or writing or by impaired vision or hearing, are not aphasic in and of themselves. Such disorders may accompany aphasia, however, and thus complicate the clinical manifestation of the language defect itself.

A stroke, which occurs when a blood artery in the brain is blocked or ruptured, is the most common cause of aphasia. When there is a lack of blood flow to the brain, brain cells in areas that affect language die or are damaged (Mayo Clinic, 2022), based on which brain parts are affected by a stroke, it can disrupt motor, sensory, cognitive, language, and other abilities (Kelly-Hayes, Robertson, Broderick, Duncan, Hershey, Roth, Thies, Trombly, 1998). A stroke can impair communication in several ways; during the acute period of a stroke, communication problems are widespread. The most difficult challenge in rehabilitating people who have had a stroke is language impairment, which is a significant roadblock to their independence (Pedersen, Jorgensen, Nakayama, Raaschou, & Olsen, 1995; 1996). Temporary aphasia can occur at any time. These symptoms can be caused by migraines, seizures, or a brief ischemic stroke -Transient Ischemic Attack. A TIA happens when the blood supply to a part of the brain is temporarily cut off. People who have had a TIA are more likely to have a stroke in the near future (Mayo Clinic, 2022).

Each year, 180,000 new cases of aphasia are expected to be diagnosed in the United States (National Institute on Deafness and Other Communication Disorders [NIDCD], 2015). Aphasia affects approximately one million people in the United States, or one in every 250 people, according to the National Institute on Deafness and Other Communication Disorders (NIDCD). Aphasia following a stroke is more common in older people than in younger people (Ellis & Urban, 2016). After their first ischemic stroke, 15% of those under the age of 65 develop aphasia; for those 85 and older, the figure rises to 43%. (Engelter et al., 2006). There are no statistically significant differences in the prevalence of aphasia between men and women. However, some finding demonstrates that the severity and type of aphasia may differ. Wernicke's and global aphasia, for example, are more prevalent in women, whereas Broca's aphasia is more prevalent in men (Hier, Yoon, Mohr, & Price, 1994).

Aphasia is typically caused by a stroke or brain damage that impacts one or more of the brain's language-processing areas. According to the National Aphasia

Association, aphasia affects approximately 25% to 40% of stroke survivors. In addition to a stroke, other causes include head injuries, a tumor in the brain, infection, and dementia. In some cases, aphasia can be a symptom of epilepsy or another neurological condition. Experts are still debating whether aphasia can destroy your linguistic structure or merely impair your ability to access and use language (Shishira, 2022).

2.1 Symptoms of aphasia and its classification

An individual with aphasia may speak in brief or incomplete sentences, in sentences that do not ring true, in sentences that replace one word for another or one sound for another, in unidentifiable words, in difficulty finding words, in understanding other people's conversations, in understanding what they read, and in writing sentences that do not make sense. The aphasia symptomatology varies between individuals and is partially or entirely dependent on the speaking situation in which the production occurs. Signs and symptoms can vary in severity and level of communication disruption. However, the most common symptoms are a reduction in oral expression, spoken language comprehension, and written expression and comprehension disturbances. The clinical manifestations of aphasia are numerous and diverse (Lecours, Lhermitte & Bryans, 1983). Clinicians have spent years attempting to distinguish between different kinds of aphasia based on their observations of clustering of linguistic symptoms. Goodglass and Kaplan (1972) outlined the significant characteristics of different types of aphasia, which are given in Table 1.

Table 1.

Classification of aphasia (Goodglass & Kaplan, 1972)

Aphasic Syndrome	Conversational Speech	Auditory Comprehension	Repetition	Confrontation Naming	Reading		Writing
					Aloud	Comprehension	
Anomic	Fluent, empty	Good to mild	Good	Severely abnormal	Good/ abnormal	Good/ abnormal	Good/ abnormal
Broca's	Nonfluent	Good	Abnormal	Abnormal	Abnormal	Good/ abnormal	Abnormal
Wernicke's	Fluent, paraphasic	Abnormal	Abnormal	Abnormal	Abnormal	Abnormal	Abnormal
Conduction	Fluent, paraphasic	Good	Abnormal	Usually good	Abnormal	Good	Abnormal
Transcortical motor	Nonfluent	Good	Good	Abnormal	Abnormal	Often good	Abnormal
Transcortical sensory	Fluent, paraphasic echolalic	Severely abnormal	Good	Abnormal	Abnormal	Abnormal	Abnormal
Mixed transcortical	Nonfluent with echolalia	Severely abnormal	Good	Severely abnormal	Abnormal	Abnormal	Abnormal

Another recent classification of aphasia given by ASHA is the Common Classification of Aphasia (ASHA): The table below uses a classification scheme based on verbal expression traits to depict distinct aphasia kinds (nonfluent or fluent) (Davis, 2007; Goodglass & Kaplan, 1972).

Table 2.

Common Classification of aphasia (nonfluent or fluent) (Davis, 2007; Goodglass & Kaplan, 1972)

Classification of Aphasia			
Nonfluent		**Fluent**	
Speech production is halting and effortful. Grammar is impaired; content words may be preserved.		The person can produce connected speech. The sentence structure is relatively intact but lacks meaning.	
Language comprehension is relatively intact	Language comprehension impaired	Language comprehension is relatively intact	Language comprehension impaired
Broca's Aphasia: repetition of words/phrases poor Transcortical Motor Aphasia: strong repetition skills; may have difficulty spontaneously answering questions	Global Aphasia: severe expressive and receptive language impairment; may be able to communicate using facial expression, intonation, and gestures	Conduction Aphasia: word-finding difficulties; difficulty repeating phrases Anomic Aphasia: repetition of words/phrases good; word-finding difficulties; uses generic fillers (e.g., "thing") or circumlocution	Wernicke's Aphasia: repetition of words/phrases poor Transcortical Sensory Aphasia: repetition of words/phrases good; may repeat questions rather than answering them ("echolalia")

As they do not easily fit into the common classification of aphasia or other standard classification schemes, subcortical aphasia and crossed aphasia are termed "exceptional aphasias." Crossed aphasia occurs when a person has difficulty speaking due to damage to the hemisphere on the dominant side of the body rather than the opposite side. As a result, crossed aphasia exists in a right-handed person who develops aphasia after a right hemisphere stroke. Subcortical aphasia is caused by damage to the brain's subcortical areas, and its symptoms may resemble those caused by cortex lesions. Primary progressive aphasia (PPA), despite its name, is a type of dementia. It is characterized by a progressive loss of language function alongside reasonably intact memory, visual processing, and personality (Mesulam, 2001; Rogers, 2004). However, Lezak (1983) suggests that profiling speech and language functions in persons with aphasia will indicate communication problems by assessing verbal behavior such as “Spontaneous speech, repetition, comprehension, naming, reading, and writing”.

Language impairment in aphasic individuals manifests in a variety of ways, there is no consistent pattern visible. As a result, different modalities are affected to varying degrees. For example, reading and writing are sometimes more hampered than comprehension and production, with comprehension being more impaired than production (Davis, 2007; Duffy & Ulrich, 1976). The speech samples of people with aphasia subjected to linguistic analysis demonstrate deficiencies in the following areas.

Expressive language: Wernicke (1908) distinguished between "fluent" and "nonfluent" speech production when referring to people with aphasia. People who have aphasia as a result of anterior lesions frequently exhibit greater effort, slow rate, shorter phrases, and decreased verbal production. The phrase length of speech has reduced, and the strongest indicator of whether a speaker is fluent or not is the melody (Goodglass, Quadfasel, & Timberlake, 1964). In contrast to nonfluent aphasia, which is characterized by halting output, erratic rhythm, a lack of inflections, and disruptive melody, fluent aphasia possesses typical prosodic traits. Prepositions, articles, and adverbs, among other syntax-specific language structures, are removed, and relational terms are difficult to use (Goodglass & Berko, 1960). Contrarily, speech output from individuals with aphasia with posterior lesions is characterized by normal or excessive tempo, normal phrase length, rhythm, melody, articulatory agility, paragrammatic form, frequent pauses, circumlocutions, and faults in using grammatical structures of language (paragrammatism), as well as substitution of words within language (paraphasia) (Pick, 1913; Lecours, Lhermitte, & Bryans, 1983; Ryalls, Valdois & Lecours, 1988). The speaking rate was cited by Kerschensteiner, Poeck, and Brunner (1972) as a key differentiator between nonfluency and fluency.

Comprehension of spoken language: Semantic processing deficits may contribute to comprehension issues in individuals with aphasia. Comprehension issues are often exacerbated by deficiencies in verbal short-term memory (Albert, 1996; Burgio & Basso, 1997). Some semantic categories may only be subject to comprehension problems, but others may experience reasonably intact comprehension (Kertesz, Davidson, & McCabe, 1998; Semenza, 2006).

According to Davis (2007), comprehension problems are impaired when they extend beyond the word level and can range from being unable to understand simple words to narrative discourse (Helms - Estabrooks & Albert, 2004). Injury to a person's auditory processing capacity depends on where the damage is located. According to Pietrini, Nertempi, Vaglia, Revello, Pinna, and Ferro-Milone (1988), representations of living objects are concentrated in the brain's temporal lobes. Auditory comprehension skills are affected by temporal lobe damage (Auther, Wertz, Miller, & Kirshner, 2000). Difficulties in word picture matching could result from visual, phonetic, or semantic deficiencies according to Rapp and Caramazza (1998). Due to the spoken words' morphological and semantic changes, comprehension is hampered (Radanovic, Senaha, & Mansur, 2001). The semantic system is a key component of language that plays a role in both production and comprehension (Patterson & Shewell, 1987).

Both cognitive (attention, visual search, selection, and verbal memory) and linguistic skills are required for comprehension (Helm- Estabrooks & Albert, 2004). Language processing requires working memory allocation, which is compromised in stroke patients. This affects these people's ability to pay sustained attention as well as selective attention (Rothenberger, Szirtes, & Jurgens, 1982; Caplan & Waters, 1999; Csepe, Osman-Sagi, Molnar, & Gosy, 2001).

Repetition of spoken language: Even at a basic level, aphasic individuals struggle with repetition. Repetition issues are a sign of verbal output or language comprehension issues. Repetition can be more challenging for certain aphasic people than other language issues (Berndt, 1988). Errors in repetition are frequently observed in all forms of brain disease, but they are most frequently linked to perisylvian region impairment and both subjectively and numerically, they vary. Difficulty with repetition is a result of arcuate fasciculus damage (Wernicke, 1874; & Geschwind, 1965). According to research in the literature, difficulties with repetition occur from the loss of connections between the anterior and posterior parts of the brain, which alter how auditory speech coding is converted into motor speech production. The processing of linguistic information is impacted by working memory constraints (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).

People who have had a stroke have trouble with automatic speech tasks like counting backward and forwards in numbers. According to reports, those with language impairments have a significantly lower verbal span on the digit forward test (De Renzi & Nichelli, 1975). Digit backward is a difficult activity that requires the use of working memory (Black & Strub, 1978).

Naming: Persons with Aphasia have trouble naming things and finding words (Goodglass & Geschwind, 1976). Paraphasias (phonemic) or circumlocutions are signs of naming difficulty. The person has "tip of the tongue" issues, which show that they are aware of word phonological qualities (Benson, 1979; 1988). If any of the processes—decoding, storage, selection, retrieval, or encoding—is insufficient, naming issues will arise. The location of the lesion is important for naming, according to several authors, and functional neuroimaging studies have shown that the left perisylvian and extrasylvian cortex are activated during naming (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). Semantic naming errors are caused by semantic processing deficiencies (Hilis, 1990).

Reading: Alexia and agraphia are the most typical remaining disabilities noticed following a stroke and only partial recovery (Beeson et al., 2005). Reading difficulties are said to be the most obvious clinical manifestation of stroke that affects the left posterior cerebral artery (PCA) territory or the posterior watershed area between the left PCA and left middle cerebral artery (MCA) (Binder & Mohr, 1992; Cohen et al., 2004; Hillis et al., 2005). While reading, the transition from grapheme to phoneme is crucial. Dehaene et al. (2002) and Leff et al. (2006) identified the left fusiform gyrus as a crucial region for processing orthographic stimuli in their functional MRI studies.

Writing: Other than speech, it is thought that writing skills require formal education and are learned later (Feder & Majnemer, 2007). According to Grossberg and Paine's (2000) model of writing, feedback from the polysensory regions is necessary for writing (visual and somatosensory). Writing is said to involve the contralateral superior parietal cortex (Beeson et al., 2003; Menon & Desmond, 2001; Nakamura et al., 2000; Sugihara et al. 2006). Writing in the region of the left Middle cerebral artery's superior division is the only sign of a stroke (Hillis et al., 1999; 2004).

Therefore, it is clear from the review of the literature that persons with aphasia can display a variety of language processing issues and a clinician should be equipped with the knowledge, tools, and tests needed to make a precise diagnosis and create a successful treatment strategy. A team-based evaluation or assessment of an aphasic person is recommended and the basic members include a family member, a speech-language pathologist, a neurologist, a physical therapist, and an occupational therapist. A thorough aphasia assessment provides us with invaluable information, it allows us to establish the type of aphasia our client has, along with the severity of it, and its strengths and weaknesses. Furthermore, we will be able to identify therapy activities and goals that are meaningful for our clients by coordinating with the team members involved in the assessment process (Lingraphica, 2010).

According to ASHA in 2021, integrating a range of information obtained during the evaluation process is required to assess, describe, and evaluate an individual's communication abilities. Many people with Aphasia, especially those in the acute phases, are bedridden and unable to undergo complete testing. Furthermore, because aphasia symptoms are inherently unstable early after a stroke and can alter quickly, thorough testing may be a waste of time and resources (el Hachioui et al., 2017). As a result, they require quick and effective screening techniques that can be employed at the bedside to identify aphasia components during the earliest post-acute stages of recovery for at-risk individuals.

Assessment of Aphasic syndromes should be carefully tailored to target language problems and place an emphasis on various processes and tools that provide a qualitative and quantitative description of the deficits (World Health Organization; WHO, 2001). According to Spreen and Risser (2003), the clinician's perspective of the language problem has a direct impact on how the test is designed. The assessment aims to: (1) quantify and categorize communication skills and deficits; (2) spot the presence and potential impact of co-occurring disorders; and (3) set treatment objectives. (4) supplying data to forecast the course of therapy and recovery (Murray & Chapey, 2001). The type of assessment is greatly influenced by the environment, the number of resources accessible to the clinician, and the current requirements and abilities of the person with aphasia (Murray & Clark, 2005). The focus on aphasia as a particular disorder of particular abilities or as a pervasive communication disorder, or aphasia as unitary or as comprising of multiple "subtypes," directly affects how the test is constructed. When selecting an assessment method, we must take into account the following factors: a) The test's psychometric appropriateness; b) The test items' portability; and c) the amount of time required (Spreen & Risser, 2003).

Depending on the kind of procedure of evaluation, the assessment of aphasia can be generally categorized into six types as stated by Spreen and Risser (2003), which are as follows: 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.

There are many aphasia assessment tools available to SLPs. Some of them include Western Aphasia Battery-Revised (WAB-R) (Kertesz, 2006), Mississippi Aphasia Screening Test (MAST)- (Thompson, 2004), Boston Diagnostic Aphasia Evaluation-3rd Edition (BDAE-3), and Boston Naming Test (BNT) (Goodglass, Kaplan & Barresi, 2000), Cognitive-Linguistic Quick Test Plus (CLQT+) (Helm-Estabrooks, 2017), and Montreal Cognitive Assessment (MoCA) (Nasreddine, 1995) are the few standardized tools to list in aphasiology.

Among the above-listed aphasia assessment tools, the Western Aphasia Battery Revised (WAB-R) (Kertesz, 2006) has been used extensively and frequently to assess adult language impairments in English and many other languages, including Indian languages (Kyoung et al., 2010). Excellent internal consistency, validity, and test-retest reliability have all been reported (Kertesz, 2006). The WAB was developed by Kertesz and Poole in 1982, and it was updated by Kertesz in 2006 to evaluate language function in adult aphasic patients between the ages of 18 and 89. The contents of the prior WAB are included in the revised WAB. However, it also has two additional tasks that help physicians differentiate between surface, deep (phonological), and visual dyslexia (reading and writing of irregular and non-words) (Kertesz, 2006).

Four versions and three quantitative measurements are offered by the WAB-R scoring system: The severity of aphasia, regardless of the kind or cause, is related to the aphasia quotient (AQ), which is the essential summary value of the individual aphasic impairment. To highlight the importance of communication and the connection between the two modalities, the Language Quotient (LQ) combines oral and written language scores. The Cortical Quotient (CQ), which combines the AQ with optional nonverbal tests, apraxia, and written language, offers a fair assessment of the focal cortical functions (Kertesz, 2006; Kertesz & Poole, 1974). It is interesting to note that the bedside WAB-R test consists of six smaller tests and takes about 15 minutes to complete. The raw scores could be used to calculate the AQ (Cummings, 2008; Kertesz, 2006). The WAB-R, a criterion-referenced exam based on the AQ, LQ, and CQ, can be used in clinical and research settings to evaluate the degree of aphasia. According to research, the AQ can be used to stage Alzheimer's disease and primary progressive aphasia in degenerative disorders and has a good predictive value for stroke (Kertesz, 2006).

In India, screening tests are preferred over the usual diagnostic testing for aphasia. The standard test can be difficult to utilize widely in nations like India where multilingual challenges are a very severe concern since it necessitates the supply of specialized language and linguistic services, takes a lot of work, has little resources, and can be time-consuming. Screening refers to an examination that is quick and cursory and is used to look for disorders. There are three different aphasia screening techniques: 1) The classic method of clinical evaluation in clinical neurology is the bedside clinical examination (Krishner, 1995; Strub & Black, 1993). It spans from an unstructured method to a test that is structured. It has been employed by doctors, neurologists, and speech therapists as a routine technique. 2) Screening tests themselves, which are usually quick and extremely sensitive because they are created in standardized ways. Halstead-Reitan test battery, for instance (Reitan, 1991; Wheeler & Reitan, 1962). 3) Evaluations of particular linguistic abilities that are sensitive to the presence of aphasia. For example, the Token Test (De Renzi & Vignolo, 1962). Screening tests are needed to detect aphasia in acute strokes and intensive clinical practice. Bedside aphasia screening tools are more effective in the early diagnosis of aphasia.

2.2 Screening tests in the western context

Screening tools available in the western context are Frenchay Aphasia Screening Test (FAST) by Enderby et al. (1987), Sklar Aphasia Scale (SAS), Bedside Evaluation Screening Test (BEST – 2) by West et al. (1998), etc, 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 classical neurology tradition (Krishner, 1995; Strub & Black, 1993). Bedside examination has historically been a primary method for assessing aphasia, and it is still a standard tool utilized by many other professionals such as Speech-Language Pathologists and other allied professionals. The screening tool's depth can range from an unstructured conversation with the person with aphasia to a structured interview such as pointing, listing the days of the week, etc.

One of the first aphasia screening tests was the Halstead-Wepman screening test (Halstead & Wepman, 1949) which came shortly after World War II. It was developed to provide a quick evaluation and preliminary diagnosis of aphasia and its related disorders. It could also be used to classify the type of disorder, plan a therapeutic plan or evaluate progress in therapy. It had an administration time of around 30 minutes. During that time, there was no accepted classification of aphasic syndromes. Hence, the authors formulated their own. The domains that this test included were agnosias, apraxias, anomia, and dysarthria. The diagnosis given based on this test could be expressive aphasia, receptive aphasia, expressive-receptive aphasia, or comments on the concomitant disorders. This test was used initially to assess individuals with aphasia but did not have a robust psychometric foundation.

In 1940, the Halstead Reitan neuropsychological battery was developed, a single test used to identify and evaluate the severity of neurological deficits of an individual. This test has a subsection called the Aphasia Screening Test, which is used to detect the presence of aphasia (Halstead & Reitan, 1940). This test includes subsections like naming, repetition, written naming, reading, arithmetic problems, drawing, and placing one hand on an area on the opposite side of the body.

Enderby et al. developed the Frenchay Aphasia Screening Test (FAST) in 1987 to provide medical professionals with a fast and simple way to evaluate whether a patient has a language loss when dealing with patients who may have aphasia. The FAST was administered to 50 older patients by Philip, Lowles, Armstrong, and Whitehead (2002), with a nurse repeating the test one or two weeks later; using Kappa statistics, the test-retest reliability of the FAST was found to be excellent (Kappa = 1.00). Enderby et al. (1987) investigated the concurrent validity of the FAST and the Functional Communication Profile in patients 15 days after a stroke and in those with chronic aphasia. There were very high correlations between the two measures for both groups (r = 0.87 and r = 0.87, respectively).

Crary et al. developed the Acute Aphasia Screening Protocol (AASP), which was first published in 1989, to provide an objective assessment of language deficits in acute patients who might not be able to endure a more thorough examination. In 2007, Crary et al. investigated the preliminary psychometric properties of the Acute Aphasia Screening Protocol; the results revealed that when compared to other aphasia batteries, it exhibited a good content and constructed validity as well as good concurrent validity with the Western Aphasia Battery. High test-retest reliability demonstrated the procedure's temporal stability. Within and between patients, preliminary interjudge reliability was high. These findings suggest that the AASP may be a helpful clinical tool for assessing aphasia when used for specified purposes.

Al-Khawaja et al. in 1996 compared Frenchay Aphasia Screening Test (FAST) with the Sheffield Screening Test (SST) for Acquired Language Disorders. The correlation between receptive skill scores and comprehension scores on the FAST was 0.74 (P 0.001). The scores on the two tests showed a strong association of 0.89 (P 0.001), with the correlation coefficient for expressiveness being 0.92 (P 0.001). The total scores on the FAST and the Short Orientation, Memory, and Concentration test (SOMC) correlated favorably, with r=0.86 (P 0.001) and r=0.91 (P 0.001), respectively. Additionally, there is a strong positive correlation between the Barthel index and the FASTr=0.59 (P 0.001) and SSTr=0.63 (P 0.001). The study showed that both assessments had comparable predictive values for detecting and diagnosing aphasia and were straightforward, quick, and easy to administer. Additional benefits of the SST were discovered, including that it did not require specific tools or stimulus cards and was not affected by visual neglect.

Thommessen et al. in 1999, developed an aphasia screening test by the name Ullevaal Aphasia Screening Test (UAS). This test was initially developed in the Norwegian language to the presence of aphasia in persons with stroke. The nurses assessed 37 stroke patients using the UAS, and a comprehensive aphasia test was also administered by speech-language pathologists. According to the speech therapist, only two out of 28 people who screened negative on the UAS had mild aphasia. The test's predictive value was 0.67 for a positive and 0.93 for a negative result. The nurses' and speech therapists' scoring showed a firm agreement with each other, with a weighted Kappa coefficient of agreement of 0.83. However, the standardization of this test has not been done.

A review of available tools for identifying aphasia post-stroke was done by Salter et al (2006). They evaluated the psychometric properties of the screening tools available in the literature on stroke. Six tools were identified and assessed for validity, reliability, classification sensitivity, and practical utility. The Acute aphasia screening protocol (AASP), Frenchay Aphasia screening test (FAST), Mississippi aphasia screening test (MAST), Reitan-Indiana aphasia screening examination (ASE), ScreeLing, and Ullevaal aphasia screening test (UAS) were among them. The authors said that there was a lack of published information that was publicly available and constituted a hindrance in evaluating the tools found in their investigation. They concluded by saying that among the tests that they reviewed, FAST had undergone the most extensive reliability and validity testing of all the tools examined. Although the figures stated for the UAS were higher than FAST, the figures could not be found in the published literature. FAST's sensitivity is higher than the UAS's (87 percent vs. 75 percent), and its specificity is higher (80 percent vs. 90 percent).

El Hachioui (2012) studied the reliability and validity of the ScreeLing, which was found by studying 141 subjects with acute aphasia (2 weeks post-stroke), 23 with chronic aphasia, and 138 healthy controls. At 12 days after a stroke, it was discovered that the ScreeLing was valid and reliable for determining the presence and the severity of aphasia and linguistic difficulties.

Nursi et al. (2018) adapted and validated the Mississippi Aphasia Screening Test (MAST) in the Estonian language, which revealed that for measuring expressive and receptive language skills in Estonian patients with aphasia following an early stroke, the MAST is a reliable screening tool. Less than one million people globally speak Estonian, making the MAST the first validated aphasia screening exam. The author Nakase-Thompson et al. studied the test's psychometric properties in 2005, which showed a Sensitivity of 72.7% (low-moderate), and a Specificity of 60% (low).

The Bedside Evaluation Screening Test (BEST-2) was given in 1998 by West et al. they administered the test to 164 individuals with aphasia and 30 typical control individuals, results of which are not available (Rhode et al., 2018). An absence of literature was noted in the usage of the BEST-2, and its measurement properties are not available (Salter et al., 2006).

Flamand-Roze (2011) studied the psychometric properties of the Language Screening Test (LAST), which revealed a sensitivity of 98% (high) and specificity of 100% (high). The Intraclass correlation coefficient was 0.96 (high), and the Inter-rater agreement was 0.998 (high). A feasibility study done by Flowers et al. (2020) reveals that LAST seems to work as intended. Besides high parallel form reliability, score heterogeneity exists for individuals with aphasia and desired ceiling effects for those without aphasia. The results motivate a significant investigation of diagnostic accuracy in acute stroke patients.

The Aphasia Rapid Test (2013) by Azuar et al. is a clinical bedside tool that quantifies the aphasia severity in stroke patients using a 26-point rating scale. The inter-rater reproducibility, sensitivity, and predictive value were checked. It was administered on 91 aphasics to check for reproducibility within one week of stroke onset. The weighted Kappa value (w) was 0.93, and the inter-rater concordance coefficient was 0.99. The sensitivity is more than 90% and 80% specificity (Azuar et al., 2013).

El Hachioui et al. also reviewed screening tests for aphasia in patients with stroke in 2016 research literature on stroke. They wanted to recognize tests that could differentiate aphasics from non-aphasics and check these tests for feasibility, reliability, and test accuracy. Nine studies were included in the review: 1. Frenchay Aphasia Screening Test (FAST), 2. Mississippi Aphasia Screening Test (MAST), 3. Language Screening Test (LST), 4. ScreeLing, 5. Sheffield Screening Test for Acquired Language Disorders (SST), 6. Semantic Verbal Fluency (SVF), and 7. Ullevaal Aphasia Screening test (UAS) 8. Mobile aphasia screening test (also abbreviated as MAST) 9. Semantic Verbal Fluency (SVF). In conclusion, they found that there are a number of aphasia screening measures for stroke patients; however, many of these tests have not been adequately validated. The most effective diagnostic features appear to be LAST and ScreeLing. The LAST's quick administration time is a benefit, and it was found to have an excellent diagnostic odds ratio (DOR).

In 2021, Araki et al. used a multicenter, large-sized sequential series to explore the effectiveness of a 10-min screening scale for estimating aphasia, dysarthria, and cognitive impairments and it revealed that 23 out of 29 items had Phi coefficients (a statistical test that checks for the association between two binary variables) above the targeted disorder's moderate effect size of 0.3. Overall, sensitivity (82–92%) and specificity (77–78%) were well-balanced, with moderate to significant positive and negative probability ratios (3.7-4.19 and 0.1-0.23). The correlation coefficients (Pearson's r) between the verbal and nonverbal sections and the Western Aphasia Battery Aphasia Quotient, Assessment of Motor Speech for Dysarthria, and Western Aphasia Battery Nonlinguistic Skills were 0.89, 0.70, and 0.79, respectively. It was concluded that STAD was shown to have good content and concurrent validity for evaluating communication function in brain damage patients. This brief screening approach may be helpful in certain circumstances, such as in the early stages of bedside investigations, to quickly assess communicative function before administering other tests, and in situations where more extensive testing is impractical.

2.3 Tests available in the Indian context

Nagendar K, Ravindra, and Swathi (2012) at the All India Institute of Speech and Hearing adapted the Mississippi Aphasia Screening Test to Telugu (MAST-T); it is the first screening tool for aphasia available in Telugu. The test was validated in three groups: the neurotypical (NT) group (n=50), the left hemisphere damage group (n=25), and the right hemisphere damage group (n=05). The exam had high inter-rater reliability (r=0.993), good criterion validity (r =0.84), and good concept validity. The LHD group performed worse on both subtests than the RHD group. Furthermore, the results showed that neuro-typical people outperformed both groups on all 46 items, with the exception of the object recognition task, which had nearly identical scores for all three groups. MAST-T is thus a viable and reliable screening technique for Telugu-speaking individuals with aphasia.

In 2020, Paplikar et al. adapted and validated the Frenchay Aphasia Screening Test (FAST) to the Indian context in two Indian languages, Telugu and Kannada, for the literate and illiterate population. In the sample, the best cut-off values for aphasia detection had good sensitivity and specificity, falling between 25 and 25.5 (for literate people) and 13.5 to 15.5 (for illiterate people). Additionally, aphasia scores for the Western Aphasia Battery (WAB) and the adapted FAST showed a significant association, demonstrating good convergent validity. They also concluded that the Indian version of FAST's psychometric characteristics complied with the predetermined standards for adaptation and validation.

The Bedside Screening Test for aphasia was developed at AIISH in the following languages 1) Ramya and Goswami - Kannada (2011), 2) Kanthima and Goswami - Malayalam (2011), 3) Monalisa and Goswami- Odiya (2012) and 4) Santosh and Goswami - Telugu (2013). The developed test in Kannada was administered to two groups of participants: Thirty healthy individuals in three age groups (30–40, 40–50, and 50–60) and seven patients with stroke were considered as participants. The objective of the research was to test the overall performance of healthy participants on the test's numerous domains and subsections before assessing the performance of three age groups on the same parts and subsections. The study also attempted to compare the performance of normal and stroke patients to gauge the test's sensitivity. According to the normal group's findings, there is no noticeable difference in the three age groups across the subsections (30–60 years). As a result, the three age groups were combined into one. The performance of the two groups—normal people and people who had strokes—was compared, and the results showed a considerable difference between the groups. When compared to the normal volunteers, the stroke participants performed poorly. The stroke participants had comprehension, repetition, naming, reading, and writing issues. This shows that the test can distinguish between pathological and normal speech and language disorders. These studies had the following implications- a) The tools can be used to screen stroke patients and evaluate their speech and language abilities. b) The screening tests require less time and provide a quick indication of whether stroke patients have any aphasic deficits. c) The tools can assist in creating an effective management plan for people with aphasia. However, these tests are not standardized, and these tools' psychometric properties were unavailable.

2.4 Summary of the screening tests available in the Western and Indian context

Based on the literature, it is evident that there are numerous screening tools available in the western context but there are very few in the Indian context. Most of the tests that are available in the Indian context are adapted from the western tests themselves but very few of them are developed in India. There are two schools of thought stated in Pauranik et al. study (2019), some researchers say that there is no need to develop new tests when there are widely accepted standardized screening tests available while others emphasize the linguistic and cultural variations and say there is a need for developing indigenous tests. Table 3 given below describes the various screening tools available in the western as well as the Indian context in terms of their authors and year of publication, the domains that they cover, the time required to administer them, the result or the outcome of the test, languages it is available in and whether the normative data is available for that test or not.

Table 3, 4.

Summary of screening tests available in the Western and Indian Context

Sl No.	Test name	Author and Year	Domains	Test Time	Test outcome	Languages available	Normative available
			Western context				
1.	LAST	Flamand-Roze et al, (2011)	Naming; Repetition; Automatic speech; Picture recognition; Executing verbal orders	2-3 mins	Receptive index, Expressive index	German, English, French, Spanish, Chinese,	Yes
2.	ART	Azuaret al, (2013)	Execution of simple orders; Repetition of words; Repetition of a sentence; Object naming; Scoring of dysarthria; Verbal semantic fluency task	<3 mins	Aphasia severity in acute stroke patients	French, English	Yes
3.	BEST	West et al, (1998)	Auditory comprehension, Speaking, and Reading.	<20 mins	Assesses and quantifies adult language disorders resulting from aphasia	English	Yes

4.	SAS	Sklar, (1983)	Auditory decoding, Visual decoding, Oral encoding, and Graphic encoding	60 mins	Severity and nature of language disorders following brain damage in adults	English, German	Yes
5.	Screenling	Doesborg, (2003)	Semantics, Phonology, Syntax	15 mins	Presence/Absence of Aphasia	Dutch	Yes
6.	UAS	Thommessen et al (1999)	Expression, Comprehension, Repetition, Reading, Reproduction of a string of words, Writing, Free Communication	5–15 mins	Detect aphasia in the acute stage of stroke	Norwegian	No
7.	SST	Syder and Body (1993)	Receptive skills, Expressive skills	3-5 mins	The presence of a language deficit/ Aphasia	English	Yes
8.	STAD	Kentaro Araki (2021)	Verbal section, Articulation section, Non-verbal section	4-15 mins	The presence of aphasia/ dysarthria	Japanese, English	No
9.	FAST	Enderby et al., (1987)	Comprehension, Verbal expression, Reading, Writing	3–10 mins	The presence of a language deficit/ Aphasia	English, Hindi, Bengali, Telugu, Kannada, and Malayalam.	Yes
10.	MAST	Nakasen Thompson, et al. (2005)	Naming, Automatic speech, Repetition, Verbal fluency, Writing, Yes/no responses, Object recognition, Following instructions, Reading instructions	10-15 mins	Expressive Index, Receptive Index, Total score	English, Telegu, Estonian	Yes

11.	AASP	Crary et al., (1989)	Attention/orientation to communication, auditory comprehension, expressive ability, and conversational style.	10 mins	Index of aphasia severity	English	Yes
12.	Bedside WAB-R	Kertesz., (2007)	Spontaneous speech Content and Fluency, Yes/no questions, Sequential commands, Repetition, Naming, Reading, Writing and Apraxia	15 mins	Bedside Aphasia score, Bedside Language score, Bedside Aphasia Type and severity	English, Persian.	Yes

Indian Context							
1	BST-K, BST-T, BST-O & BST-M	Ramya (2011), Kanthima V (2011), Monalisa (2012) Dhaamkar Santosh (2013)	Spontaneous speech, Auditory verbal comprehension, repetition, Naming, Reading, Writing	20 mins	Presence of aphasia	Kannada, Telugu, Odiya, Malayalam	No
2	FAST	Paplikar et al., (2020)	Comprehension, Verbal expression, Reading Writing	3–10 mins	The presence of a language deficit/ Aphasia	Hindi, Bengali, Telugu, Kannada, and Malayalam.	Available for Telegu and Kannada
3	MAST	Nagendar and Swathi (2012)	Naming, Automatic speech, Repetition, Verbal fluency, Writing, Yes/no responses, Object recognition, Following instructions, Reading instructions	10-15 mins	Expressive Index, Receptive Index, Total score	Telugu	Yes

Note: Language screening test (LAST); Aphasia Rapid test (ART); Bedside Evaluation Screening Test (BEST); Sklar Aphasia Scale-Revised (SAS); Screenling; Ullevaal Aphasia Screening Test (UST); Sheffield screening test for Acquired Language Disorders (SST); Screening test for aphasia and dysarthria (STAD); Frenchay Aphasia Screening Test (FAST); Mississippi Aphasia Screening Test (MAST); Acute Aphasia Screening Protocol (AASP); Bedside WAB-R, Bedside Screening Test (BST); Frenchay Aphasia Screening Test (FAST); Mississippi Aphasia Screening Test (MAST)

The flexibility, brevity, and suitability of the bedside screening test are due to the professional conducting the investigation at the bedside by rapidly skipping across the strong areas where there is no obvious ailment, one of a kind is the WAB-R Bedside Record Form. According to Spreen and Risser, (2003) the following factors should be taken into account while selecting any assessment method: a test's psychometric suitability, portability of the test materials, and time constraints are all factors. Aphasia screening tools are supposed to be brief and sensitive to tap into all the various linguistic deficits that can be found in a person with aphasia (PWA). The necessary domains that a test must include are a) expressive language, b) comprehension of spoken language, c) repetition of spoken language, d) naming, e) reading, and f) writing to arrive at a diagnosis and preferably classify the type of aphasia present.

Based on the literature that has been reviewed in the current study, Bedside WAB-R seems to be the best choice for adaptation into the Indian context as it fulfills all the criteria listed above. Further, the literature about WAB-R has been reviewed in the upcoming section and the merits of the same are highlighted.

2.4 Bedside Western Aphasia Battery-Revised

The Bedside Western Aphasia Battery-Revised (Bedside Record Form) is a shortened version of the Western Aphasia Battery Revised (WAB-R) that is used to evaluate language function after a stroke, or dementia, or other acquired neurological ailment (Kertesz, 2006). Clinicians with limited time and busy schedules, as well as patients who cannot withstand a lengthy examination, can use the Bedside Record Form to quickly assess patients. The Bedside Record Form, which also experiments with nonlinguistic abilities such as drawing, math, block design, and praxis, is used to detect aphasia. The WAB-R employs a cut score based on a normative criterion. The Bedside Record Form has three available scores: Bedside Aphasia Score, Bedside Language Score, and Bedside Aphasia Classification (Pearson Education Inc, 2020).

The Bedside WAB-R is composed of nine linguistic subtests: 1) spontaneous speech, 2) fluency, 3) auditory comprehension, 4) sequential commands, 5) repetition, 6) naming, 7) reading, 8) writing, and 9) apraxia (Kertesz, 2020). The entire test takes about 15 minutes to administer to individuals with brain damage. The Bedside WAB-R is divided into the following 8 (+1 optional) sections, with adequate space provided in front of each item to record the patient's responses. The scores have also been used to determine the severity of aphasia or a patient's capacity prior to rehabilitation or surgery. The scores have also been noted as baseline evaluations of the severity of Aphasia or the patient's ability prior to rehabilitation or surgery (Nilipour et al., 2014). It provides three measurements. 1) the Bedside Aphasia Score, 2) the Bedside Language Score, and 3) the Bedside Aphasia Classification. These measures can be used to determine the type and severity of aphasia and have a strong correlation with the WAB-R quotients (Kertesz, 2020).

The language subtests of the WAB-R Bedside version are chosen to represent equally essential functions of spoken language in order to arrive at a statistical percentile index of severity (AQ) as proposed by Kertesz (Kertesz & Poole, 1974). The Bedside Aphasia Score is a composite of the following factors: content, fluency, auditory verbal comprehension, sequential commands, repetition, and object naming. The Bedside Language Score combines the following scores: content, fluency, auditory verbal comprehension, sequential commands, repetition, object naming, reading, and writing

(Aphasia Score plus the reading and writing score). Finally, the Bedside Aphasia Classification assists us in determining the patient's Bedside Aphasia classification by comparing the patient's Fluency, Auditory Verbal Comprehension, and Repetition scores to those associated with the type of Aphasia.

Nilipour et al. (2014) translated the bedside WAB-R into Persian. They also examined the validity and reliability of the Bedside WAB-R, which was adapted from the Western Aphasia Battery (WAB-R). The P-WAB-1 was found to have internal consistency (a=0.71), test-retest reliability (r=.65 P0.001), and sensitivity to contribute to the Aphasia Quotient (AQ) as a functional measure of aphasia severity in Iranian patients with brain damage, according to the study's findings. Nilipour et al. (2014) translated the bedside WAB-R into Persian. They also examined the validity and reliability of the Bedside WAB-R, which was adapted from the Western Aphasia Battery (WAB-R). The P-WAB-1 was found to have internal consistency (a=0.71), test-retest reliability (r=.65 P0.001), and sensitivity to contribute to the Aphasia Quotient (AQ) as a functional measure of aphasia severity in Iranian patients with brain damage, according to the study's findings.

Mazumdar et al. investigated a sociolinguistic translation of the English aphasia test Western Aphasia Battery-Revised (WAB-R) (Kertesz & Raven, 2007) into Bangla (2018). There were three types of adaptation processes involved: the introduction of new words or phrases, direct translation, and direct translation replacing concepts. Record form part 1 (which gives the aphasia quotient [AQ]) obtained 25% of the sociocultural and linguistic changes, whereas Record form part 2 (which gives the cortical quotient and language quotient) obtained 57% of such changes. The items on the Bedside Record Form (the test's shortened version) were taken from Record Form Parts 1 and 2. The normal controls performed significantly better than the patients, who performed significantly worse on most of the sub-tests. According to their test results, 80 percent of the patients had aphasia, and researchers were able to categorise the patients based on the AQ and bedside aphasia score. The correlation between the Record form part 1 subtest scores and the Bedside record form subtest scores was strong. According to preliminary validation research, the Bangla WAB-R could differentiate between the healthy population and aphasia patients based on language skills.

To detect the presence or absence of aphasia, an investigation was done by Stipancic et al. (2019) using a bedside WAB-R. They aimed to do a prospective study to estimate the incidence and co-occurrence of Aphasia, dysarthria, and Dysphagia in individuals following stroke. They recruited one hundred individuals who had a stroke for the first time and screened them for the presence of Aphasia, dysarthria, and Dysphagia. Their choice of test to screen for the existence of aphasia was the bedside WAB-R, as it is a standardized and validated instrument frequently used in acute care settings (Vallila-Rohter et al., 2018). It also gives a quick aphasia diagnosis within a time of 15 minutes and also a severity quantification.

Dekhtyar et al. in 2020 checked for the reliability and validity of the WAB-R assessment through the videoconference/tele mode. Even though telepractice is expanding quickly in both clinical and academic contexts, there is not much research to support the successful conversion of conventional methods of evaluations and interventions to remote videoconference administrations. The arrangement was counterbalanced across administrations as twenty persons with chronic aphasia completed the assessment in person and through videoconference. Results revealed no difference in the domain scores between the two administration methods, which were closely associated. Most participants also expressed that they were largely or very satisfied with how the videoconference was administered. These results imply that the WAB-R can be administered to this patient population both face-to-face and via videoconference.

As per studies, the WAB's associated measures and the Quick Aphasia Battery's summary measures have a strong concurrent validity in the chronic phase, demonstrated by their close correspondence (Wilson et al., 2018). Correlations between the Western Aphasia Battery and the Cognitive Linguistic Quick Test were found to be statistically significant in several clinical groups (Kong et al., 2016). The Communicative Effectiveness Index (CETI) was validated as a measure of change in functional communication skills based on the pattern of correlations found with other measures such as the WAB (Lomas et al., 1989). The WAB-R, which divides patients into one or more syndromes based on fluency, naming, understanding, repetition, and auditory comprehension scores, can be used to categorize nearly all patients. A significant proportion of aphasias (50-60%) cannot be classified using conventional descriptions or the BDAE (Ochfeld et al., 2010). In other studies, there was less agreement between clinical impression and WAB classification (John et al., 2017).

Andrew Kertesz, the author of WAB-R, conducted a systematic review of research and clinical applications available for WAB-R in the literature in 2020. The WAB is by far the most commonly used extensive aphasia assessment tool, according to statistics. The overall severity score and quantification of the language impairment components enable the description and categorization of aphasia, as well as the assessment of the efficacy of various treatment modalities such as transcranial stimulation, melodic intonation therapy, standard or constrained therapies, and medication. The WAB is used by technological and scientific advances in neuroimaging, such as isotope scans, voxel-based morphometry, functional magnetic resonance imaging, and tractography, for functional, anatomical, and biological correlations of language. As a result, it is possible to conclude that the WAB-widespread R's acceptance among researchers and clinicians is due to its comprehensive measurement of important and distinct language functions, as well as its practical length, which allows it to be used with a diverse range of patients in a variety of clinical and research settings.

Therefore, it can be concluded from the review of the literature that professionals do employ screening tools in research and clinical settings. However, there have only been a few attempts to create such tools in Kannada, and the existing screening tools do not give us results that include the advantages of Bedside WAB-R. As a result, the goal of the current study is to adapt and validate the Bedside version of WAB-R in Kannada.

CHAPTER III

Method

The current study aimed to adapt and develop the Bedside WAB-R in Kannada and validate the Bedside WAB-R in Kannada on persons with aphasia.

3.1 Research Design

A descriptive study was used to adapt and validate the Bedside WAB-R for Kannada speakers in this preliminary study. Also, a standard group comparison method was employed to compare the performance of neuro-typical individuals and persons with aphasia. A cross-sectional study design and purposive sampling were used for the present study.

3.2. Participants

The total number of participants was 21 in number and was constituted into two groups. The two groups included *Group I* - Clinical group (Persons with aphasia) consisting of 6 participants with a mean age range of 43.166 and *Group II* – Control group (Neurotypical Individuals) consisting of 15 participants between the age range of 18-89 years with mean age 47.733 The test was administered to all participants in both groups according to their availability in workstations, homes, institutes, and or hospitals.

3.2.1 Ethical Considerations

When choosing study participants, ethical considerations were taken into account. Participants and their family members or caregivers of stroke patients, as well as neurotypicals, were explained the study's goals and methods. An informed consent form was signed by the participants or the caregivers involved in the study. All India Institute of Speech and Hearing, Mysore, ethical committee guidelines for Bio-behavioral Sciences for human subjects (2009) were followed in the present study for collecting data.

3.2.2 Source of the participants

All India Institute of Speech and Hearing, Mysore. The data was collected online via videoconferencing by the candidate. Participants were included in the study only on fulfilling specific criteria. The criteria were as follows:

3.2.3 *Inclusion Criteria for Group I Clinical Group (Persons with aphasia)*

- Participants of all the groups were diagnosed with aphasia (of various types) by speech-language pathologists on the administration of WAB-R (Kertesz, 2006) and confirmed by the neurologist concerning the radiological evaluations.
- No associated disorders like dementia and other psychological illnesses were present.

3.2.4 *Inclusion Criteria for Group II Control Group (Neurotypical Individuals)*

- The age range was between 18-89 years (Based on WAB-R).
- Participants who had no history or complaint of speech, language, hearing or any other communication disorders were recruited based on a semi-structured interview and self-report by the participant.
- None of them had any sensory, motor, or cognitive impairment.

- They did not have symptoms of any severe emotional, behavioural or physical disorders.
- Cognition was recorded to be normal as per Montreal cognitive assessment (MoCA) which was administered.
- A WHO Ten-Question Disability Screening Checklist (Singhi, Kumar, Prabhjot & Kumar., 2007) was used to screen all the subjects for hearing, intelligence, motor functions, and behavioral and emotional factors.

3.2.5 *Common Inclusion Criteria Combined for Group I and Group II*

- All the participants were native speakers of Kannada with or without knowledge of English, Hindi, or any other language.
- Kannada was the L1 of all the participants.
- The age range was between 18-89 years (Based on WAB-R).
- All the participants were right-handers.
- They could also read and write Kannada.
- These individuals had a minimum of 10 years of formal education, irrespective of the medium of instruction. However, the medium of instruction was noted.
- Participants with any kind of sensory deficits were excluded (e,g, visual, or auditory deficits).

Table 7 below includes details of demographic data of patients with aphasia which includes the type of aphasia, age/sex, site of lesion, and education level and Table 8 below contains demographic details of the control group.

Table 5.

Demographic details of PWA

Sl No.	Type of Aphasia	Age/Sex	Site of lesion	Education Level
1	Broca's Aphasia	36/M	Left MCA	Graduate
2	Anomic Aphasia	34/M	Left MCA Territory Infarct	Post Graduate
3	Wernicke's Aphasia	24/M	Left acute infarct in MCA-PCA territory	Student
4	Global Aphasia	68/M	Left Parietal and B/L basal ganglia Infarct	Graduate
5	Anomic Aphasia	55/F	Sub Arachnoid Hemorrhage	Graduate
6	Broca's Aphasia	42/M	Left MCA	Graduate

Table 6.

Demographic details of the control group

Sl No.	Age Range (yrs)	Total number of subjects	Subjects	
			Male	Female
1	18-30	4	1	3
2	31-45	3	2	1
3	46-60	3	2	1
4	31-75	3	1	2
5	> 75	2	1	1

3.3 Procedure

The study was conducted in four phases:

Figure 1.

Phases of the study

Phase I - Adaptation of Bedside WAB-R to Kannada language

↓

Phase II- Subsections considered for the Bedside WAB-R in Kannada

↓

Phase III- Content Validation of the developed and adapted Bedside WAB-Revised Kannada Language

↓

Phase IV- Pilot study

3.3.1 Phase I: Adaptation of Bedside version of Western Aphasia Battery (B-WAB-R) to the Kannada language

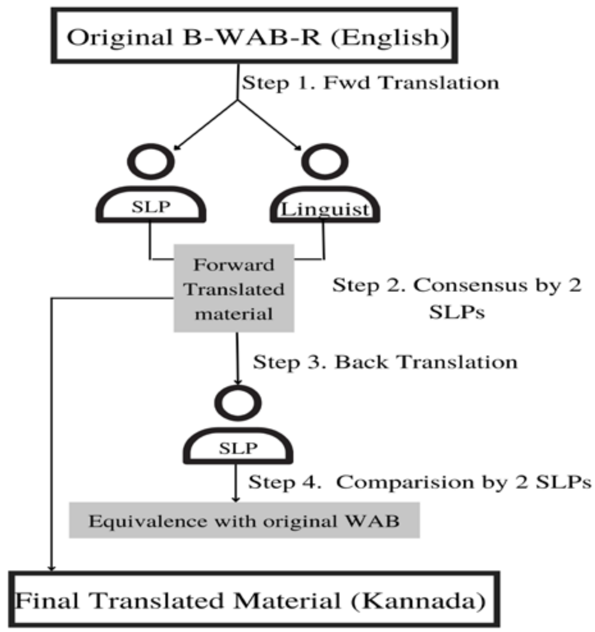
The first phase involved the adaptation of the Bedside WAB-R (Kertesz, 2006). Before adaptation, consent from the author of WAB-R was obtained via email for the same. The bedside WAB-R is a supplemental screening tool attached to the standardized test, WAB-R (Kertesz, 2006).

For adaptation, the investigator used the back translation method introduced by Brislin (1970). This technique is one of Brislin's four techniques to maintain the equivalence between the original and the translated materials and is widely used to translate or adapt various test materials worldwide.

Initially, in *Step 1* of the adaptation, the test material was given to two professional language experts, one Speech-Language Pathologist (SLP), and one Linguist for forward translation, after which two separate forms of B-WAB-R in Kannada were obtained. *Step 2* involved presenting these two forms to an expert committee which consisted of another two SLPs who compared the two forms in Kannada and came to a consensus, which resulted in one forward translated material. *Step 3* involved giving this forward-translated material for blind back-translation from Kannada to English to another SLP. In *Step 4*, this back-translated material (English) was compared to the original material (English) for concept equivalence by the expert committee. The same translation process is depicted in Figure 2.

Figure 2:

Phase 1- Translation process from English to Kannada



All the SLPs and Linguist involved in the translation process were native speakers of Kannada, with their second language as English, who were proficient in reading and writing both languages. The SLPs had an experience in adult language rehabilitation for a minimum of five years and the linguist holds a degree of Ph.D. in linguistics with expertise in the field of over 15 years.

3.3.2 Phase II: Subsections that were considered for the Bedside WAB-R in Kannada

Domains*:* The WAB-R Bedside Kannada had the following subsections given in the table below:

Table 7.

Subsections of the Bedside *WAB-R*

Sl No.	Domain	Task Given	Patient response and Scoring	Total Score
1.	Spontaneous Speech	Content: Three 'wh' questions and one picture description task will be given.	Based on length and complexity of sentences, word-finding difficulty, and paraphasias.	10
		Fluency:	They are rated based on the picture description. Where, 10 = Normal speech, 9 = Some hesitations and word-finding difficulty, 8 = Circumlocutory, fluent speech with semantic paraphasia and word-finding difficulty, 7 = Fluent phonemic jargon, resemblance to English syntax and phonology, 6 = Logopenic but regular syntax; few, if any, paraphasias; significant word-finding difficulty, 5 = Halting, paraphasic, but more complete sentences; significant word-finding difficulty, 4 = Agrammatic, effortful; verb-noun phrases, but only one or two propositional sentences, 3 = Mostly unintelligible, low volume mumbling; some single words, 2 = Single words, often paraphasias, effortful and hesitant, 1 = Recurrent, stereotypic utterances with meaningful intonation, 0 = No words or short, meaning utterances.	10

2.	Auditory Verbal Comprehension	Ten Yes/No Questions will be asked.	The patient may respond verbally or gesturally, and a score of 1 or 0 is given. 1= correct response, 0= no response	10
3.	Sequential Commands	Four commands of increasing order of complexities will be given. The patient will be asked to follow the command.	Coin, piece of paper, and pen will be used. Scoring will be based on the complexity of the order. Each command fetches a score of 1.	10
4.	Repetition	Patients will be asked to repeat six words and sentences of increased complexity of syntactic structure.	Scoring will be based on the complexity of the sentence. 0.5 would be deducted for phonemic paraphasia or word order error.	10
5.	Naming	Patients will be presented with twenty items individually and asked to name each object.	A score of 0.5 will be given for each correct response.	10
6.	Reading	The patient will be asked to read a paragraph aloud from a magazine.	Patients will be scored according to reading fluency and correctness of words. Scoring of up to 5 points for fluent, correct sentences and 5 extra points for reading comprehension. 1 point will be deducted for significant error or omission.	10
7.	Writing	Four writing tasks with increasing order of complexity will be given. Scores of tasks increase as complexity increases.	A paper and pen will be provided to the patient; he/she has to respond to the questions asked through writing mode and will be scored accordingly.	10

8.	Apraxia (Optional)	Five different commands are presented to the patient, with increasing order of complexity.	A score of 2 will be given per task if the patient carries out the command appropriately.	10 (optional)
Total	7+1 Domains	49 tasks+ 4 tasks (Apraxia)	--	80+10

Note. + Indicates Tasks and Scores from the Apraxia domain as it is optional

As shown in Table 5, the current test contained subtests that were based on the same principles as the WAB-R (Kertesz, 2007). Elements for each subtest were primarily translations of WAB-R English (Kertesz, 2007), with some materials updated to account for India's cultural setting and the Kannada language's linguistic principles. The description of each of the subtests of the study is as follows:

3.3.2.1 Spontaneous speech

Description of the test items: This section aims to elicit conversational discourse from the patient in response to questions posed during an interview and the description of a picture. It is acceptable to modify the questions' wording and add a few supportive remarks according to the contextual or dialectical variation. The Information Content and Fluency of spontaneous speech are the two main elements that need to be examined. It consists of three 'wh' questions, mainly translations of the original Bedside version of WAB-R and the picture card description.

Scoring: According to the established standards for spontaneous speech, information content, and fluency are scored, Every item in this subsect has a different score based on the level of complexity of the questions (refer to table 5 for fluency scores).

3.3.2.2 Auditory Verbal Comprehension

Description of the test items: The patient is asked to answer "Yes" or "No" to 10 questions by nodding or responding. The patient will find the first three questions to be the most relevant to themselves. The following three questions are concerned with the environment, and the final four are more generic, but they all maintain their semantic simplicity and preciseness despite a rise in linguistic complexity that calls for a deeper understanding of syntax, such as relational words. The inclusion of Yes/No questions helps to some extent prevent comprehension skills from being hampered by pointing difficulties or apraxia.

Instruction: The patient should be told to respond only with "Yes" or "No." The instruction should be repeated if the patient keeps chit-chatting, talking, or responding in whole phrases. Eye closure for "Yes" should be established if it is difficult to generate a consistent verbal or gesture response. During the test, the instructions should be repeated if necessary.

Scoring: A score of 1 point is given for each correct answer. If the response was ambiguous, score 0.

3.3.2.3 Sequential Commands

Description of the test items: This subtest is meant to assess the comprehension of syntax consisting of four commands. The first instruction and sequence are straightforward and brief in order to build rapport, the items are placed in order of increasing complexity.

Instruction: Pen, paper, and coin are placed in front of the subject in this respective order, and each of them is labeled verbally by saying: “see the pen, paper, and the coin . I will ask to point to them and do things with them, do just as I say. Are you ready? ”. If the patient does not seem to understand the task, demonstrate and start again.

Scoring: The scoring is identical to that in the original bedside WAB-R. Credit is granted for partial responses when the activity or object represented by the underlined portion of the sentence was correctly carried out,

3.3.2.4 Repetition

Description of the test items: High-frequency words of increasing length, composite words, numbers, number-word combinations, high and low probability sentences, and sentences that get longer and more complex grammatically are all used to assess repetition. It comprises oral agility tests, test sentences that only contain short grammar words, and test sentences that have all the letters.

Instructions: The patient is asked to repeat the words listed below, and then the responses are recorded. The stimulus may be given one more time. Not when the patient's response was in error, but only if the patient asks or doesn't seem to hear.

Scoring: Scoring is provided in increasing order of complexity. Colloquial pronunciations or minor dysarthric mistakes are graded as correct. 1/2 point for each phonemic paraphasia or word order error is subtracted.

3.3.2.5 Naming

Description of the test items: Twenty common objects that are easily available in a bedside setting are shown individually. The patient is asked to name the object on visual presentation.

Scoring: A score of 1/2 point is given if named correctly or with minor articulatory error.

3.3.2.6 Reading

Description of the test items: The “Bengaluru Passage” will be provided to the subject, which they have to read aloud, after which the subject will be asked questions based on the passage to check for reading comprehension

Scoring: Up to 5 points for fluent, correct sentences are given. One point is deducted for each significant error or omission. The level of reading comprehension is determined by asking questions. Up to 5 points are provided for good reading comprehension.

3.3.2.7 Writing

Description of the test items: The subject is asked to write his name, address, and a short sentence that the clinician will say aloud. This will assess the writing on request skill. The subject will also be asked to write about a picture that will be provided from any magazine or newspaper which will assess his descriptive writing skills.

Scoring: Depending on the increase in the order of complexity of each test item, the scores will be provided accordingly (refer to table 5).

3.3.2.8 Apraxia (optional)

Description of the test items: Five commands are given for upper limb, buccofacial, instrumental (transitive), and complex performances.

Instruction: The patient is instructed verbally by saying: “I am going to ask you to do some things, try and do them as well as you can”.

Scoring: A score of 2 for correct response and 1 for approximate or imitation.

3.3.2.9 Interpretation of scores in general:

A correct response was equivalent to a particular score corresponding to a specific description of the clients' responses, yes/no responses with repetition were also considered for scoring. Each domain has its own scoring system. However, the extended scoring and interpretation are as follows;

1) Bedside Aphasia Score: It is the sum of Content, Fluency, Auditory Verbal Comprehension, Sequential Commands, Repetition, and Object Naming scores. The total score is divided by 6; then multiplied by 10 to obtain the Bedside Aphasia Score.

(Sum of scores ÷ 6) × 10 = Bedside Aphasia Score

2) ***Bedside Language Score:*** It is the sum of Content, Fluency, Auditory Verbal Comprehension, Sequential Commands, Repetition, Object Naming, Reading, and Writing scores, divided by 8; then multiplied by 10 to obtain the Bedside Language Score.

(Sum of scores ÷ 8) × 10 = Bedside Language Score

3) ***Bedside Aphasia Classification Criteria:*** To determine the patient's Bedside Aphasia Classification, the patient's Fluency, Auditory Verbal Comprehension, and Repetition scores are compared to the three scores associated with each aphasia type, as given in Table 6.

Table 8.

Bedside Aphasia Classification

Aphasia Type	Scores		
	Fluency	**Auditory Verbal Comprehension**	**Repetition**
Global	<5	<4	<5
Broca's	<5	>3	<8
Isolation	<5	<4	>4
Transcortical Motor	<5	>3	>7
Wernicke's	>4	<7	<8
Transcortical Sensory	>4	<7	>7
Conduction	>4	>6	<7
Anomic	>4	>6	>6

3.3.3 Phase III: Content Validation of the developed and adapted Bedside WAB-Revised Kannada Language

After the preparation of the test in the Kannada language, the test material was subjected for content validity by three speech-language pathologists who are native speakers of Kannada, proficient in reading and writing Kannada, and who have at least two years of experience as Speech-Language Pathologists in the field of neuro-rehabilitation. A content validation questionnaire was developed based on a content validation questionnaire by Goswami et al., (2012) and some other sources. There were 14 parameters in total like simplicity, familiarity, cultural relevance, etc (refer to table 5) which were to be rated on a 5-point Likert scale ranging from 1 (Very poor) to 5 (excellent). The SLPs were asked to judge each item and suggest modifications if required. The items in the questionnaire were modified based on the suggestions provided if 2 out of the 3 SLPs rated it as poor.

3.3.4 Phase IV: Pilot study

The sensitiveness of the bedside screening test was tested by conducting a pilot study on a group of populations. The pilot study was done using the Bedside WAB-R test adapted in Kannada. It involved a semi-structured interview that sought the demographic details of the participants and whether they fit into the inclusionary criteria.

3.3.4.1 *Mode of Assessment and seating arrangement*

As per the college guidelines the study was carried out online mode due to the pandemic restrictions. The participants/caregivers were informed about the items that will be needed to administer the test. The participants were asked to sit comfortably in front of the table with the camera facing toward him/her. Objects were placed around him such that it would be easy to see and reach for the objects or items named. All possible distractions were reduced from both ends (Subject and clinician) as much as possible.

3.3.4.2 Pretest Instructions

Before the exam, instructions were given to see if the participant understood the kind of task that needed to be completed, which was, “ I'm going to give you a test right now. I'll ask you a few questions, some of which you must respond to verbally and others to which you must identify and name items I point at and also carry out some commands that I will be instructing. Please stop me and I will repeat the instructions if you are unclear or need them to be repeated”. The prosodic characteristics of speech, such as rate, intonation, emphasis, and juncture, were maintained while the instructions were repeated at a comfortable hearing level in the Kannada language.

3.3.4.3 Introduction to subsections and test administration

Following the pretest instructions, the participant was prompted with the question "Are you clear now with the task you have to complete? Shall we start the test?/Are you ready? The test's subsection was then administered by the examiner in the Kannada language.

3.3.4.4 Test-retest reliability

Test-retest reliability was measured by administering the same test to the same group of participants (10% of the considered individuals) two weeks later in order to determine whether there is a statistically significant change in the results between the tests and retests.

3.3.4.5 Analysis of the Data

The above data was first collected and then analyzed. The raw scores that were obtained from the two groups of participants (normals and persons with stroke) were both tabulated using the SPSS software (Statistical Package for the Social Sciences package, version 17.0) and were subjected to statistical analysis to compare the performance of neurotypical individuals and persons with aphasia on various domains of the Bedside WAB-R in Kannada.

CHAPTER IV

Results

The Bedside Western Aphasia Battery-Revised was a widely used screening tool for various brain-damaged individuals and also persons with dementia and primary progressive aphasia to detect the presence of language impairments and/or aphasia. The main purpose of the present study was to adapt this test to the Kannada language and conduct a pilot study by administering the adapted test to individuals with aphasia. The results of this study are documented under two headings, 1) The content validation of the adapted test and 2) The pilot study.

4.1 Content validation of the Adapted test

The adapted B-WAB-R was subjected to content validation. Three Speech-Language Pathologists (SLPs) with at least 2 years of working experience who held a Master's Degree in Speech-Language Pathology in the field of neuro-rehabilitation and were also proficient in the Kannada language were requested to validate each stimulus of the adapted test material. The stimuli were rated by a questionnaire based on the one developed by Goswami et al. (2012) and the one by Ryan Micheal (2020). The entire adapted test material was rated under parameters such as simplicity, familiarity, complexity, framing of items, applicability, cultural appropriateness, scoring pattern, clarity, relevance, size of the picture, color, and appearance as given in the following Tables 9-16. The majority of the responses for each of the test items by all the validators were more or less similar, and the same was considered validated responses, as shown in the tables below. Based on the remarks and opinions of the content validators, changes were made respectively. Results were found to be similar and the same were considered validated responses as shown in the following Tables 9-16.

Table 9.

Content Validation scores obtained for the Spontaneous Speech Content and Spontaneous Speech Fluency Domain

	Simplicity			**Familiarity**			**Framing of items**			**Applicability**			**Cultural Appropriateness**			**Scoring Pattern**			**Clarity**		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
SSC1	4	5	4	5	5	5	4	5	5	4	5	5	4	5	5	4	5	4	-	-	-
SSC2	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	4	5	5	-	-	-
SSC3	4	5	2	4	5	4	4	5	3	4	5	5	4	5	5	4	5	4	-	-	-
SSC4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4	3	5	4	-	-	-
SSF	5	5	5	4	5	5	5	5	5	4	5	5	4	5	5	4	5	5	-	-	-
P	4	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	5	3

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the spontaneous speech section, including the picture description task. As seen above almost all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: SSC2- Change in the grammatical form of the sentence, which was incorporated.

SSC3- Change in the grammatical form of the sentence, which was incorporated.

P- Change in the picture as it was not culturally appropriate, hence a picture description that is culturally appropriate could be used for further use.

Table 10.

Content Validation scores obtained for the Auditory verbal Comprehension domain

	Simplicity			**Familiarity**			**Complexity**			**Framing of items**			**Applicability**			**Cultural Appropriateness**			**Scoring Pattern**		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
AVC1	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5
AVC2	5	5	4	5	4	4	5	5	4	5	5	4	5	5	4	4	5	5	5	5	5
AVC3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
AVC4	5	5	4	5	5	3	5	5	3	5	5	4	5	5	3	4	5	4	5	5	5
AVC5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
AVC6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
AVC7	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
AVC8	5	5	5	5	5	5	5	5	5	5	5	4	5	5	4	5	5	5	5	5	5
AVC9	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
AVC10	5	5	3	5	5	3	5	5	4	5	5	3	5	5	5	5	5	5	5	5	5

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the Auditory Verbal Comprehension domain. As seen above all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: AVC4- |dIpA:| - |laitU|, Either of the words can be said.
AVC10- Change in the grammatical form of the sentence, which was incorporated.

Table 11.

Content Validation scores obtained for the Sequential Commands domain

	Simplicity			Familiarity			Complexity			Framing of items			Applicability			Cultural Appropriateness			Scoring Pattern		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
SC1	5	5	5	5	5	5	4	5	5	4	5	5	5	5	5	5	5	5	5	5	5
SC2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
SC3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
SC4	5	4	5	4	4	5	4	5	5	4	5	5	5	5	5	5	5	5	5	5	5

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the Sequential Commands domain. As seen above all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: No Remarks, hence no changes were made.

Table 12.

Content Validation scores obtained for the Repetition domain

	Simplicity			Familiarity			Complexity			Framing of items			Applicability			Cultural Appropriateness			Scoring Pattern		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
R1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
R2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
R3	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5
R4	5	5	5	4	5	5	5	5	5	4	5	5	4	5	5	4	5	5	5	5	5
R5	3	5	5	3	5	5	4	5	5	4	5	5	3	5	5	4	5	5	4	5	5
R6	4	3	4	3	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	5

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the Repetition Domain. As seen above all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: R5- Change in the grammatical form of the sentence, which was incorporated.
R6- The sentence was complicated and did not follow the rules of grammar, which was incorporated.

Table 13.

Content Validation scores obtained for the Object Naming domain

	Simplicity			Familiarity			Complexity			Framing of items			Applicability			Cultural Appropriateness			Scoring Pattern		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
ON1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON2	4	4	5	3	4	5	4	5	5	4	5	5	4	5	5	4	5	5	5	5	5
ON3	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5	5	5
ON4	4	5	5	4	5	4	4	5	4	4	5	4	4	5	5	4	5	4	5	5	5
ON5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5	5	5
ON6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON7	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5
ON8	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON9	5	5	4	5	5	5	5	5	3	5	5	3	5	5	5	5	5	5	5	5	5
ON10	5	5	3	5	5	3	5	5	3	5	5	3	5	5	3	5	5	3	5	5	5
ON11	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON12	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON13	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON14	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5
ON15	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5	5	5
ON16	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5	5	5
ON17	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

ON18	4	4	4	4	3	4	4	4	3	4	4	3	4	3	4	4	3	4	5	5	5
ON19	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ON20	5	5	3	5	5	4	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the Object Naming domain. As seen above all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: Items on ON 9, 10, and 16 were changed to more appropriate words.

Table 14.

Content Validation scores obtained for the Reading and Writing domain

	Simplicity			**Familiarity**			**Complexity**			**Framing of items**			**Applicability**			**Cultural Appropriateness**			**Scoring Pattern**		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
RD	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5
W1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5W2	5	5	4	5	5	4	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5
W3	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	3	4	5	5	5
W4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4	5	5	5

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the Reading and Writing domain. As seen above all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: No Remarks, hence no changes were made.

Table 15.

Content Validation scores obtained for the Apraxia domain

	Simplicity			**Familiarity**			**Complexity**			**Framing of items**			**Applicability**			**Cultural Appropriateness**			**Scoring Pattern**		
Validators	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
A1	3	5	3	3	5	3	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4
A2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
A3	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	4	5	5	5
A4	4	5	3	4	5	3	4	5	4	4	5	4	4	5	4	4	5	4	4	5	5
A5	5	4	4	5	4	4	5	4	5	5	4	5	5	4	4	5	4	4	5	5	5

Note. C1- Content Validator 1, C2- Content Validator 2, C3- Content Validator 3. This table demonstrates the content validation scores for the Apraxia domain. As seen above all the items were scored between good and excellent. The suggestions and recommendations received by the validators were considered, and changes are incorporated into the constructed test.

Remarks: A1- Change in the grammatical form to a more culturally appropriate form, which was incorporated.

Table 16.

Content Validation scores obtained for the overall adapted Bedside WAB-R Kannada

Parameters	Very Poor	Poor	Fair	Good	Excellent
Simplicity				2	1
Familiarity				3	
Complexity				2	1
Framing of items				2	1
Applicability				1	2
Cultural Appropriateness				2	1
Scoring Pattern				1	2
Clarity				2	1
Relevance				1	2
Size of the picture				3	
Color and appearance				2	1
Arrangement				1	2
Presentation				1	2
Scope of practice				2	1
Publication, outcomes, and Developers				2	1

Note. The overall test material was rated by the three content validators, who gave it ratings ranging from Good to Excellent across all domains. The suggestions and recommendations of the validators were taken into account, and changes were made to the test. As a result, the translated test was adapted and validated, and used in the pilot study ahead. The adapted Bedside WAB-R Kannada is attached in Appendix A.

4.2 Pilot Study

In the present study, the adapted B-WAB-R-Kannada was administered to a total of 21 individuals. Fifteen were neurotypical individuals and six were persons with aphasia within the age range of 18 to 89 years. Participants in the experimental group were of different aphasia types and severity. Using SPSS software (version 20), the results of the test administered to the participants were analyzed in various aspects.

After conducting the pilot study, a few notable responses were obtained. Firstly, the picture used for the spontaneous speech section was not found to be very culturally appropriate. Some neurotypicals hesitated to describe a part of the picture where the lady is pouring wine in a glass. Some took a pause and said juice, some said wine after a pause while some others said that the lady was pouring something in the glass. Secondly, in the object naming section, there were a few objects for which the investigator kept two options as acceptable responses, mostly the other acceptable response was a borrowed word from English which is more colloquially used, especially in the urban parts of the country. For instance, in the test, for light, both responses |LaitU| or |dIpa| could be accepted and the participants also responded in the same way. 60% of the participants responded as 'light' for that object while the others said |dIpa|. Similarly, there were other items as well for which two responses can be accepted. Lastly, in the object naming section itself, there was a stimulus for index finger. All the neurotypicals named it as a finger, further, a probe question 'which finger is it?' was needed in order for them to respond as index finger. However, 60% of the neurotypicals did not know what is index finger called in Kannada. Hence, if they responded in English, calling it an index finger, it was accepted as a response. For these issues noted after conducting the pilot study the investigator suggests the following changes 1) adaptation of the picnic picture (WAB-R) to an Indian context and 2) accepting colloquially used borrowed words in object naming section.

Further, using SPSS software (version 20), the results of the test administered to the participants were analyzed in various aspects.

4.2.1 Descriptive Statistics

To describe and summarize the characteristics of the current data set, descriptive statistics were done. The spontaneous speech content (SSC), spontaneous speech fluency (SSF), auditory verbal comprehension (AVC), sequential commands (SC), repetition (R), Object Naming (ON), reading (RD), writing (W), and apraxia (A) scores were computed for both the groups. The Mean, Median, and, Standard Deviation (S.D) were calculated for each domain and are tabulated in Table 17.

Table 17.
Mean, median and standard deviation for Neurotypicals and Persons with Aphasia

	Neurotypicals			**Aphasics**		
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
SSC	10.00	10.00	0.000	4.67	4.50	3.141
SSF	10.00	10.00	0.000	4.50	5.00	3.082
AVC	10.00	10.00	0.000	7.17	7.50	2.317
SC	9.93	10.00	0.258	3.67	4.50	2.582
R	9.93	10.00	0.258	3.67	3.50	2.875
ON	10.00	10.00	0.000	3.67	4.00	3.204
RD	9.93	10.00	0.258	1.50	.00	3.674
W	10.00	10.00	0.000	2.83	2.00	2.994

Table 17 continued…

A	10.00	10.00	0.000	5.33	5.00	3.445
BAS	99.80	100.00	0.775	46.17	44.50	24.310
BLS	99.73	100.00	1.033	40.50	36.00	24.946

Note. SSC= Spontaneous Speech Content, SSF= Spontaneous Speech Fluency, AVC= Auditory Verbal Comprehension, SC= Sequential Commands, R= Repetition, ON= Object Naming, R= Reading, W= Writing, A= Apraxia, BAS= Bedside Aphasia score and BLS= Bedside Language score.

The neurotypical group (NT) had 15 participants while the Persons with aphasia group (PWA) had six. If we compare the mean scores across all the domains of the B-WAB-R, the Neurotypical Individuals (NTI) performed better than the PWA across all domains. For SSC, SSF, AVC, ON,W and A the mean score obtained by the group with NTI was 10 (S.D.=.00), which means that all normal scored 100% scores irrespective of age and gender. For the SC and R, RD sections, the mean scores obtained by the group with NTI were 9.93 (S.D.=.258). If we contrast these scores with the ones obtained by the PWA group, the latter obtained poorer scores in all domains. The mean scores obtained by the PWA group were as follows, SSC- 4.67 (S.D=3.141), SSF- 4.5 (S.D.= 3.082), AVC-7.17 (SD=2.317), SC- 3.67 (SD= 2.589), R- 3.67 (SD=2.875), ON-3.67 (SD=3.204), RD-1.50 (SD=3.674), W- 2.83 (2.994), A- 5.33 (3.445) respectively. The BAS and the BLS are scores that are obtained by applying calculations on various domains of the test. These scores indicate the presence of aphasia as well as its severity. The mean BAS and BLS scores obtained by the group with NTI are BAS- 99.08 (S.D.=.775) and BLS-99.73 (S.D.=1.033) respectively while the ones obtained by the PWA group are BAS-46.17 (S.D.=24.310) and BLS- 40.50 (S.D.=24.946) respectively. Hence, there is a notable difference between the two group means.

Median is a better representative of a central tendency for the current study as the sample size is less and the number of participants is unequal across the two groups. The median score obtained by neurotypical individuals for all the subsections of B-WAB-R-Kannada is 10 for all. For BAS and BLS, the median scores were 100 each. The majority of the neurotypical individuals' scored 100% scores across all the subsections of the adapted test material. The median scores obtained by Persons with aphasia were as follows, SSC- 4.50, SSF- 5, AVC- 7.50, SC- 4.50, R- 3.50, ON- 4, RD- .00, W- 2.00, and A- 5 respectively. When the median scores for BAS and BLS were calculated for the PWA group, they came to be BAS- 44.17 and BLS- 40.50 respectively. Thus, when we compare the median scores across the groups, it is clear that the group with NTI performed better on the test as compared to the PWA group. The median scores obtained by both groups are represented in Figure 3. The median scores of BAS and BLS by both the groups are represented in Figure 4.

Figure 3.

Figure representing the median scores obtained by NTI and PWA across all subsections

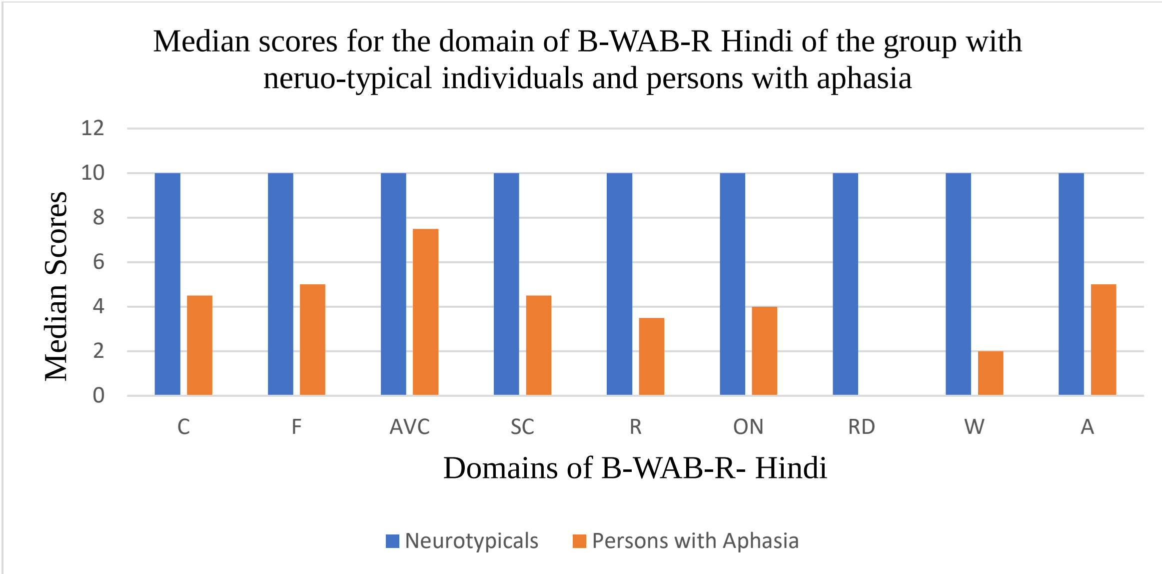
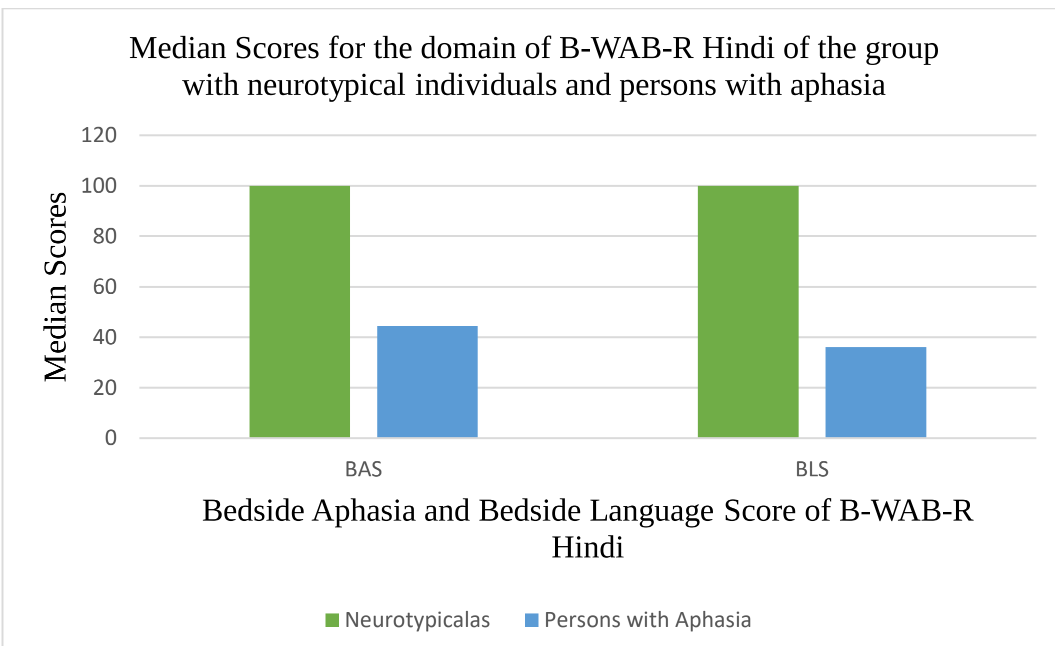


Figure 4.

Figure representing the median scores of BAS and BLS obtained by NTI and PWA.



On visual inspection as well as by comparing median values of the scores, clearly, there is a difference between scores obtained by the two groups. However, to further confirm whether a statistically significant difference was present across the two groups, the data was subjected to further analysis.

4.2.2 Comparison of neurotypicals and persons with aphasia

After computing a mean, median, and standard deviation, a statistical test was necessary to check whether there was a statistically significant difference present or not across the groups. First, the Shapiro-Wilk test of normality was administered on the data to check whether the data followed normal distribution or not. The result of the Shapiro-Wilk suggested that the data did not follow a normal distribution, i.e., $p < 0.05$. Hence, a non-parametric test was administered for comparing the two groups. The Mann-Whitney U test was administered to compare the performance of individuals from both groups. The results of the Mann-Whitney U test are tabulated in Table 18.

Table 18.

Results of the Mann-Whitney U test when NT was compared with PWA

	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
SSC	0.000	-4.392	0.000
SSF	0.000	-4.392	0.000
AVC	7.500	-3.907	0.000
SC	0.000	-4.176	0.000
R	0.000	-4.178	0.000
ON	0.000	-4.396	0.000
RD	0.500	-4.168	0.000
W	0.000	-4.396	0.000
A	7.500	-3.909	0.000
BAS	0.000	-4.174	0.000
BLS	0.000	-4.174	0.000

Note:

The Mann-Whitney U test results reveal that all the subsections of the adapted test material are statistically significantly different from each other. The present study concluded this because the U statistic is .00 for all the domains except ON, W, and A. The |Z|> 1.96, ($p<0.05$) for all the domains which again suggests the above findings. The |Z| value for each of the domains were as follows, SSC- 4.392 (p=.00), SSF- 4.392 (p=.00), AVC- 3.907 (p=.00), SC- 4.176 (p=.00), R- 4178 (p=.00), ON- 4.396 (p=.00), RD- 4.168 (p=.00), W- 4.369 (p=.00), A- 3.909 (p=.00), BAS- 4.174 (p=.002), BLS- 4.174 (p=.00) respectively.

Therefore, it is evident that the performance of the group with NTI was statistically significantly different from the group with PWA.

4.3 Correlation between Bedside Aphasia Score and Aphasia Quotient

The Bedside Aphasia Score (BAS) is a final score that is obtained using six subtests of the B-WAB-R which can be used to estimate the severity of aphasia. The maximum obtainable score on B-WAB-R is 100 and a score below 93.8 indicates a presence of aphasia. The Aphasia Quotient (A.Q.) is a score obtained on the full version of the same test, i.e., Western Aphasia Battery-Revised (WAB-R). The A.Q. is also a score obtained out of 100 which determined the presence or absence of aphasia with the same cutoff score (93.8). According to Kertesz (2006), the BAS and A.Q. are comparable in the original test material.

Hence, in order to see the correlation between the adapted B-WAB-R-Kannada and the A.Q. scores as obtained on WAB-R, a statistical test of correlation was performed. Since the data did not perform normal distribution, Spearman's rank correlation was used to check the strength of the relationship between BAS and A.Q. scores. The results indicated a perfect positive correlation between the two scores, i.e., ρ(3) =1 when $p<0.01$. the results of Spearman's rank correlation test are tabulated in Table 19.

Table 19.

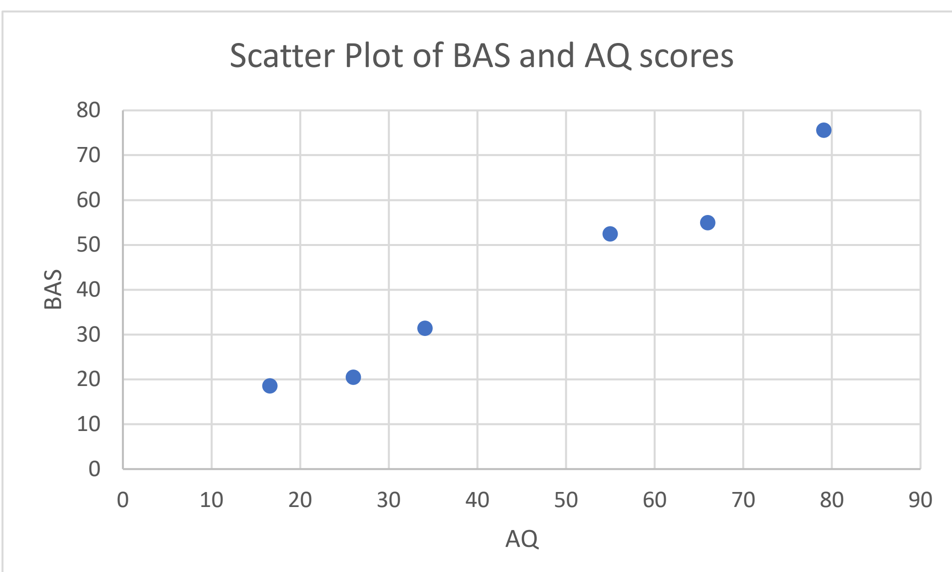
Spearman's rank correlation between BAS and A.Q
.

Correlations	Aphasia Group		BAS	WAB
Spearman's rho	BAS	Correlation Coefficient	1.000	1.000**
		Sig. (2-tailed)	.	.
		N	6	6
	WAB	Correlation Coefficient	1.000**	1.000
		Sig. (2-tailed)	.	.
		N	6	6

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 5

Figure representing scatter plot of the correlation between BAS and A.Q.



Therefore, it is statistically evident that there is a perfect positive correlation between the BAS and A.Q. scores which indicates that both the tests produce very similar results.

To summarize, the results revealed all the items in content validation were all rated between Good and Excellent and the overall test material was also rated the same. Hence, the translated test was adapted and validated to Kannada. Upon visual inspection of the graph as well as when comparing the mean and median values, there was a significant difference between the aphasic and neurotypicals group. Further to check for the statistical difference, the Man-Whitney U test was administered as the data did not follow a normal distribution. The results of the Man-Whitney U test suggested that there was a statistically significant difference across the groups for all the subsections, as well as Bedside Aphasia Score (BAS) and Bedside Language Score (BLS) which indicates that the normal performed better than the persons with aphasia. To check the strength of the relationship, the BAS was correlated with Aphasia Quotient (AQ), Spearman's rank correlation was used to check the strength of the relationship between BAS and A.Q. As a result, it is statistically proven that there is a perfect positive correlation between the BAS and A.Q. scores, demonstrating that the findings of the two tests are remarkably similar. The results of the current study will be discussed in the following chapter.

CHAPTER V

Discussion

Aphasia in stroke patients must be detected immediately, allowing for appropriate referral and treatment as soon as feasible, considering the impact of aphasia on quality of life, rehabilitation after stroke, and the expenses of stroke care (Enderby et al., 2012). Therefore, it is essential to have a quick and straightforward aphasia screening test that can be used by SLTs and other medical professionals soon after the onset of the condition. It is appropriate for ill stroke patients for whom a battery of lengthy tests would be too taxing. To identify patients with aphasia in stroke studies, a simple aphasia screening tool may potentially be helpful for research (El Hachioui et al., 2016).

Among all the popular western screening tools available, the Frenchay Aphasia Screening Test (FAST) appeared to be the most widely used and frequently evaluated tool in the stroke research literature (Salter et al., 2006). Reliability, validity, classification sensitivity, and practical utility were evaluated to arrive at this conclusion. FAST had one of the best psychometric properties; it was a simple screening method for identifying linguistic impairments caused by stroke. It is an accurate test that non-specialists can use to distinguish between aphasics and non-aphasics. The exam is short and straightforward to administer, and preliminary studies have demonstrated test-retest solid reliability (Enderby et al., 2012), giving it an upper hand above the other screening tools available. Therefore, from the resources available on screening tools for aphasia in the western context, FAST was observed to be a widely used tool; however, in the study by El Hachioui et al. (2017) and Salter et al. (2006) did not consider Bedside WAB-R in their review as it was not freely available.

El Hachioui et al. (2016), with an emphasis on the methodological quality of the validation study, assessed ten studies that reported on the validation of eight screening tests for aphasia following stroke. Results revealed that FAST had a sensitivity and specificity of 100% and 90 %, respectively. However, it was not described as the best screening tool according to the above study as it screened for only four language areas comprehension, verbal expression, reading, and writing. It requires a testing kit and only detects the presence or absence of aphasia. Al Khwaja et al., 1996 studied two aphasia screening tests Sheffield Screening Test for Acquired Language Disorders (SST) and FAST. Results revealed that the SST had more advantages as it lacked dependence on specialized tools or stimulus cards and would not be affected by visual neglect. FAST also does not give us a score equivalent to AQ, which provides a severity of aphasia. It does not help us classify aphasia between its respective types. It is advised to be cautious when administering FAST to patients with the following conditions: visual field deficiencies, neglect or inattention, illiteracy, deafness, lack of concentration, or disorientation. (Enderby, 1987; Al-Khawaja, Wade, & Collin, 1996; Gibson, MacLennan, Gray, & Pentland, 1991).

The Bedside Western Aphasia Battery-Revised (Kertesz, 2006) is a clinical technique that has been regularly and widely used to assess adult language impairments in several languages, including Indian languages like Kannada and Telegu (Kyoung et al., 2010). Based on the current study, the following are the key advantages of bedside WAB-R: 1st point, It helps detect the presence or absence of aphasia, 2nd point, gives a baseline level of performance to track changes over time, 3rd point, gives a Bedside aphasia score equivalent to the Aphasia quotient obtained as per WAB-R, 4th point, provides the severity of aphasia, 5^{th} point, classifies aphasia into its different types, 6^{th} point, it assesses eight language domains including reading and writing unlike many screening tools, 7^{th} point, it also assesses non-verbal apraxia which none of the reviewed screening tools assess, and lastly, 8^{th} point, all these measures and information can be obtained within 15 minutes. Nilipour et al. (2014) examined the validity and reliability of the Bedside version of the Persian WAB (P-WAB-1). Results revealed that bedside WAB-R had Good internal consistency and test-retest reliability, and the subtests are sensitive enough to contribute to Aphasia Quotient (AQ). The B-WAB-R’s general acceptance among academics and clinicians may be ascribed to its comprehensive measurement of essential and distinctive language functions and its practical duration, which enables it to be utilized with a variety of patients in a variety of clinical and research settings (Kertesz, 2020). Hence, we chose to adapt the Bedside Western Aphasia Battery-Revised to Kannada as it offered various advantages over other screening tools.

Many variables like age, gender, literacy, socio-economic status, handedness and the number of languages known impact an individual's language performance after brain damage (Ivanova & Hallowell, 2013). In the current study, these extraneous variables were controlled by keeping robust inclusion criteria to maintain uniformity between the groups since it was a pilot study. However, these variables which could impact the performance of the individuals are discussed and could be studied further.

According to Al Thalaya et al., 2017, persons over 60 years of age who were healthy and non-aphasic showed a reduction in their repetition scores. The deterioration of short-term memory can explain this with ageing (Buckner,2004). Additionally, they saw a significant reduction in fluency and AQ scores in persons over 60. These findings are in line with earlier ones made during the translation of WAB into languages like Kannada and Korean (Keshree, Kumar, Basu, Chakrabarty, & Kishore, 2013; Kim &Na, 2004). In contrast, the other skills like content, comprehension, complex auditory commands, and naming were not significantly different among age groups. Many authors have reported comparable findings in the Bengali, Kannada, and Korean versions of WAB (Chengappa & Kumar, 2008; Kim & Na, 2004).

The severity of aphasia also varied by gender. According to WAB-R, males had more impairment based on AQ. Their performance was poor on the WAB-R, including the domains of information content, fluency, repetition, sentence completion, responsive speech, and comprehension (yes/no, auditory word identification, and sequential instructions) (Sharma et al., 2019).

Lahiri et al. (2020), found that the distribution of education between non-fluent and fluent participants with aphasia was significantly different (p = 0.003). Individuals with fluent aphasia had higher levels of education than those without aphasia. However, it may be related to the lesion site because those with posterior lesions in their study had longer tenures in formal schooling, and posterior lesions are substantially correlated with fluent aphasia. Gonzalez-Fernandez et al., (2011) recently reported that participants with aphasia who had completed more than 12 years of formal education made fewer mistakes on a variety of language tasks than their illiterate counterparts. The participants' greater cognitive reserves explained this finding.

Between three participant groups, monolingual native English speakers, bilingual Asian Indian-English speakers, and bilingual Spanish-English speakers, Milman et al.

(2014), investigated the contribution of novel WAB-R data. Results show that both bilingual groups perform poorly overall than monolingual English speakers. These results align with earlier research showing a linguistic and cultural bias in aphasia tests (Anderson & Ulatowska, 1978; Gollan et al., 2007; Roberts & Hamsher, 1984). The findings imply that both bilingual groups find it particularly difficult to complete specific language tasks and test items. The WAB-R tasks requiring repetition, phrase completion, and word fluency were particularly susceptible to subpar performance.

Concerning handedness, the most transient aphasias were found among the left-handers. Agraphia and alexia occurred significantly more frequently in lesions contralateral to the dominant hand in all left-handed patients. Aphasia occurred in right-handed patients only in those with left cerebral lesions, while it occurred in left-handed patients with left and right hemispheric damage. There are many more unclassifiable aphasias in the left-handers than in the right-handers. Both groups experienced common syndromes such as Wernicke's, Broca's, and global aphasia (KarlGloning, 2002). However, these variables mentioned above were kept constant in the present study as it is a pilot study, and variables could not be manipulated.

Addressing the construct validity of the current test, the investigators tried to do a preliminary test. The B-WAB-R-Kannada revealed a substantial link between the AQ scores of the participants as obtained on WAB-R and their BAS scores on the adapted test. The findings of Spearman's rank correlation suggest that the individuals performed similarly on both the original and the adapted tests in view of the fact that a perfect positive correlation was obtained between the two test results. These findings were similar to previous studies done to develop tests based on the framework of B-WAB-R (Al Thalaya et al., 2017) or adaptation studies of B-WAB-R (Persian WAB).

5.1 Performance of neurotypical individuals (NTI) and persons with aphasia (PWA) on the adapted B-WAB-R-Kannada

The results of this study make Bedside-WAB-R-Kannada potentially a reliable bedside assessment tool that can be used as a clinical tool to screen for language impairments in Kannada-speaking brain-damaged individuals. It might be used to compare pre-/post-scores in order to evaluate the effectiveness of treatment, determine the severity of language impairment, and provide the type of aphasia present.

The group with NTI and PWA performance was compared after administering the Bedside WAB-R-Kannada as reported in chapter IV. As anticipated, the current study's findings reveal that the NTI performed better than the PWAs on all the subsections of the adapted test material. A mean cut-off was not estimated based on this pilot study as the sample size was too small to arrive at a score. However, if we compare the performance of the individuals with respect to the cut-off scores given by Kertesz (2006), the adapted test is sensitive enough to detect the NTI group as non-aphasics and the PWA group as aphasics. These findings also support the previous literature (Al Thalaya et al., 2017; Nilipour et al., 2014).

Based on the mean scores, a significant difference was found in all of the subsections on B-WAB-R-Kannada. The greatest difference was found in the reading and writing domains followed by repetition, sequential commands and spontaneous speech domains.

The most affected domain in the PWA group was 'reading' and 'writing'. One possible reason for that is two out of six patients had hemiparesis of their dominant hand and tried to write with their non-dominant hand. They also had limited verbal output (Broca's aphasia), which resulted in low scores in the reading domain. The site of lesion also impacts the reading and writing skills. In the present study, most neurological findings were left MCA lesions. According to some studies, the activation of specific brain regions is essential in facilitating reading. Binder et al. (2003) and Fiebach et al. (2002) discovered bilateral mid-fusiform gyrus activation during reading tasks. Several studies have also suggested that the left angular gyrus is involved in orthography to phonology conversion at the word and subword levels. According to Dehaene et al. (2002); Leff et al. (2002) functional imaging and lesion studies, orthographic stimuli processing is more concentrated in the left fusiform gyrus while reading (2006). The findings of Foundas et al. (1998), Raymer et al. (1997), and Price and Devlin (2003) support the importance of brain damage disrupting access to orthographic word forms, resulting in difficulties with oral naming and reading. Thus, difficulties in accessing the stored word and orthography to phonology conversion are present in persons with stroke during the post-acute stages of recovery due to the varied lesions in the areas of the brain and cognitive limitation.

On the 'sequential command' task, most participants could only follow simple one step commands which suggests that, as the complexity of the commands increased, their performance decreased. In 1976, Heilman and Scholes profiled the comprehension deficits present in aphasics, which was in correlation with the current study's findings. The results suggested that as the sentences' syntactic and semantic complexity increased, the aphasics performance declined. This finding indicates that the sequential commands domain was the sensitive enough to pick up minor deficits in comprehension of PWA. This also suggests a preliminary finding that PWAs, irrespective of their aphasia type, find it difficult to perform sequential commands. Even though the PWA cohort consisted of three persons with Broca's aphasia, all aphasics performed poorly in the sequential command section. Many studies show that sentence length and complexity affect auditory comprehension. For instance, according to Goswami (2004), the difficulty in comprehension increases as the syntactic complexity of the sentence increases. According to Caplan and Waters (1999), allocation in working memory is required for language processing. Working memory limitations can also cause comprehension deficits. Albert (1976), Burgio and Basso (1997), DeDe, Caplan, Kemtes, and Waters (2004), and others have reported that deficits in verbal short-term memory, in conjunction with the ageing process, can result in comprehension difficulties. Difficulties with verbal decoding would also result in comprehension deficits. In their study, Helm-Estabrooks and Albert (2004) stated that auditory comprehension includes linguistic skills, attention, visual search and selection, and verbal memory.

The PWAs also performed poorly on the 'repetition' subsection. One reason why the repetition was affected in the PWA group was because this domain also requires phonological processing, short-term auditory memory and working memory to be relatively intact and is not just a function of language (Neves et al., 2013). In the current pilot study, no persons with transcortical aphasia were included, all participants performed poorly on this section. Therefore, the repetition subsection was sensitive enough to tap on the deficits of these individuals while the neurotypicals normally performed on it. The only participant who obtained better scores on this section was the one with anomic aphasia. All the other participants could not respond as the complexity of the sentence increased. The findings of the current study are in line with the one's available in the literature. The results of the current study are consistent with research by Wernicke (1874) and Geschwind (1965). They found that repetition problems can occur in people with aphasia if the arcuate fasciculus has been structurally damaged. Additionally, they claimed that the conversion of auditory speech code into muscular speech production occurs in anterior and posterior speech areas, which are disconnected. The performance of PWAs was better in the initial sentences but got worse as the complexity increased due to increased cognitive load, as discussed earlier. According to Moser et al. (2009), processing the temporal order of speech syllables relies heavily on the inferior parietal lobe. In their study, stroke patients had a lower performance in this domain because they had lesions in numerous important areas of the cortex that support the conversion of the auditory speech code to motor speech production. Numerous mechanisms, including difficulties with phoneme identification, phonological production issues, limitations with auditory verbal short-term memory, and difficulties with syntactic and semantic comprehension, are stated to underlie the deficiencies in repetition in the literature. According to some authors, repetition problems are linked to cognitive deficiencies in aphasic individuals. Studies by Conner, MacKay, & White (2000), Dick et al. (2001), Friedmann & Gvion (2003), Martin (2000), Murray (2004), Wright et al. (2003), and Yasuda & Nakamura (2000) have shown that working memory constraints have a significant impact on the processing of linguistic information. Hence, the current study and literature suggest that the repetition difficulties arise from any disruption of the circuits connecting the multiple cognitive components or injury to the various brain regions.

The results showed a statistically significant difference between PWA and Neurotypicals in the Spontaneous speech content domain, probably because the first few items questioned in the domain were automatic answers. Whereas the complexity of the task increased in the further items, the scores obtained in the content domain were mainly because of the first few items which had more automatic answers. Also, spontaneous speech content requires both comprehension and expression of language and since the present study had a heterogeneity among the PWA group, the overall content scores were found to be low for PWA. It was also seen that participants who scored low in the spontaneous speech content section had an overall low Bedside Aphasia score which is equivalent to a low Aphasia quotient. A study done by Crary and Rothi (1989) also confirms that, information content was the best predictor of the severity of aphasic impairment as measured on AQ. The information content score reflects several aspects of a patient's communicative abilities and contributes significantly to the Aphasia Quotient calculation. According to Kertesz (1979), the information content score represents a measure of functional communication, which means that the patient must have some level of comprehension and expression abilities to respond appropriately in the task. There was a statistically significant difference among the groups for the Spontaneous speech fluency domain as well. This may be because of the heterogeneity within the PWA group.

The ‘object naming’ section is essential in detecting the presence of aphasia since anomia is one of the hallmark features of aphasia. Even though confrontation naming is a simple task, the inability to name simple objects helps clinicians to identify the presence of aphasia. In the current study, three out of the six participants faired better than the other PWAs, scoring around 6 in the object naming subsection. These participants were diagnosed with Broca’s Aphasia and Anomic aphasia. In the neurotypical group, two participants from the last subgroup (75-89 years) failed to name a few objects, which can be attributed to the age-related changes. The primary type of anomic errors found were phonemic paraphasias and semantic paraphasias followed by circumlocutions. According to Goodglass and Wingfield (1993), injuries to some brain regions can lead to impaired picture naming. When performing the naming tasks, the replies' qualitative analysis revealed paraphasias, circumlocutions, and retrieval issues. Benson has also reported similar findings (1979, 1988). Further, the current study shows a trend between the severity of aphasia and the object naming scores. The object naming scores worsened with the severity of aphasia. However, this was not statistically analysed. This finding is supported by many studies available in the literature, like the one by Mayer and Murray in 2010. These authors reported that the confrontation naming scores were strongly correlated with the severity of aphasia present. Richardson et al. in 2018, concluded that there was a strong correlation between narrative production and the naming test scores as obtained on the WAB-R, which supports the current study's findings as the investigators also found a trend between spontaneous speech content scores and the object naming scores.

Apraxia is an optional section in Bedside WAB-R, the results of the current study showed statistically significant differences among both the groups, with PWA scoring poorly. It was observed that individuals diagnosed with Broca's and Global Aphasia had poor apraxia scores, followed by Wernicke's Aphasia. This is probably because of the site of lesion of damage, as the frontal lobe is responsible for planning and programming. Thus, it mostly always occurs with Broca's and global aphasia. Individuals with Wernicke's aphasia also had poor apraxia scores due to comprehension deficits, therefore, they could not understand the commands. The present study's findings follow the same lines as that of Kertesz (2007), where he states that praxis is intimately linked to language, and, consequently, apraxia follows language disorders. Basilakos et al. (2015), noted that cortical motor regions were most significantly related to the pattern of brain damage associated with apraxia, with somatosensory areas also involved. Apraxia or aphasia-related speech production deficiencies were linked to an injury to the temporal lobe and the inferior precentral frontal regions.

To summarize, the overall differences obtained in each subsection of the test, as well as supporting literature, were discussed above. The current study found significant findings with possible explanations that are in congruence with previous research. The preliminary content validity test also revealed a strong correlation between the adapted and original test. As a result of the pilot study, the B-WAB-R-Kannada can be described as a potentially sensitive and specific bedside screening tool for identifying the presence, type, and severity of Aphasia.

CHAPTER VI

Summary And Conclusion

The current study was undertaken to adapt and validate the Bedside Western Aphasia Battery, a screening tool that provides a quick assessment for clinicians with time constraints and busy schedules or patients who cannot tolerate a more extended evaluation for any speech and language disturbances during the initial post-acute stages of recovery following a stroke in the Kannada language. A review of literature has shown that, since screening instruments are rapid, simple to use, and have high internal consistency and reliability, they are employed as the primary methods of evaluation.

The test was adapted and validated to provide a language-specific bedside screening tool in the Indian context for the Kannada population. The B-WAB-R was designed to identify the presence or absence of language disturbances, calculate the severity of aphasia, and classify it based on its different types in persons with stroke.

The B-WAB-R-K, which was adapted from the B-WAB-R (Kertesz, 2007), consists of nine domains: spontaneous speech content, spontaneous speech fluency, auditory verbal comprehension, repetition, naming, reading, writing, and apraxia (optional). The adapted tool was administered to two groups of participants, including fifteen neurotypicals and six people who had previously been diagnosed with aphasia using WAB-R, between 18-89 years of age.

The raw scores were tabulated for statistical analysis using the SPSS (version 17.0) software package. Descriptive analysis of the raw scores yielded the mean (M), median (Md), and standard deviation (SD) scores for each domain and its subsections for participants in both groups separately. Statistical analysis of the data using non-parametric tests, specifically the Mann- Whitney U test, to identify significant differences between neurotypical individuals and persons with aphasia across the test domains and subtests.

The results of the current study revealed a statistically significant difference between the two groups across all the subsections. All the neurotypicals normally performed while the aphasics performed poorly. The developed test could diagnose aphasics as aphasics and neurotypicals as non-aphasics. The PWA had difficulty in all domains, including spontaneous speech, comprehension, repetition, naming, reading, and writing. Damage to specific areas of the brain, as well as poor cognitive skills, would have contributed to auditory processing difficulties in stroke patients. The increased cognitive load in naming tasks puts pressure on the cognitive processing components in retrieving from stored memory, which could be a cause of poor performance in aphasic patients. According to studies, the information content is the best indicator of the severity of aphasia which holds true for the current study also. In the current study, all the aphasics performed poorly in the spontaneous speech domain which was statistically significantly different from the neurotypical individuals. Reading and writing were the most affected domains in the PWA group. Studies support the importance of brain damage disrupting access to orthographic word forms, resulting in difficulties with oral naming and reading. They also showed limited verbal output (Broca's aphasia), resulting in low reading domain scores. On the Sequential Commands task, most participants could only follow simple one step commands which suggests that, as the complexity of the commands increased, their performance decreased. The Repetition subsection was sensitive enough to tap on the deficits of PWA while the neurotypicals normally performed on it, in the present study no transcortical aphasias were included, therefore repetition score obtained was poor among all PWA. However, this was not statistically analyzed. Moreover, since all the domains of the adapted test showed a statistically significant difference, this demonstrates that the test can distinguish between pathological and normal speech and language skills. The correlation coefficient for the Bedside Aphasia Score and the Aphasia quotient is also a perfect positive one which suggests good validity of the adapted Bedside-Western Aphasia Battery-Revised.

Implications of the study

1. This tool can be used for screening to assess speech and language skills in Kannada-speaking brain-damaged individuals.
2. This screening tool can be used to detect the presence, type, and severity of aphasia in less time.
3. This tool can assist in formulating an efficient management plan for people with aphasia.
4. The adapted tool can serve as a baseline measure for comparison between pre and post-therapy.
5. It can serve as a quick measure to compare the performance of an individual pre and post-surgery or pharmacological treatment.

Limitations of the study

1. Only a pilot study was conducted and the sample size was considered less.
2. The test-retest reliability could not be checked due to the small sample size.

3. Variables like gender, literacy, bilingualism, handedness and site of the lesion were not taken into consideration but were kept constant in the current study.

Future Suggestions

1. The present study included only a pilot study of the adapted tool. Administration of the test on a larger population or standardization is required.

2. The screening tool can be translated and adapted to other languages for use with various Indian languages.

3. The effect of different variables like age, gender, bilingualism, handedness, and site of lesion, literacy, socio-economic status on the performance of individuals on the adapted test could be measured.

4. The psychometric properties of the adapted tool like reliability, validity, and sensitivity specificity should be checked.

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APPENDIX A

Validation form used for the constructed test

Adapted from the Manual for Non-Fluent Aphasia Therapy in Kannada

(Goswami et al., 2012)

Sl. No	Parameters	Very Poor	Poor	Fair	Good	Excellent
1.	Simplicity					
2.	Familiarity					
3.	Complexity					
4.	Framing of items					
5.	Applicability					
6.	Cultural Appropriateness					
7.	Scoring Pattern					
8.	Volume					
9.	Complexity					
10.	Accessibility					
11.	Feasibility					
12.	Generalization					
13.	Scope of Practice					
14.	Coverage of Parameter					

Format for assessing content validity

To the evaluator:

This study aims at adapting the Bedside Western Aphasia Battery- Revised (Bedside WAB-R) to Kannada. This screening test would be used with patients aged from 18-89 years to check for the presence of aphasia. The entire test material has been translated to Kannada by Speech-Language Pathologists and Linguists according to the method introduced by Brislin (1970). You are requested to give your valuable input on the same.

Instructions: Please check/tick the appropriate box for rating each question across various parameters. The rating scale ranges from 1 (Very poor) to 5 (excellent). Also, kindly provide the remarks along with the modifications to be made, beneath each table, if any of the questions are rated as poor, which will help in revising the questionnaire and increasing its specificity. There are a few stimuli where two options are provided with a slash. Kindly choose the appropriate one and rate for the same.

For a few questions, pictures/reading passages corresponding to the options will be shown to the patient during testing. Separate rating table is inserted for it as well. Kindly check/tick the appropriate box.

The parameters and their operational definition for rating the *questions* are as follows:

Simplicity of the item- Item is simple to understand

Familiarity of the item- Item is familiar

Complexity of the item- The material is arranged in the increasing order of difficulty

Framing of the item- Item is framed well with no ambiguity

Applicability of the item- Item is applicable to the age group of interest

Cultural appropriateness- Item is applicable to the Indian (Maharashtrian) context and culture

Volume: The overall size of the test material is appropriate

Accessibility: The test material is user-friendly

Scope of Practice: The test material is within the profession's scope of practice or within the personal scope of practice

Scoring Pattern: The scoring pattern is appropriate

Coverage of parameters: The test material contains the essential language components to be tested

The parameters and their operational definition for rating the *pictures* are as follows:

Clarity of the picture- Picture is clear

Simplicity of the picture- Picture is simple to understand

Relevance of the picture- Picture is relevant

APPENDIX B

Bedside Western Aphasia Battery-Revised- Kannada

Demographic details:

Name:________________ Date: ______________ DOB:__________

Age: _____ Gender: _____ Diagnosis:_________________________

Date of Onset: __________ Neuroimaging:______________________

Bedside Record Form | **Western Aphasia Battery Revised**

Kannada
ಕನ್ನಡ

Spontaneous Speech: Content

Directions: Ask the patient these questions and encourage complete responses. Score length and complexity of sentences, word finding difficulty, and paraphasias.

Item	Score
ಇಂದು ನೀವು ಹೇಗಿದ್ದೀರಿ? (1 point = any meaningful response)	(1)
ನಿಮ್ಮ ಪೂರ್ಣ ವಿಳಾಸ ಏನು? (2 points = complete address; 1 point = street of the city only)	(2)
.ನೀವು ಇಲ್ಲಿಗೆ ಯಾಕೆ ಬಂದಿದ್ದೀರಾ? (2 points = complete response; 1 point = Incomplete response)	(2)
Show the patient a magazine picture of some complexity. Say: - ಈ ಚಿತ್ರದಲ್ಲಿ ಏನಾಗುತ್ತಿದೆ ಎಂದು ಹೇಳಿ, (5 points = complete description; 4 points = incomplete description; 3 points = essential Items; 2 points = few Items only; 1 point = some relevant words; 0 points = no meaningful response)	(5)

Content Score: ☐ (10)

Spontaneous Speech: Fluency

Directions: Circle the point value that represents the statement that best describes the patient's speech fluency.

10 = Normal speech
9 = Some hesitations and word-finding difficulty
8 = Circumlocutory, fluent speech with semantic paraphasias and word-finding difficulty
7 = Fluent phonemic jargon, semblance to English syntax and phonology
6 = Logopenic but normal syntax; few, if any, paraphasias; significant word-finding difficulty

5 = Halting, paraphasic, but more complete sentences; significant word-finding difficulty
4 = Agrammatic, effortful; verb-noun phrases, but only one or two propositional sentences
3 = Mostly unintelligible, low-volume mumbling; some single words
2 = Single words, often paraphasias, effortful and hesitant
1 = Recurrent, stereotypic utterances with meaningful intonation
0 = No words or short, meaningless utterances

Fluency Score: ☐ **(10)**

Auditory Verbal Comprehension: Yes/No Question

Directions: Say, ನಾನು ನಿಮಗೆ ಕೆಲವು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಿದ್ದೇನೆ. ಹೌದು ಅಥವಾ ಇಲ್ಲ ಎಂದು ಉತ್ತರಿಸಿ. (Patients may respond verbally or gesturally)

Items	Score	
1.ನಿಮ್ಮ ಹೆಸರು ಶಿವಕುಮಾರ್?	1	0
2. ನಿಮ್ಮ ಹೆಸರು ಶೆಟ್ಟಿ?	1	0
3. ನಿಮ್ಮ ಹೆಸರು (Say the patient's last name.)	1	0
4. ಈ ಕೋಣೆಯಲ್ಲಿ ದೀಪಗಳು/ ಲೈಟು ಹಚ್ಚಿದೆಯೇ?	1	0
5. ನೀವು ವೈದ್ಯರೇ?	1	0

Items	Score	
6. ಬಾಗಿಲು ಮುಚ್ಚಿದೆಯೇ?	1	0
7. ಕಾಗದಕ್ಕೆ ಬೆಂಕಿ ಹತ್ತಿಕೊಳ್ಳುತ್ತದೆ ಯೇ?	1	0
8. ಮಾರ್ಚ್ ತಿಂಗಳು, ಜೂನ್ ತಿಂಗಳಿಗಿಂತ ಮೊದಲು ಬರುತ್ತದೆಯೇ?	1	0
9. ನೀವು ಬಾಳೆಹಣ್ಣನ್ನು ಸಿಪ್ಪೆ ಸುಲಿಯುವ ಮೊದಲೇ ತಿನ್ನುತ್ತೀರಾ?	1	0
10. ಕುದುರೆಯು ನಾಯಿಗಿಂತ ದೊಡ್ಡದಾಗಿದೆಯೇ?	1	0

Auditory Verbal Comprehension Score: ☐ (10)

Sequential Commands:

Materials: Coin, piece of paper, pen **.Directions**: Place a coin, a piece of paper, and pen in front of the patient and say: ನಾಣ್ಯ, ಕಾಗದ ಮತ್ತು ಪೆನ್ನು ಇಲ್ಲಿ ಇವೆ, ನೋಡಿ? ಅವುಗಳನ್ನು ಸೂಚಿಸಲು ಮತ್ತು ಅವುಗಳೊಂದಿಗೆ ಕೆಲಸ ಮಾಡಲು ನಾನು ನಿಮ್ಮನ್ನು ಕೇಳುತ್ತೇನೆ. ನೀವು ಸಿದ್ಧರಿದ್ದೀರಾ?(Read each item)

Items	Score
ನಾಣ್ಯ ಮತ್ತು ಪೆನ್ನನ್ನು ತೋರಿಸಿ.	(2)
ಪೆನ್ನಿನಿಂದ ಕಾಗದವನ್ನು ತೋರಿಸಿ.	(2)
ಪೆನ್ನನ್ನು ಕಾಗದದಿಂದ ತೋರಿಸಿ.	(2)
ಪೆನ್ನನ್ನು ಕಾಗದದ ಮೇಲೆ ಇಟ್ಟು, ನಾಣ್ಯವನ್ನು ತಿರುಗಿಸಿ.	(4)

Sequential Commands Score: ☐ (10)

Repetition:

Directions: Ask the patient to repeat the words listed below. Say,ಈ ಪದಗಳನ್ನು ಪುನರಾವರ್ತಿಸಿ. (Subtract 1/2 point for each phonemic paraphasia or word order error.)

1.ಹಾಸಿಗೆ
2.ಕಿಟಕಿ
3.ನಲವತ್ತೆದು
4.ದೂರವಾಣಿ ರಿಂಗ್ ಆಗುತ್ತಿದೆ.
5.ಮೊದಲನೆಯ ಭಾರತೀಯ ನೌಕಾಪಡೆ5.ನನ್ನ ಗಾಡಿಯನ್ನು ಐದು ಡಜನ್ ಬಿಳಿ ಗೋದಿಯ ಮೂಟೆಗಳಿಂದ ತುಂಬಿ.

Repetition Score: ☐ (10)

Object Naming:

Directions: Ask the patient to name objects in the room. **Say:** ಇದು ಏನು? ಈ ವಸ್ತುವಿನ ಹೆಸರೇನು? (Score 1/2 point for each correct response).

Items		Score	Items		Score
1.	ಹಾಸಿಗೆ		11.	ಕೂದಲು	
2.	ದೂರವಾಣಿ		12.	ಕುರ್ಚಿ	
3.	ದಿಂಬು		13.	ಕೈ ಗಡಿಯಾರ	
4.	ಯಾವುದಾದರೂ ಒಂದು ಬಟ್ಟೆಯ ಬಣ್ಣ		14.	(ಕೋಟ್) ಕಾಲರ್	
5.	ಮೊಣಕೈ		15.	ಬಟನ್	
6.	ಬಾಗಿಲು		16.	ದೀಪ/ ಲೈಟು	
7.	ಕ್ಯಾಲೆಂಡರ್		17.	ಪೆನ್	
8.	ಭುಜ		18.	ಸ್ಟ್ರಾ	
9.	ಗ್ಲಾಸ್/ಕಪ್		19.	ಕಿಟಕಿ	
10.	ಕೀಲಿ/ ಬೀಗದ ಕೈ		20.	ತೋರುಬೆರಳು/ಒಂದು/ ಬೆರಳು	

Object naming score: ☐ **(10)**

Bedside Aphasia Score

Sum the Content, Fluency, Auditory Verbal Comprehension, Sequential Commands, Repetition, and Object Naming scores. Divide the sum by 6; then multiply by 10 to obtain the Bedside Aphasia Score.

Sum of scores ÷ 6
× 10

Bedside Aphasia Score: ☐

Bedside Language Score

Sum the Content, Fluency, Auditory Verbal Comprehension, Sequential Commands, Repetition, Object Naming, Reading, and Writing scores. Divide the sum by 8; then multiply by 10 to obtain the Bedside Language Score.

Sum of scores ÷ 8
× 10

Bedside Language Score: ☐

Reading:

Directions: Ask the patient to read a paragraph aloud from a magazine, Score up to 5 points for fluent, correct sentences. Deduct 1 point for each significant error or omission. Determine level of reading comprehension by asking questions. Score up to 5 additional points for reading comprehension.

Reading Score: ☐ (10)

Writing:

Directions: Place a piece of paper and a pen on the table and say,

Items	Score
1. ನಿಮ್ಮ ಹೆಸರು ಬರೆಯಿರಿ.	(1)
2. ನಿಮ್ಮ ವಿಳಾಸ ಬರೆಯಿರಿ.	(2)
3. ಬರೆಯಿರಿ: "ದೂರವಾಣಿ ರಿಂಗ್ ಆಗುತ್ತಿದೆ!"	(2)
4. Picture description: Ask the patient to write about a picture of some complexity from a magazine. Say, ಚಿತ್ರದಲ್ಲಿ ಏನಾಗುತ್ತಿದೆ ಎಂಬುದರ ಕುರಿತು ಬರೆಯಿರಿ.	(5)
5 points = complete description; 4 points = incomplete description; 3 points = essential items; 2 points = few items only; 1 point = some relevant words; 0 points = no meaningful response.	

Writing Score: ☐ **(10)**

Bedside Aphasia Classification Criteria

Directions: To determine the patient's Bedside Aphasia Classification, compare the patient's Fluency, Auditory Verbal Comprehension, and Repetition scores to the three scores associated with each aphasia type.

Apraxia (Optional)

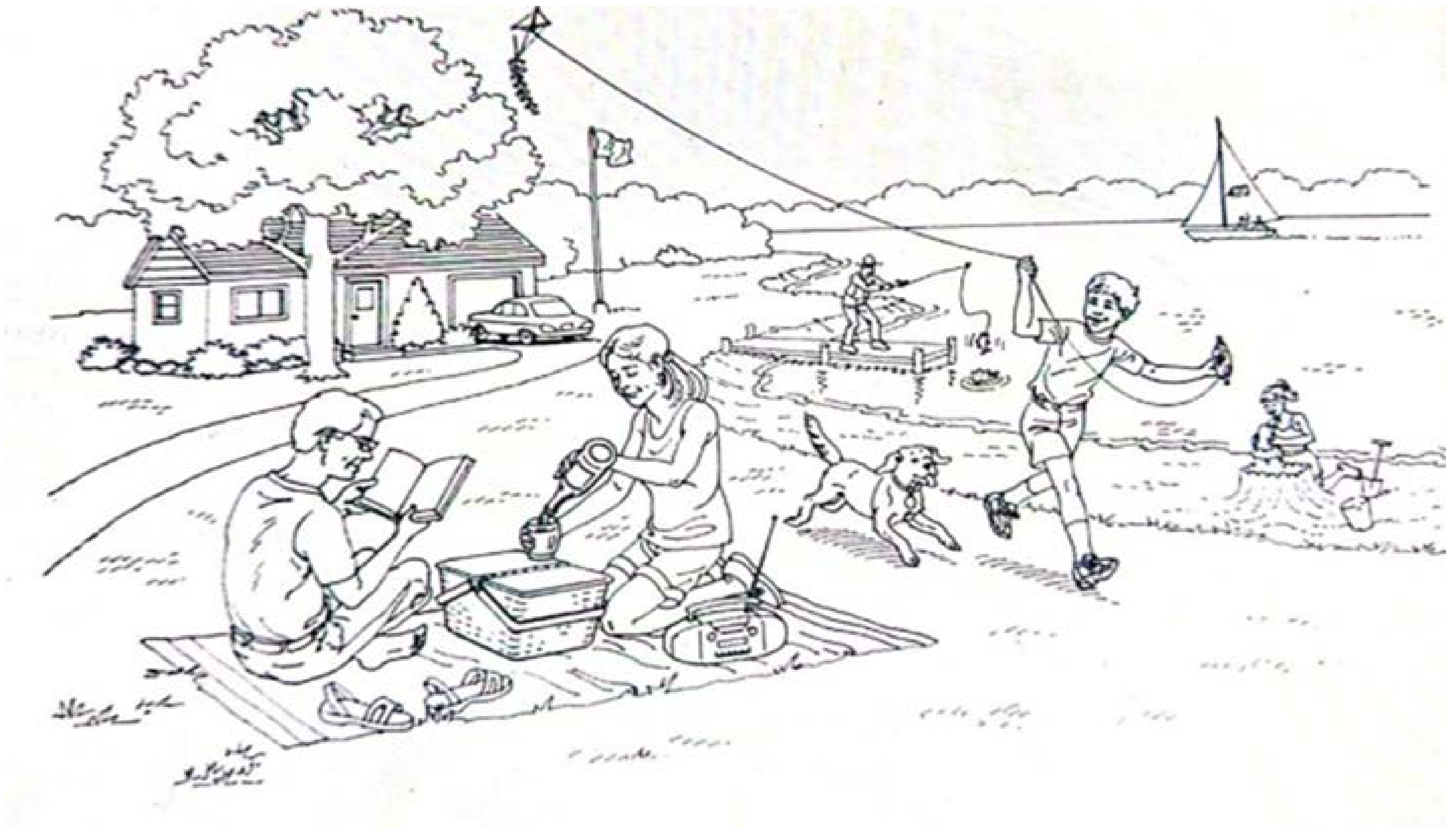
Directions: Say, ನಾನು ಕೆಲವು ಕಾರ್ಯಗಳನ್ನು ಮಾಡಲು ಹೇಳುತ್ತೇನೆ. ನಿಮಗೆ ಸಾಧ್ಯವಾದಷ್ಟು ಉತ್ತಮವಾಗಿ ಮಾಡಲು ಪ್ರಯತ್ನಿಸಿ.

Items	Score
ವಿದಾಯ ಎಂದು ಸೂಚಿಸುವಂತೆ ಕೈ ಆಡಿಸಿ/ ಗುಡ್ ಬಾಯ್ ಮಾಡಿ.	(2)
ನಿಮ್ಮ ಕಣ್ಣುಗಳನ್ನು ಮುಚ್ಚಿ.	(2)
ಬೆಂಕಿಕಡ್ಡಿ ಯನ್ನು ಆರಿಸುವಂತೆ ನಟಿಸಿ	(2)
ಟೂತ್ ಬ್ರಷ್ ಬಳಸುವಂತೆ ನಟಿಸಿ.	(2)
ಬಾಗಿಲನ್ನು ತಟ್ಟಿ ನಂತರ ತೆಗೆಯುವಂತೆ ನಟಿಸಿ.	(2)

Apraxia score: ☐ **(10)**

Aphasia Type	**Scores**		
	Fluency	**Auditory Verbal Comprehension**	**Repetition**
Global	<5	<4	<5
Broca's	<5	>3	<8
Isolation	<5	<4	>4
Transcortical Motor	<5	>3	>7
Wernicke's	>4	<7	<8
Transcortical Sensory	>4	<7	>7
Conduction	>4	>6	<7
Anomic	>4	>6	>6

Picture Cards used during the administration



Picture description stimulus used for the spontaneous speech task

Stimuli used for the Object Naming task

Object Naming 1

Object Naming 2

Object Naming 3

Object Naming 4

Object Naming 5

Object Naming 6

Object Naming 7

Object Naming 8

Object Naming 9

Object Naming 10

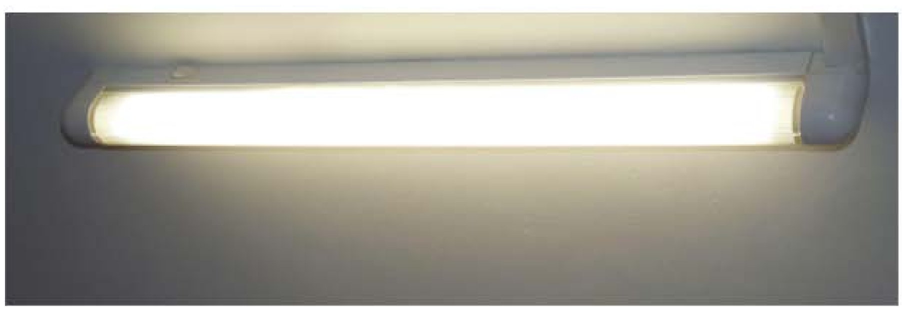
Object Naming 11

Object Naming 12

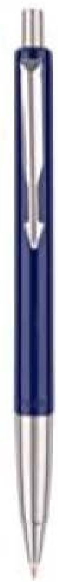
Object Naming 13

Object Naming 14

Object Naming 15



Object Naming 16



Object Naming 17

Object Naming 18

Object Naming 19

Object Naming 20

Reading passage used during the administration

ಬೆಂಗಳೂರು: ನಮ್ಮ ರಾಜ್ಯದ ಒಂದು ದೊಡ್ಡ ಊರು. ಈ ಊರನ್ನು ನಮ್ಮ ರಾಜ್ಯದ "ಬೊಂಬಾಯಿ" ಎನ್ನುವರು, ಇಂಡಿಯಾದ ದೊಡ್ಡ ನಗರಗಳಲ್ಲಿ ಇದೂ ಒಂದು. ಈ ಊರನ್ನು ನೋಡಲು ಜನರು ಬೇರೆ ಬೇರೆ ಊರುಗಳಿಂದ ಬರುವರು. ಇದಲ್ಲದೆ ನಮ್ಮ ರಾಜ್ಯದಲ್ಲಿರುವ ಬೇಲೂರು, ಜೋಗ, ನಂದಿ, ಇವುಗಳನ್ನು ನೋಡಲು ಜನರು ಬರುವರು. ಈ ನಾಡಿನಲ್ಲಿ ರೇಷ್ಮೆಯನ್ನು ಬೆಳೆಯುವರು.

*Taken from Bengaluru passage.

APPENDIX - C

All India Institute of Speech and Hearing, Naimisham Campus, Manasagangothri, Mysore-570006

CONSENT FORM

Dissertation on

"Adaptation and validation of Bedside Western Aphasia Battery-Revised in Kannada for persons with aphasia"

You are invited to participate in the study titled "Adaptation and validation of Bedside Western Aphasia Battery-Revised in Kannada for persons with aphasia". This study is conducted by Ms.Khateeja Naadia, a postgraduate student of the All India Institute of Speech and Hearing, under the guidance of Dr. Hema. N. Assistant Professor, Department of Speech-Language Sciences, All India Institute of Speech and Hearing. The study aims to adapt and validate the Bedside Western Aphasia Battery- Revised and conduct a pilot study to test the utility of the tool. Participants and caregivers will be interviewed to obtain demographic details and necessary medical information prior to confirming eligibility for the study. Once eligible, the Adapted Bedside WAB-R will be administered via tele-mode, and will be recorded for further reference. The identity of the participant will not be revealed at any time, and the information and videos will maintain confidentiality. The data obtained from the recording will not be disclosed, and the access will be limited to individuals who are working on the dissertation. Participation in this study is voluntary. You can refuse to participate or withdraw at any point in the study without penalty or loss of benefits to which you are otherwise entitled. The procedures of the study are non-invasive, and no risks are associated.

Informed Consent

I have read the foregoing information, or it has been read to me in the language I understand. I have had the opportunity to ask questions about it, and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate in this study.

I, ____, consent to be participant of this investigation/study/program.

Name, Email ID,
Age, and Address of the participant

Name of the investigator