ADAPTATION AND VALIDATION OF BEDSIDE SCREENING TEST FOR APHASICS IN TAMIL (BST-T)

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JUNE, 2026

CERTIFICATE

This is to certify that this dissertation entitled **"Adaptation and Validation of Bedside Screening Test for Aphasics in Tamil (BST-T)"** is a bonafide work submitted as part of fulfilment of the degree of Master of Science Speech-Language Pathology of the student with Registration Number P01II24S123020. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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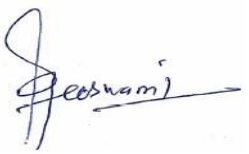
This is to certify that this dissertation entitled "**Adaptation and Validation of Bedside Screening Test for Aphasics in Tamil (BST-T)"** has been prepared under my supervision and guidance. It is also certified that this dissertation has not been submitted earlier to any other university for the award of any Diploma or Degree to any other University.



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DECLARATION

This is to certify that this dissertation entitled "Adaptation and Validation of Bedside Screening Test for Aphasics in Tamil (BST-T)" is the result of my own study under the guidance of Dr. S.P. Goswami, Professor of Speech Pathology and Dean Research and Coordinator CSLD, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other University for the award of any Diploma or Degree.

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"தெய்வத்தான் ஆகாதெனினும் முயற்சிதன்
மெய்வருத்தக் கூலி தரும்."

- திருவள்ளுவர்

என் வாழ்க்கையின் ஒவ்வொரு கட்டத்திலும் என்னை ஒருபோதும் குறைத்து மதிப்பிடாமல், எப்போதும் என்னுடன் உறுதுணையாக நின்ற என் அன்பான குடும்பத்தினருக்கு என் மனமார்ந்த நன்றியைத் தெரிவித்துக் கொள்கிறேன்

என் வாழ்க்கையின் ஒவ்வொரு கட்டத்திலும் என் மேல் சிறிதும் சந்தேகமின்றி முழு தைரியத்தையும் தன்னம்பிக்கையையும் கொடுத்தமைக்கு மிக்க நன்றி அப்பா. அம்மா, என் வாழ்க்கையில் யாராலும் நிரப்ப முடியாத நபர். தினமும் இரவு தூங்கும் முன் என் முகத்தில் சிரிப்பை கொண்டுவர ஒரே காரணம் நீங்கள்தான். மிக்க நன்றி அம்மா. ரித்தி, என்னை எப்போதும் நம்பிக்கையோடும் மகிழ்ச்சியோடும் உணரவைத்து, எப்போதும் நேர்மையான ஆலோசனைகள் தந்ததற்கு மிக்க நன்றி. நீ என்னோட வாழ்க்கையில் ஒரு தங்கையையும் நண்பியையும் தாண்டிய மிகவும் அழகான ஒரு உறவு. என்னை ஆதரித்து, அன்போடு அரவணைத்து, என்றும் உறுதுணையாக இருந்த என் அத்தை மற்றும் மாமாவிற்கு என் மனமார்ந்த நன்றியைத் தெரிவித்துக் கொள்கிறேன்.

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Chapter I

Introduction

Language constitutes a complex, structured system that plays a critical role in human communication. The language is highly accepted as comprising interconnected subsystems, including phonology, morphology, syntax, and semantics. The language is intrinsically connected to culture; it functions not merely as a medium for communication but also as a representation of intercultural identity and patterns of thought (Rabiah, 2012). Cognitively, language processing is supported by specialized neural networks, most prominently Broca's and Wernicke's areas in the left hemisphere (Elffers, 2025).

When there is a compromise in the language skills, it not only affects the speech but also has a negative impact on the ability to participate in social activities, leading to affect the social roles and quality of life (Berg et al.,2020; Furlanis et al.,2018). According to Feigin et al (2025), this compromise can be due to one of the major contributing factors known as stroke, which can clinically represent as an acute cerebrovascular accident, including ischemia (87%) and haemorrhage (13%). Sometimes, it interrupts cerebral perfusion abruptly, which has a global mortality rate of 12 million incident cases annually.

In spite of its intricacy and plasticity, language remains vulnerable to disruption following neurological damage, particularly after a stroke. Stroke poses a major global health challenge as a leading cause of death and disability, leaving many stroke survivors with persistent communication deficits (Wolfe,2000).

One of the recurrent and devastating consequences of stroke is aphasia, which affects the comprehension and production of language. Aphasia occurs in approximately 21%–38% of individuals during the acute phase of stroke, with many continuing to experience residual

deficits beyond the first year (Salter et al., 2006). The signs and symptoms of aphasia are diverse. They may include impairment in speech production, difficulty comprehending spoken language, difficulty reading and writing, and naming or word-retrieval difficulties (Ivanova & Dronkers, 2022). The language difficulties in aphasia are heterogeneous and depend on the place and extent of brain damage. This extends beyond linguistic impairment to affect mental well-being, engagement in social activities, and overall quality of life. As emphasised by Wray and Clarke (2017), communication difficulties can co-occur with an increased risk of depression and increased dependency in daily living activities.

The above-mentioned findings highlight that aphasia is not only a linguistic disorder but also a psychosocial consequence for the individuals. According to Sheppard and Sebastian (2020), the essential factors for overcoming the effects of aphasia are early identification followed by comprehensive assessment

Considering aphasia and its impact, timely identification through screening is critical. Aphasia screening tools are designed to provide a rapid, efficient method for detecting the presence of language deficits, particularly in clinical settings such as acute stroke units. These tools facilitate early referral for comprehensive assessment and intervention, which are essential for maximising rehabilitation outcomes (Salter et al., 2006). Timely detection of language impairments facilitates appropriate referral to speech and language therapy services and supports the initiation of targeted interventions. Screening tools provide a practical and efficient means of identifying individuals with potential communication deficits, particularly in hospital settings where time and resources may be limited. If there is a disruption in the system followed by a stroke, it leads to significant linguistic, social, and psychological challenges. The high prevalence and far-reaching impact of aphasia underscore the importance of early identification, accurate assessment, and comprehensive rehabilitation. Though the

screening test tools are very useful, they do not replace the comprehensive assessment but have a foremost role in preliminary identification and rehabilitation accessibility (Salter et al.,2006)

Therefore, this study aims to adapt and validate the Bedside Screening Test for Aphasics in Tamil, contributing to improved understanding and management of post-stroke aphasia.

Need for the study

The southern part of India is well known for its high linguistic diversity, and many languages are spoken in different regions. In Tamil Nadu, the common language used for interpersonal communication is Tamil. While the region is rich in linguistic resources, Tamil standardised clinical assessment tools are scarce, specifically in the field of aphasia. While a few have been created or translated from other languages, their numbers are inadequate to address the increasing clinical needs.

Screening tests for aphasia cases are necessary and will play a key role in early and quick detection of language deficits. Early detection makes it possible to have timely clinical interventions and significantly impacts prognosis and spontaneous recovery. The lack of screening tests in Tamil significantly undermines the efficiency of early diagnosis and follow-up treatment. Cross-translation of available tools is not optimal because cultural, semantic, and linguistic differences can influence the validity of the tests (Beaton et al., 2000; Horton, 2011). For example, the pictures, common words, and sentence types must be culturally relevant and easily recognisable for native Tamil speakers. Therefore, there is a need to translate and validate a bedside aphasia screening tool specifically for Tamil to ensure reliable assessment. To address these issues, there is an urgent need to construct screening tools that are culturally and linguistically suitable for Tamil speakers.

Among the various tools available for aphasia screening, the Bedside Screening Test (BST) is notable for its comprehensive coverage of all necessary language domains to identify the presence of aphasia in stroke patients. Additionally, it is designed to be time-efficient and requires minimal materials, which enhances its practicality and effectiveness for bedside use. However, this tool is not exclusively present in all Indian languages (e.g. Tamil), which reduces direct application among non-English speakers, including Tamil speakers.

The current study attempts to translate and cross-culturally adapt the Kannada Bedside Screening Test for Aphasics into Tamil to address these issues. This adaptation is expected to enhance the validity and practicality of clinical assessments for patients and professionals in the Tamil-speaking population.

Aim of the study

The current study aims to adapt, translate, and validate the Bedside Screening Test for Aphasics into Tamil

Objectives of the study

1. To translate and adapt the Bedside Screening Test for Aphasics in Kannada into Bedside Screening Test for Aphasics in Tamil

2. To validate the Bedside Screening Test for Aphasics in Tamil on the Tamil-speaking population with and without aphasia.

Chapter II

Review Of Literature

The language functions as a code for representing ideas, objects, events, and relationships through arbitrary symbols and their socially governed combinations, enabling individuals to interpret and formulate communication meaningfully across an unbounded range of contexts (Bernstein & Farber, as cited in Owens, 2009). Lyons (1995) emphasizes the structural nature of language, treating it as an abstract system rather than a concrete entity. Chaer (1995) highlights that language is fundamentally arbitrary as a system of sound symbols, a feature that renders it productive, adaptable, and diverse, while also reflecting core aspects of human nature.

2.1 Tamil: A Dravidian Language Affiliation

Tamil, the most widely spoken Dravidian language, belongs to the South Dravidian subgroup and is recognized as a classical language by the Government of India. It possesses over 2,000 years of the oldest and strongest literary evidence, characterized by distinctive phonological features, morphological forms, and syntactic structures, and is spoken by more than 80 million people worldwide (Hart,2000; Lehmann, 1989). Within India, Tamil is spoken primarily in Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, and the Union Territory of Pondicherry. Internationally, the language is used in Sri Lanka (3,346,000 speakers), Malaysia (274,218 speakers), South Africa (250,000 speakers), Singapore (191,200 speakers), Fiji (6,663 speakers), as well as in Thailand and Mauritius (Steever,1998). Despite its wide dispersal, screening test materials available in Tamil remain notably limited.

2.2 Aphasia and Its Classification

Aphasia, originally defined in 1864 as a loss of language ability, is now understood more broadly as a disturbance of overall cognitive functioning (Hillis,2007). When Paul Broca, a French neurologist, first described aphasia in the mid-19th century, he focused on patients' difficulty producing or understanding speech (Lazar & Mohr, 2011). Aphasia is an acquired communication disorder resulting from brain damage, characterized by modality-specific language impairments affecting speaking, listening, reading, and writing. These impairments occur independently of deficits in intellectual abilities, sensory or motor skills, cognition, or any underlying psychiatric illness (Brookshire,1992; Darley,1982; Goodglass,1993). Over the past 150 years, researchers have shown that the brain areas that handle language also support other mental functions. As a result, clinicians now view aphasia as just one part of a broader set of cognitive deficits that often accompany brain injuries such as stroke or traumatic brain injury.

The Broca Wernicke model first emerged in the 19th century, highlighting that Broca's frontal region governs speech production while Wernicke's temporal area supports comprehension. Early neurologists conceptualized "language" as merely a list of words, overlooking the hierarchical system that includes syntax. This narrow perspective stemmed from the dominant historical-comparative paradigm, which emphasized etymology and word forms and largely ignored sentence-level processes. Three critical prerequisites made language localization possible: (a) the belief that language resides in cortical tissue, (b) the view of aphasia as primarily a linguistic disorder, and (c) the rise of large, research-oriented hospitals that supplied enough patients. With these conditions in place, researchers could link specific lesion sites to distinct aphasic profiles, reinforcing a word-level perspective on language (Elffers, 2025). There are numerous classifications of aphasia that have been proposed by

different authors. The most widely recognised dichotomies include fluent and non- fluent aphasia reported by Benson (1967) and anterior-posterior classification by Goodglass and Kaplan (1972). Both classifications have a similarity in the lesion localization. In detail on the classification, there is a modified classification, which classifies the aphasia into 8 types based on the characteristics and site of insult (Boston,1979; Murdoch,1990), as shown in Table 1.

Table 1

Boston Aphasia Classification

Aphasia Type	Localization
Broca's aphasia	Lesion in the area responsible for speech production
Wernicke's aphasia	Lesion in the auditory-verbal recognition area
Conduction aphasia	Lesion is appreciable in the area connecting the area responsible for speech production and the auditory-verbal recognition region
Global aphasia	An extended lesion in both areas of speech production and auditory-visual recognition.
Transcortical motor aphasia	Pathways that connect the concept area to the speech production area will be disrupted
Transcortical sensory aphasia	Pathways that connect the auditory-verbal recognition area to the concept area will be affected
Isolation aphasia	Disconnection of the concept area from the auditory-verbal area and the speech production area
Anomic aphasia	Pathways that connect the concept area to the speech production area will be disconnected, or sometimes the concept area will also be disturbed

Note. Adapted from *Boston Diagnostic Aphasia Examination* (2nd ed.), by Goodglass, H., and Kaplan, E. (1983).

2.3 Aphasia and Its Impact on Communication and Quality of Life

Perrotta (2020) emphasises that aphasia impairs speech comprehension and production, naming, reading, and writing, and it often co-occurs with broader cognitive deficits affecting attention, memory, and reasoning, thereby diminishing overall communication effectiveness. This enfolds strain on interpersonal relationships, social isolation, intensifies anxiety, depression, post-traumatic stress, panic attacks, and even increased suicidal risk. These components collectively reduce once participation in family well-being and quality of life. The reduction in quality of life in aphasia is mainly due to the dependency on language, mobility, emotional distress, socioeconomic factors, and activities of daily living. The sole factor that correlates with post-stroke aphasia is depression and a reduction in occupational functioning, with family involvement playing a significant role in chronic aphasia patients. The author emphasized that, irrespective of independent mobility and other activities, the engagement in communication other than family was observed to be highly limited (Lee et al., 2015). To a significant extent, meaningful performance after stroke is constrained by communication impairments, which foster social discouragement and isolation in post-stroke aphasia. This subsequently causes a less satisfactory life and more aversive interpersonal responses from others, and makes it more difficult to sustain the friendship (Northcott & Hilari,2011). The individuals who developed aphasia post-stroke are 7.408 times more likely to have depression than those who developed aphasia without stroke. This reveals a significant correlation between the severity of aphasia and post-stroke depression. However, the authors argue that the cause of aphasia is not dependent on the age of the individuals but the severity of the stroke (Zanella et al.,2022).

Based on the evidence presented, it is evident that the post-stroke phase exerts a vigorous impact on an individual's quality of life. One effective approach to mitigate these

challenges is the timely management of communication difficulties through early identification.

2.4 Incidence and Prevalence of Aphasia in the Global Context

Globally, the prevalence of aphasia has significantly increased due to multiple factors, with stroke being a primary contributor. Berthier (2005) reported that aphasia symptoms occur in 21% to 38% of acute stroke survivors. A comprehensive review spanning 2000 to 2021 across 43 countries by Frederick et al. (2022) found that the prevalence of post-stroke aphasia ranged from 9% to 66% in high-income countries and from 7% to 77% in low and upper-middle-income countries among individuals diagnosed with stroke.

2.5 Incidence and Prevalence of Aphasia in the Indian Context

Over the past two decades, the incidence of stroke in India has ranged from 44.29 to 559 per 100,000 population across different regions. Furthermore, in India, the cumulative annual incidence of stroke has ranged from 105 to 152 per 100,000 population per annum during the same period (Kamalakannan et al., 2017). According to Frederick et al. (2022), India was classified as a lower-middle-income country, with the post-stroke aphasia rates ranging from 18% to 28%. Kasper et al. (2015) estimated that the presence of stroke in rural areas was reported to be 84 to 262/100,000 and 334 to 424/100,000 in urban areas in the year 2012. He also states that there was a higher prevalence of haemorrhagic stroke in Asian countries than in other countries in the world as a consequence of ineffectively managed hypertension, which may serve as one of the causes for an increase in stroke rate from 17.7 % to 32 % in India.

In Tamil Nadu, 72.60% of patients experienced ischemic stroke, while 27.39 % suffered from haemorrhagic stroke; notably, 88.27% of patients had stroke affecting the anterior circulation. The authors found that the older adults, particularly those above 60 years of age,

are more susceptible to stroke. Haemorrhagic stroke is less prevalent than ischemic stroke, with hypertension identified as the primary risk factor (Kannan et al.,2021). Nevertheless, research has consistently demonstrated that these rates exhibit substantial heterogeneity, driven in part by increased prevalence associated with depression, hyperactivity, and poor lifestyle factors.

2.6 Assessment

Given the incidence and prevalence of aphasia in the Western and Indian context, there is a need for a comprehensive assessment of the communication abilities in persons with aphasia. Assessment is defined as a systematic process of gathering qualitative and quantitative data to evaluate an individual's communication abilities, limitations in activity and participation, and to strategize appropriate treatments. An effective assessment should include procedures for establishing diagnosis, comprehensively understanding and describing all language components, collecting background information regarding individual characteristics and family history, and obtaining input from families to guide rehabilitation (Papathanasiou et al., 2013). According to Murray and Clark (2006), the selection of an appropriate assessment instrument depends on the clinical setting: in a hospital setting, a screening test is most suitable, whereas in rehabilitation settings, a detailed diagnostic assessment tool is more appropriate. The commonly used diagnostic test tool includes Western Aphasia Battery (WAB; Kertesz, 1979, 1982), Western Aphasia Battery–Revised (WAB–R; Kertesz, 2006), which has been translated into Indian languages including Hindi, Marathi, and Kannada developed as a dissertation work of All India Institute of Speech and Hearing (Baral,2022; Dudwadkar,2022; Khateeja,2022). Multilingual Aphasia Examination (MAE; Benton et al., 1994), Boston Diagnostic Aphasia Examination (BDAE 3rd ed.; Goodglass & Kaplan, 2000), Aphasia Diagnostic Profile (ADP; Helm-Estabrooks, 1992), Porch Index of Communicative Ability (PICA; Porch, 1990), Discourse Comprehension Test (DCT; Brookshire & Nicholas, 1997),

The Token Test (De Renzi & Vignolo, 1962), The Revised Token Test (RTT; McNeil & Prescott, 1978) has also been adapted into several Indian languages through as a part of dissertation work at All India Institute of Speech and Hearing, including Oriya, Malayalam, and Kannada (Bijoya, 2010; Lincy Mary, 2010; Veena, 1982).

2.7 Importance of Screening Tool

Bedside screening tools serve as valuable indicators for assessing the patient's cognitive status, including responsiveness and the ability to communicate. However, these tools do not provide a comprehensive profile of an individual's communication skills, activities of daily living, or cognition. Compared to detailed comprehensive examinations, bedside examinations have evolved into a primary assessment method and remain a standard tool, particularly for neurologists, speech-language pathologists, and other allied health professionals working in primary care settings or with non-ambulatory patients.

Hence, a quick language testing tool to identify the presence or absence of aphasia is required to evaluate persons with aphasia and other neurological deficits. EI Hachioui et al. (2017) reported that in many hospitals, the availability of Speech-Language Pathologists is constrained, especially for comprehensive evaluation immediately after stroke. To overcome such situation, a quick and simple screening test is required to check the presence or absence of aphasia, which can also be administered by different professionals. Screening is vital for appropriate referral regarding language intervention and counselling.

Numerous bedside screening tools have been developed in different languages, cover different domains, and are empirically standardised. These tools are playing an essential role in enabling early detection and management.

2.8 Screening Test Tools in Western Context

A considerable number of screening test tools are available in the Western context to screen for aphasia. The most popular screening tool is the Frenchay Aphasia Screening Test (FAST) (Enderby et al., 1987; Enderby & Crow, 1995), developed and validated in English with high reliability when used by non-SLPs. This test consists of four main domains that contribute to aphasia, including comprehension, expression, reading, and writing, with comprehensible instructions; altogether, the test requires an estimated duration of 3-10 minutes to administer. The FAST has been adapted and translated into various Indian languages.

The Halstead-Wepman Aphasia Screening Test by Halstead and Wepman (1949) was developed as an aphasia screening test for adults aged 15 to 40 years and older. This test has been officially approved by the United States Army and primarily validated on civilian neurosurgical patients and military personnel to provide a rapid diagnostic profile of language disturbances in English-speaking individuals. The categories included were Agnosia, Apraxia, Anomia, Dysarthria, and Paraphasia, and the responses analysed included naming, reading aloud, repeating, explaining, writing, copying, spelling, computing, pointing, drawing, and placing, typically taking a short time to complete. It assesses global, expressive, and receptive aphasia. The screening test is used for tentative diagnosis, decision for therapeutic purposes, and progress monitoring.

Williams and Shane (1986) composed the Reitan-Indiana Aphasia Screening Test in English for the rapid assessment of those hospitalised for brain tumours, stroke, and traumatic brain injury. The linguistic categories include; naming, repetition, construction, ideomotor apraxia, arithmetic, spelling, writing, and reading, with scores on a 5-point rating scale. This test includes two factors: general language ability and sensorimotor coordination.

The Sheffield screening test (SST) was designed by Snyder et al. (1993), which is a quick and simple test in English, that will be used to assess for acquired language disorders, to assess the receptive skills using single word comprehension by pointing to the objects, sequential commands, complex commands, comprehension of odd ones, narrative comprehension and asking questions. Expressive skills are assessed through word-finding abilities, abstract word-finding, sequencing, definitions, and verbal reasoning. The cognitive skills will be assessed using short orientation, memory, and concentration tests (SOMC), and scoring will be carried out according to the manual.

The Bedside Evaluation Screening Test – Second Edition (BEST-2) by West et al. (1998) is a screening tool developed in English that concisely summarises the original BEST (West et al.,1983), that can be completed within 30 minutes. The test utilises seven main categories that comprise conversational expression, which focuses on initiating and maintaining dialogue; object naming involves lexical retrieval; object description incorporates semantic content and fluency; sentence repetition comprises auditory-motor integration; and object identification encompasses visual-semantic mapping. Identifying components in a picture prioritises analytic visual processing, and reading involves visual-phonological conversion. Responses are collected in a question-and-answer format, and respondents provide verbal or gestural responses, depending on the particular subtest under consideration.

The Ullevaal Aphasia Screening (UAS) test was developed by Thommessen et al. (1999). This test can be administered primarily by nurses in Norwegian. The nurses administered the screening test, and the assessment was carried out by the Speech Language Pathologist to concurrently validate the UAS test tool. This test includes seven language areas: comprehension, expression, repetition, reading, writing, reproduction of a string of words, and

free communication. The screening takes 5-15 minutes and provides a severity rating for the language disorder.

The language screening test (LAST) by Flamand-Roze et al. (2011) to assess the presence of aphasia in acute-stage stroke patients was modified to assess individuals aged 18 years or older with neurological insults. Though it is mainly associated with speech-language pathology, the test may also be used by neurologists, nurses, or other medical professionals. The LAST includes two subtests: the Expression Index and the Receptive Index. In Expressive index subtests, the patient is asked to name several everyday objects, repeat a multisyllabic word and a syntactically complex sentence, and perform automatic speech, such as counting from one to ten. In the Reception Index subtest, the patient identifies words from a series of pictures and carries out increasingly complex commands. The task does not require reading or writing. Therefore, it is not affected by a person's literacy level or by visual-spatial impairments. The test, originally developed and validated in French, has since been translated and validated into English (Flowers et al., 2015), German (Köder et al.,2016), and Chinese (Xie et al., 2018) due to its success in the field.

The Mississippi Aphasia Screening Test (MAST), developed by Nakase-Thompson et al. (2005), is a short test made for bedside screening for individuals who are suspected of having post-stroke language impairments. This test targets adults aged 18 to 85, with an administrative duration of 5-10 minutes and only requiring standardised picture cards, a pencil, and paper. The test has two domains: the receptive domain, consisting of oral comprehension, reading, written comprehension, and auditory discrimination, and the expressive domain, consisting of naming, oral reading, writing, repetition, and spontaneous speech. It is suitable for other professionals, such as nurses, physicians, and allied health professionals, to administer. The MAST was initially developed in the English language and subsequently translated and validated in

multiple languages, including Czech, Spanish (MASTsp), Persian (MASTp), and Estonian versions (Khatoonabadi et al., 2015; Kostálová et al., 2008; Nakase-Thompson et al., 2005; Nursi et al., 2019; Romero et al., 2012).

The Bedside Assessment of Language (BAL) was designed by Sabe et al. (2008) in English for bedside screening and comprises five domains of linguistic skills: spontaneous language, comprehension, repetition, reading, and writing. This test takes 5-10 minutes and requires no special materials.

The Quick Aphasia Battery (QAB) was constructed by Wilson et al. (2018) for the adult population who are in acute and post-acute stroke aphasia. The duration of the test is considered to be 15 minutes, with eight domains, which are the level of consciousness, connected speech, word comprehension, sentence comprehension, picture naming, repetition, reading aloud, and motor speech. The QAB test has been primarily developed in English and adapted into several languages, including Mandarin Chinese, Persian, and Greek (Wilson et al., 2018; Zhang et al., 2020; Rostami et al., 2021; Efstratiadou et al., 2022).

The Aphasia Rapid Test (ART) was developed by Azuar et al. (2013) as a bedside screening assessment, a 26-point scale that takes less than 3 minutes to administer. This can be used by any healthcare professional after the training. The test tool is based on the structure of the NIH Stroke Scale (NIHSS) (Ortiz & Sacco,2014). This includes tasks such as comprehension (simple and complex commands), word and sentence repetition, object naming, the semantic fluency task (naming animals in 1 minute), and dysarthria, with no strict time limits imposed on patient responses except for the fluency component. The ART has been translated and adapted into several languages, including French, Italian, Persian, Portuguese, and Turkish (ART-TR) (Azuar et al., 2013; Ghorbani et al., 2020; Ribeiro et al., 2018; Yıldız et al., 2021; Kavakci et al.,2022).

Salehi et al. (2016) developed the Azeri Turkish Aphasia Screening Tool specifically for the Iranian population, comprising eight domains: picture description, syntax, verbal reasoning, descriptive naming, minimal pair perception, receptive vocabulary, expressive vocabulary, and semantic verbal fluency.

The Serbian Aphasia Screening Test (SAST) is a screening test given by Vuković et al. (2024) developed explicitly for the Serbian population, which includes ten domains with an initial conversation probe includes automatised sequences, auditory comprehension, visual confrontation naming, responsive naming, word repetition, sentence repetition, oral word reading, oral sentence reading, reading comprehension, and writing. The SAST can be successfully administered to patients with visuospatial deficits and illiterates.

Araki et al. (2021) designed the Screening Test for Aphasia and Dysarthria (STAD), a short, multicenter-validated tool for rapid assessment of multiple communication domains, including language, articulation, and cognitive function, in approximately 10 minutes. STAD is available in Japanese.

The Brief Executive Language Screen (BELS) was created by Robinson et al. (2021) in English and is a 15–20-minute scale to assess cognitive components in frontal aphasia, with a distinct focus on executive functioning in TBI, stroke, and neurodegenerative conditions at the bedside. The BELS is designed to assess propositional language, nominal language functions, and executive functions, which assess language generation, and is composed of Spontaneous Speech, Oral Apraxia, and Sentence Repetition. oral naming, word repetition, comprehension, action naming, word fluency, verbal generation, the Motor Go-No Go task, and Memory, and the test included with this oral apraxia screening.

The Cyprus Aphasia Screening Test (CAST) is another screening test developed by Charalambous et al. (2025) for native Greek speakers. This material has 10 linguistic subscales,

which collectively assess severity, verbal fluency, sentence completion, automatic speech, yes/no questions, command following, word and sentence repetition, and object and picture naming. CCAST is a rapid test that requires 10 minutes to complete.

2.9 Screening Test Tools in the Indian Context

There are a few screening tools available for the Indian context when compared to western context because of India's wide range of multilingual backgrounds. It is difficult to use the Western context test tools in the Indian context due to its linguistic variabilities. The provided table summarizes the screening test tools adapted and translated into Indian languages.

Table 2

Review of Aphasia Screening Tools Available in the Indian Context

Test Tool	Author(s)	Year	Language	Domains Assessed
Bedside Screening Test for Aphasia – Kannada	Ramya and Goswami	2011	Kannada	a. Auditory Verbal Comprehension b. Spontaneous Speech c. Naming d. Repetition e. Reading f. Writing
Bedside Screening Test for Aphasia – Malayalam	Kanthima and Goswami	2012	Malayalam	a. Auditory Verbal Comprehension b. Spontaneous Speech c. Naming d. Repetition e. Reading f. Writing

Bedside Screening Test for Aphasia – Odia	Monalisa and Goswami	2013	Odia	a. Auditory Verbal Comprehension b. Spontaneous Speech c. Naming d. Repetition e. Reading f. Writing
Bedside Screening Test for Aphasia – Telugu	Santosh and Goswami	2020	Telugu	a. Auditory Verbal Comprehension b. Spontaneous Speech c. Naming d. Repetition e. Reading f. Writing
Indian Version of the Frenchay Aphasia Screening Test (FAST)	Alladi et al.	2022	Telugu and Kannada	a. Comprehension b. Expression c. Reading d. Writing
Bedside Aphasia Battery – Tamil (BAB-T)	Sivagnanapandian et al.	2025	Tamil	a. Spontaneous speech b. Auditory verbal comprehension c. Repetition d. Naming e. Reading f. Writing
Language Screening Test – Tamil (LAST-Tamil)	Manivannan et al.	2025	Tamil	a. Naming b. Automatic speech c. Repetition d. Picture recognition e. Verbal instruction tasks

The above-mentioned tools are aphasia screening measures specifically designed for administration during the immediate post-acute stage of recovery to individuals at risk for

aphasia; these are specifically designed for administration in the immediate post-acute period of recovery to identify individuals at risk for aphasia. This facilitates the earlier diagnosis and communication management. These are easy to use, time-efficient, and convenient for speech-language pathologists and neurologists. Most of these tools were initially developed in English and then translated into European languages.

The Indian Version of the Frenchay Aphasia Screening Test (FAST), developed by Alladi et al. (2022), which includes four different parts: the comprehension part, administered by giving pointing tasks to varied scenes and shapes, the expression part, assess the verbal fluency by asking the patient to describe a picture. The reading section consists of five different instructions with increasing difficulty, and finally, the writing part is examined by asking the patients to write about the given picture. This test has a maximum score of 30, with the cut-off 27 for patients up to 60 years and a cut-off of 25 for those above 61 years. Both Telugu and Kannada versions of FAST (Alladi et al.,2022) reported to have high internal consistency.

The Bedside Aphasia Battery in Tamil (BAB-T; Sivagnanapandian et al.,2025) was developed for assessing language abilities with six domains and sixteen subdomains with increasing complexity of the test items composed of spontaneous speech, which includes content, fluency, automatic speech, describing objects, verbal reasoning, and sequencing. Auditory verbal comprehension consists of yes/no questions, pointing tasks, auditory word recognition, and sequential commands. Repetition includes word-level, phrase-level, and sentence-level. Naming includes confrontational naming, responsive naming, and lexical generative naming; Reading and Writing. Each subdomain has 10 as the maximum score. This test has high inter-rater reliability with positive correlation of test-retest reliability.

The LAST-T (Manivannan et al.,2025) has five subtests: naming, automatic speech, repetition, picture recognition, and verbal instruction. Picture stimuli are used for the naming

task and for assessing automatic speech through counting from 1 to 10. Repetition ability is evaluated using four different repetition tasks. The picture recognition is assessed using distracted pictures. The verbal instruction subtest involves the execution of five verbal instructions ranging from simple to complex. The test demonstrated a statistically significant difference in the performance between the neurotypical group and the persons with aphasia group, with statistically significant values.

2.10 BST and its availability in other languages

The Bedside Screening Test for Aphasics (BST) in Tamil is an adapted and translated version of the Bedside Screening Test-Second edition (West, Sands & Swain, 1998). The Indianized adaptations of the BST have been developed in multiple regional languages, including Kannada (Ramya & Goswami, 2011), Malayalam (Kanthima & Goswami, 2011), Odia (Monalisa & Goswami, 2012), and Telugu (Santhosh & Goswami,2013). The BST assesses six main domains: spontaneous speech, auditory verbal comprehension, repetition, naming, reading, and writing. In these adaptations, the instrument was administered to two different groups: group 1 consisted of neurotypical adults, and group 2 consisted of persons with aphasia. Each study concluded that the BST effectively distinguishes the presence or absence of aphasia among age-matched neurotypical adults (Ramya & Goswami, 2011; Kanthima & Goswami, 2011; Monalisa & Goswami,2012; Santhosh & Goswami, 2013). Notably, analyses of the reading and writing subsets revealed no significant score differences between literate and illiterate participants across studies, indicating that the BST can be applied to both literate and illiterate populations without compromising overall screening outcomes.

Among available screening instruments, the BST is noteworthy for including all the relevant domains and sub-domains necessary to screen patients at risk of aphasia and to guide appropriate assessment and timely referral. Lezak (1983) argued that profiling speech and

language functions by evaluating spontaneous speech, repetition, comprehension, naming, reading, and writing, facilitates the identification of communication deficits in persons with aphasia. This perspective underpins the importance of BST in different languages with all necessary language domains and a stimulus to perform the screening with fewer items to carry, making it highly suitable for bedside screening in the neurology and stroke units. In Tamil, existing screening tools that cover all requisite domains are limited; relative to other available screening test tools in Tamil, BST has all the essential domains (including reading and writing), with clear colour-contrasted pictures, and minimal material requirements. Given its focused design for screening rather than a comprehensive diagnostic battery, it minimizes the administration time while retaining coverage of the core language domains essential for identifying aphasia. Although some tools serve dual roles (screening and diagnosis), their longer administration times limit their practicality for rapid bedside assessment. Consequently, a purpose-built, time-efficient instrument like the Bedside Screening Test (BST) is particularly well suited to the clinical constraints of neurology and stroke settings, emphasising the need for a validated Tamil version to enable timely identification, triage, and referral of persons with aphasia.

The review of literature established a critical gap in validated, culturally appropriate aphasia screening tools for Tamil-speaking populations. Although Tamil is one of the world's oldest languages, with over 80 million speakers worldwide (Hart,2000; Lehmann,1989), and post-stroke aphasia affecting 18% to 28% of stroke survivors in India (Frederick et al.,2022). The availability of validated aphasia screening tools in Tamil remains severely limited. Currently, only two screening tools have been developed and standardized as standard aphasia screening tools in Tamil recently: the Bedside Aphasia Battery in Tamil (BAB-T; Sivagnanapadian et al.,2022) and the Language Screening Test in Tamil (LAST-T; Manivannan

et al.,2024). Since BST covers all the necessary domains and subdomains, the present study focuses on translating and adapting BST for clinical use in Tamil-speaking populations.

The methodology was explicitly designed to address the critical gap in the evaluation of Tamil-speaking individuals with post-stroke aphasia, providing clinicians with a psychometrically valid screening instrument that encompasses all core language domains while remaining feasible for bedside administration in acute care settings.

Chapter III

Method

The present study aimed to adapt and validate the Bedside Screening Test for Aphasics in Kannada (BST-K; Ramya & Goswami,2011) into Tamil (BST-T). The methodology comprised a structured framework that began with a review of the test material and progressed through translation and cultural adaptation, expert review, and empirical validation of BST-T.

3.1 Study design

This study employed a descriptive, cross-sectional, standard-group-comparison design to adapt, translate, and validate the BST-K into BST-T. The design enabled the evaluation of group differences between neurotypical adults and persons with aphasia and the assessment of the diagnostic effectiveness, reliability, and validity of the BST-T.

3.2 Ethical Considerations

The study strictly adhered to the Institutional Review Board (IRB) for Bio-behavioural guidelines for research involving human participants (Venkatesan & Basavaraj, 2009). Ethical approval for this study was obtained from the Institutional Review Board (IRB) with approval number (Approval No. SH/IRB/M.5/SLP.19/2025-26). Written informed consent was obtained from all neurotypical adults and from the caregivers of persons with aphasia before their participation.

The consent forms, which were used in both Tamil and English, are included in Appendices I and II, which clearly describe the purpose of the study, the testing procedures, the voluntary nature of participation, and the right to withdraw from the study at any time. The information in the consent forms was also conveyed verbally to ensure participants

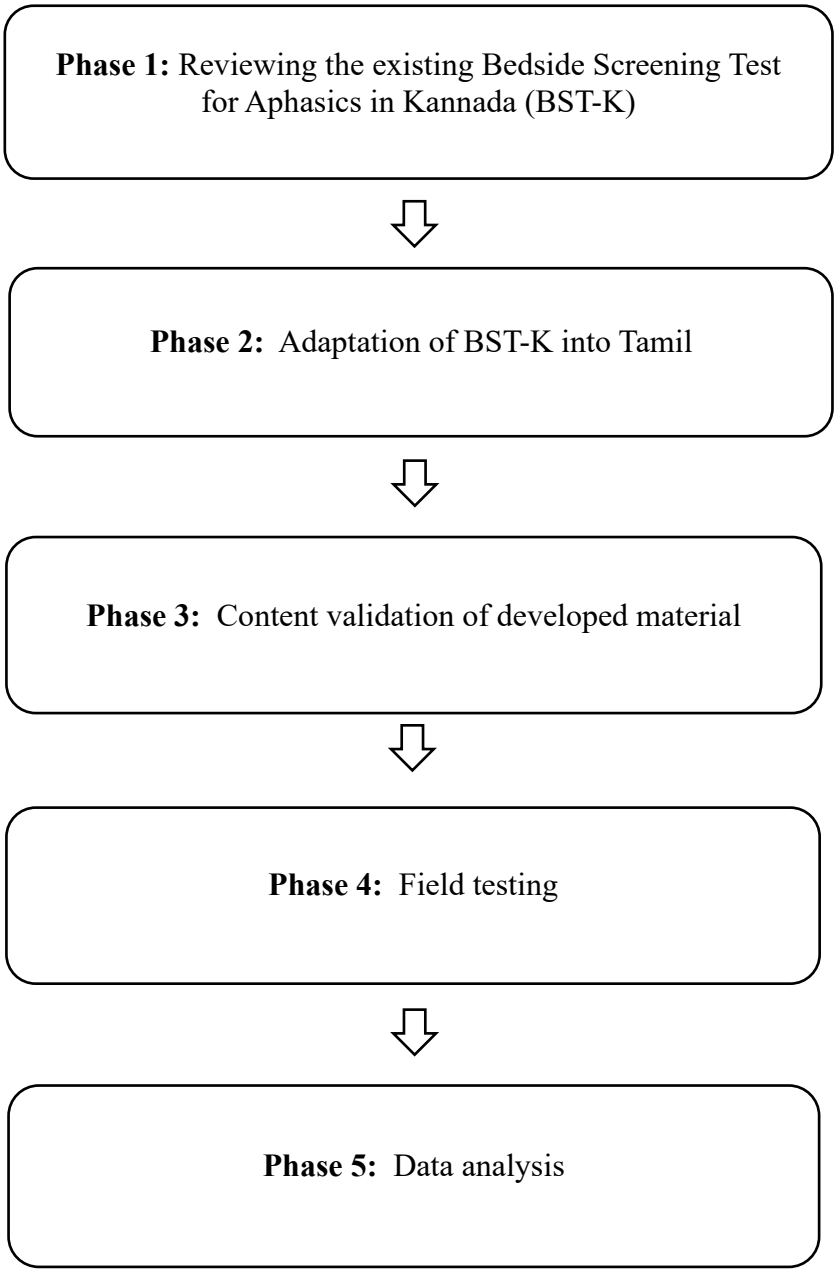
comprehension. Consent was documented by the participant as well as the caregiver via signature or thumbprint.

3.3 Procedure:

The study was conducted in five phases, as illustrated in Figure 1.

Figure 1

The Process of Translation and Adaptation of BST-K (Ramya & Goswami,2011) into Tamil



3.3.1 Phase 1: Reviewing the existing Bedside Screening Test for Aphasics in Kannada (BST-K)

The BST-K is a screening tool designed to identify the presence of aphasia in post-stroke individuals who speak Kannada. The original version was developed as a dissertation at the All India Institute of Speech and Hearing (Ramya & Goswami,2011). In Phase 1, the BST-K development process, the intended target population, and the administration and scoring guidelines were reviewed. The psycholinguistic properties of the stimuli were evaluated with respect to word frequency, phonetic complexity, and graphical representation. The frequency and familiarity of words were prioritised to maintain the cognitive load across domains in BST-T adaptation. Various psychometric properties of the BST-K were examined in this phase by reviewing the reliability, validity, and responsiveness, ensuring the consistency, accuracy, and clinically appropriate scores across domains in neurotypicals and persons with aphasia.

3.3.1.a Description of the BST-K (Ramya & Goswami, 2011)

The BST-K is structured into six domains: Domain 1, Spontaneous Speech, consists of two subtests; Domain 2 is Auditory Verbal Comprehension, includes five subtests; Domain 3 is Repetition, consists of four subtests; Domain 4, Naming, composed of three subtests; while Domain 5 and 6, which are Reading and Writing, do not include further subsections. The domains and subtests are shown in Table 3.

Table 3

Description of the Domains and the Subtests of the BST-K

SI. No.	Language Domain	Subtest
1.	Spontaneous speech	a. Fluency b. Content
2.	Auditory verbal comprehension	a. Yes/No question b. Pointing Task c. Auditory word recognition d. Verification Task e. Sequential commands
3.	Repetition	a. Automatic speech b. Word level c. Phrase Level d. Sentence level
4.	Naming	a. Confrontational naming b. Responsive naming c. Lexical generative naming
5.	Reading	No subtest
6.	Writing	No subtest

3.3.2 Phase 2: Adaptation of BST-K into BST-T

In Phase 2, the BST-K was culturally adapted and linguistically translated into Tamil. The initial translation was carried out by two bilingual speech language pathologists who were native speakers of Tamil and proficient both Tamil and Kannada languages. The translated version was subsequently reviewed and adapted in collaboration with speech-language pathologists with three years of clinical experience and a linguist with seven years of experience in Tamil literature.

The verification process ensured semantic, conceptual, and cultural equivalence between the BST-K and BST-T, while also accounting for the phonological and morphosyntactic characteristics of Tamil. During the adaptation process, five stimuli were modified to improve linguistic appropriateness, cultural acceptability, and stylistic integrity in

Tamil. The modifications included acceptable lexical variations, refinement of stimuli, and revisions to the scoring criteria, as presented in Table 4.

Table 4

Summary of modified stimuli and scoring in BST-T

Domain	BST-K item (Original item)	BST-T item (Modified item)	Rationale
Naming; Confrontational naming	ದೂರವಾಣಿ / d̪uːɾʋaːɳi /	தொலைபேசி /டெலிபோன் /t̪olaippeːsi/ /ʈelipōn/	Acceptable variations of the words were included to ensure the accessibility of the assessment tool.
Naming; Confrontational naming	ಬಕೆಟ್ಟು / bʁket̪ːu /	வாளி/பக்கெட் /ʋaːɭi/ /ˈbʌkɛt/	Acceptable variations of the words were included to ensure the accessibility of the assessment tool.
Naming; Confrontational naming	ಬೀಗದ ಕೈ / biːgʁd̪ʁ/ /kʁi /- 2	பூட்டு சாவி /puːʈʈu/ - 1; /saːʋi/ - 1	Scoring criteria were revised to ensure accurate scoring and to eliminate ambiguity in scoring distribution.
Naming; Lexical Generative naming	Score - 2	Score of 0.5 for 1–5 items, 1 for 6–10 items, 1.5 for 11–15 items, and 2 for 16–20 items.	Scoring criteria were revised to ensure accurate scoring and to eliminate ambiguity in scoring distribution.
Naming Lexical Generative Naming	ಕೆಂಪು ಬಣ್ಣ ಇರುವ ವಸ್ತುಗಳನ್ನು ಹೆಸರಿಸಿ /kempu/ /bʁɳːʁ/ /iɾuvʁ/ /vʁst̪ugʁlʁnːu/ /hesʁɾisi/	விலங்குகளின் பெயர்களைக் கூறுங்கள் /ʋilaŋgugaliɳ/ /peijaɾkalaip/ /kuːɾuŋgaɭ/	Stimuli were modified to enhance the familiarity of the task and pragmatic applicability.

3.3.3 Phase 3: Content and appropriateness of the developed material evaluation

In this phase, appropriateness and content of the screening tool were evaluated using the feedback questionnaire adapted from the Manual for Non-Fluent Aphasia Therapy in Kannada (Goswami et al., 2010). The content validation was conducted using a 5-point Likert scale (very poor, poor, fair, good, and excellent) across all 20 parameters, encompassing item-level characteristics, including simplicity, familiarity, size of picture, colour and appearance, arrangements, presentation, volume, relevance, complexity framing of items, iconicity, accessibility, flexibility, trainability, stimulability, feasibility, generalization, scope of practice, scoring pattern, aware of similar publications and overall coverage of parameters to quantify the SLP's agreement and identify areas for refinement prior to wider use.

The feedback questionnaire, along with the BST-T test tool and the associated picture manual, was distributed to five native Tamil-speaking Speech Language pathologists (SLPs) who had a minimum of three years of clinical experience in the field of aphasia assessment and management. The experts were instructed to rate the screening tool using the parameters outlined in the feedback questionnaire. Feedback was collected, and modifications were incorporated accordingly to improve the familiarity, clarity, cultural relevance, and practicality of the screening test.

3.3.4 Phase 4: Field Testing

In phase 4, the field testing was done with the adapted BST-T to evaluate its applicability and psychometric performance in neurotypical and persons with aphasia groups. Neurotypical individuals were recruited from an institutional setup, and persons with aphasia were recruited from a hospital in Tamil Nadu.

3.3.4.a Participants

The study participants were divided into two groups: the control group (neurotypicals) and the clinical group (persons with aphasia). The control group consisted of 30 Tamil native speakers, stratified across three different age ranges: 18 – 40 years, 41 – 60 years, and 61 and above. Within each age group, 10 participants were recruited (5 male,5 female). The clinical group comprised eight native Tamil speakers aged ≥ 18 years who had been diagnosed with aphasia following an acute stroke and were assessed within the first two weeks post-onset (Powers et al., 2019).

3.3.4.b Criteria for participant selection

The participants were selected based on inclusion and exclusion criteria for both the control group (neurotypicals) and clinical group (persons with aphasia).

Group 1: Control Group

The participants included in the study must have had Tamil as their native language and be aged 18 years and above, to ensure the linguistic and developmental appropriateness. Participants were assessed informally to rule out speech, language, or cognitive impairments that could affect the validity and reliability of the study, thereby ensuring a more accurate comparison with the aphasic group. Additionally, individuals with pre-morbid neurological history or psychological history, known structural history, brain abnormalities, or history of alcohol or substance dependence were excluded to reduce the effect of comorbid conditions on the tests' homogeneity and reliability of the neurotypical individuals. Such conditions were applied to ensure the significant difference in group performance was attributed more confidently to the presence or absence of stroke-related aphasia rather than other confounding factors.

Table 5

Distribution of Mean Age Across Age Ranges in the Control Group

SI. No.	Age Range	Gender		N	Mean Age
		M	F		
1	18 – 40	5	5	10	28.6
2	41–60	5	5	10	45.4
3	61 and above	5	5	10	65.6

Group 2: Clinical Group

The clinical group consisted of participants with aphasia who met the following inclusion and exclusion criteria. All the participants in the study were native Tamil speakers, aged 18 years and above. The participants had a documented history of stroke- related brain insults, with the diagnosis confirmed through neuroimaging techniques such as CT or MRI by a neurologist. Participants who were medically stable at the time of screening and able to provide informed consent, either by themselves or through a caregiver, were recruited to ensure ethical adherence. Participants with severe cognitive impairments or psychiatric conditions were excluded. Any significant uncorrected auditory or visual impairments, and a history of other neurological disorders (e.g., Traumatic brain injury, neurodegenerative diseases), or a prior diagnosis of any speech language disorder unrelated to stroke were also excluded to maintain the diagnostic equivalence within the persons with aphasia group and reliability of the test results. The participants' demographic details, post-onset stroke duration, and CT/MRI findings are shown in Table 6.

3.3.5 Pilot study

A pilot study was conducted prior to administering the test tool. Two persons with aphasia were recruited to assess the appropriateness of the BST-T, including clarity of materials

and procedures and unambiguous instructions. Results revealed the cultural relevance of the Tamil version of BST and the clarity of the administration instruction, requiring no further refinements.

Table 6

Details of participants with stroke in the clinical group

Sl. No	**Age**	**Gender**	**Onset duration**	**Lesion site**
1	67 years	Male	3 days	Acute right ICA (MCA-ACA)/left ACA large infarcts with altered sensorium and quadriparesis.
2	51 years	Male	7 days	Intraparenchymal haemorrhage with edema in the left ganglion capsular region.
3	43 years	Male	5 days	Left lateral medullary syndrome with left vertebral artery dissection and right vertebral artery dissection.
4	52 years	Male	4 days	Large area of acute ischemic infarct in the left frontal, temporal, and parietal lobes and the left capsulo-globular region.
5	62 years	Male	6 days	Large evolving haemorrhagic infarct in the left middle cerebral artery territory and adjacent watershed zone between left MCA & PCA.
6	42 years	Male	3 days	T2/FLAIR hyperintensity with diffusion restriction in left frontal, temporal, occipital, left centrum semiovale, corona radiata, gangliocapsular regions with gradient blooming in left parietotemporal, left gangliocapsular region- infarct with haemorrhagic transformation.

7	65 years	Female	8 days	Left distal anterior cerebral artery (ACA) territory ischemic cerebrovascular accident with right hemiplegia
8	58 years	Male	10 days	Left hemispheric ischemic cerebrovascular accident (CVA) with right hemiplegia

3.3.6 Phase 5: Data Analysis

Data analysis was conducted using IBM SPSS software (Statistical Package for the Social Sciences, version 26.0). Descriptive statistics, including median and Interquartile Range (IQR), were computed for each domain of the BST-T (auditory comprehension, repetition, naming, reading, and writing). The Shapiro-Wilk test was employed to assess the normality of data distribution. Considering the results of the normality test, appropriate statistical procedures were employed to compare the group difference between the normative group and the persons with aphasia group. Group comparison and psychometric properties were evaluated and detailed in Chapter IV.

Chapter IV

Results

The study focused on translating and adapting a bedside screening tool to screen for the presence or absence of aphasia in post-stroke individuals. The primary objectives of the study are as follows;

i. To translate and adapt the Bedside Screening Test for Aphasics in Kannada into Bedside Screening Test for Aphasics in Tamil
ii. To validate the Bedside Screening Test for Aphasics in Tamil on the Tamil-speaking population with and without aphasia.

The result section is explained under two major headings:

1) Content validation
2) Field testing

4.1 Content validation to assess the effectiveness of the adapted BST-T

Content validation was conducted to ensure the adapted BST-T is representative, appropriate, and clinically relevant for persons with aphasia. Content validation was conducted using a 5-point Likert scale (very poor, poor, fair, good, and excellent) for all 20 parameters. The SLP's ratings were analysed separately for each parameter to quantify experts' opinions. Items that received uniformly high ratings were interpreted as demonstrating strong content validity for those aspects of the adapted BST-T. Table 7 represents the SLP's ratings for each parameter *(N=5).*

Table 7

Summary of Responses of Speech-Language Pathologists to BST-T (N=5)

Sl. No	Parameters	Very Poor	Poor	Fair	Good	Excellent
1	**Simplicity**	-	-	-	4	1
2	**Familiarity**	-	-	-	4	1
3	**Size of the picture**	-	-	1	2	2
4	**Colour and appearance**	-	-	1	4	-
5	**Arrangement**	-	-	-	5	-
6	**Presentation**	-	-	-	4	1
7	**Volume**	-	-	-	4	1
8	**Relevance**	-	-	-	-	5
9	**Complexity**	-	-	-	-	5
10	**Iconicity**	-	-	-	5	-
11	**Accessibility**	-	-	-	3	2
12	**Flexibility**	-	-	-	3	2
13	**Trainability**	-	-	-	4	1
14	**Stimulability**	-	-	-	3	2
15	**Feasibility**	-	-	-	4	1
16	**Generalization**	-	-	-	5	-
17	**Scope of Practice**	-	-	1	3	1
18	**Scoring pattern**	-	-	-	4	1
19	**Publications, outcomes, and developers (Professional Background) ***	Yes -2 No -3	-	-	-	-
20	**Coverage of parameters**	-	-	-	4	1

*Note. This parameter was evaluated in terms of 'Yes' or 'No.'

Table 8

Summary of Responses of Speech-Language Pathologists to BST-T (N=5) in Percentage

Sl. No	Parameters	Very Poor (100%)	Poor (100%)	Fair (100%)	Good (100%)	Excellent (100%)
1	**Simplicity**	-	-	-	80	20
2	**Familiarity**	-	-	-	80	20
3	**Size of the picture**	-	-	20	40	40
4	**Color and appearance**	-	-	20	80	-
5	**Arrangement**	-	-	-	100	-
6	**Presentation**	-	-	-	80	20
7	**Volume**	-	-	-	80	20
8	**Relevance**	-	-	-	-	100
9	**Complexity**	-	-	-	-	100
10	**Iconicity**	-	-	-	100	-
11	**Accessibility**	-	-	-	60	40
12	**Flexibility**	-	-	-	60	40
13	**Trainability**	-	-	-	80	20
14	**Stimulability**	-	-	-	60	40
15	**Feasibility**	-	-	-	80	20
16	**Generalization**	-	-	-	100	-
17	**Scope of Practice**	-	-	20	60	20
18	**Scoring pattern**	-	-	-	80	20
19	**Publications, outcomes, and developers (Professional Background) ***	Yes-40 No-60	-	-	-	-
20	**Coverage of parameters**	-	-	-	80	20

Note. This parameter was evaluated in terms of ‘Yes’ or ‘No.’

Content validation of the BST-T demonstrated good validity across assessed parameters. All five SLP's rated the BST-T "excellent" for relevance and complexity, indicating the test items are appropriate to clinical utility. Four of five SLPs provided a "good" rating for simplicity, familiarity, colour and appearance, presentation, volume, trainability, feasibility, scoring pattern, and overall coverage, suggesting broad acceptability of the test's format and administration procedures. Only one of five SLPs rated picture size, picture colour/appearance, and scope of practice as fair, indicating limited concern about visual design and applicability. Two of five SLPs stated picture size, accessibility, flexibility, and stimulability as excellent. Regarding awareness of existing instruments, two of five SLPs reported familiarity with publications, while three reported no awareness, indicating mixed exposure to comparable tools among the SLPs. Overall, the pattern of responses supported proceeding to pilot testing and reliability assessment.

4.2 Concurrent validity

The concurrent validity of the BST-T was assessed using Spearman's rank-order correlation between BST-T total scores and Language Screening Test in Tamil (LAST-T; Manivannan et al.,2025) scores due to the non-parametric nature of the data. Spearman's rho indicated a strong, positive association between the two measures, $rs = 0.843$, $p=0.009$, such that higher BST-T scores were associated with higher LAST-T scores. This statistically significant correlation supports the concurrent validity of the BST-T for identifying language impairments in Tamil-speaking individuals.

4.3 Test- retest reliability

Test-retest reliability of the translated and adapted version of BST-T was assessed on a sample comprising 10% of the participants. Two persons with aphasia who were in the acute stage of stroke recovery were recruited randomly and administered the BST-T and retested three to four days after the initial administration. Performance across domains and subdomains

remained consistent between administrations, with no clinically or statistically meaningful variation observed. These findings indicated acceptable short-interval test-retest reliability for the adapted BST-T in this preliminary subsample.

4.4 Field testing

Field testing was conducted following content validation by SLPs. This phase assessed the administration procedures of the instruments, participant comprehension, item functioning, and preliminary psychometric properties across the target population, with 30 neurotypicals recruited to examine typical performance and to establish baseline metrics, and eight persons with aphasia were recruited who were in the acute stage of stroke. Objectives of the study included documenting participants' responses to test items, measuring administration time, and collecting data to support subsequent reliability and validity analyses in both neurotypicals and persons with aphasia.

Descriptive statistics were computed to analyse the distribution of scores across each domain for both neurotypicals and persons with aphasia. Prior to inferential analysis, the Shapiro-Wilk test was used to assess the normality of the data distribution. Since the provided data have a non-normal distribution, the descriptive statistics (median and interquartile range (IQR)) were computed for each domain in both participant groups (neurotypicals and persons with aphasia). Between-group differences (neurotypicals and persons with aphasia) were evaluated using the Mann-Whitney U test. Within the neurotypical group, differences across the three age ranges (18–40 years, 41–60 years, 61 years and above) were evaluated using the Kruskal–Wallis test. Statistical significance for all inferential statistical tests was considered to be $p<0.005$.

4.4.1 Descriptive statistics for Neurotypical across age groups

Descriptive statistics for the neurotypical group were computed across three different age categories (18-40 years, 41-60 years, and ≥ 61 years) for each domain and subdomain; the values are reported as median and IQR. Neurotypical participants in all three age groups demonstrated near-ceiling performance in the auditory-verbal comprehension and repetition subdomains. By contrast, participants aged ≥61 years showed relatively poor performance on lexical generative naming, reading, writing, naming total, and overall BST-T scores.

As shown in Table 9, the auditory-verbal comprehension domain, all three age groups showed identical median and IQR values of 10 (0) across all subdomains, and the total score for auditory-verbal comprehension was consistent across groups (median 50, and IQR 0), indicating consistent performance across age groups.

In the repetition domain, participants aged ≥ 61 years exhibited a modest reduction in automatic speech that slightly affects the overall repetition scores. However, the median scores remained high across all age groups.

In the naming domain, lexical generative naming was comparatively lower in participants aged ≥ 61 years (Median=7.50, IQR=1) compared with the other two age groups, 18-40 years (Median=9.50, IQR=2) and 41-60 years. The total scores were comparatively lower in the older age group.

Reading and writing performances were also demonstrated with lower median scores in participants aged ≥ 61 years (Median = 7.00, IQR = 8) than in younger age groups. Within the 41-60 years group, two participants were illiterate; they were able to complete partial tasks (copying, shape drawing, and writing their names) and to read numeric stimuli, which affected

the reading and writing item scores. Similarly, in the ≥ 61 years group, five participants were illiterate, with two of the five participants scoring in reading and writing tasks, where the other three scored "zero" in reading and writing items. Overall, the BST-T total score was highest in the 18–40 years group (Median = 135.00, IQR = 2) and lowest in the ≥ 61 years group (Median = 126.75, IQR = 15).

Table 9

Comparison of Domain and Subdomain Scores Across Age Groups in Neurotypicals

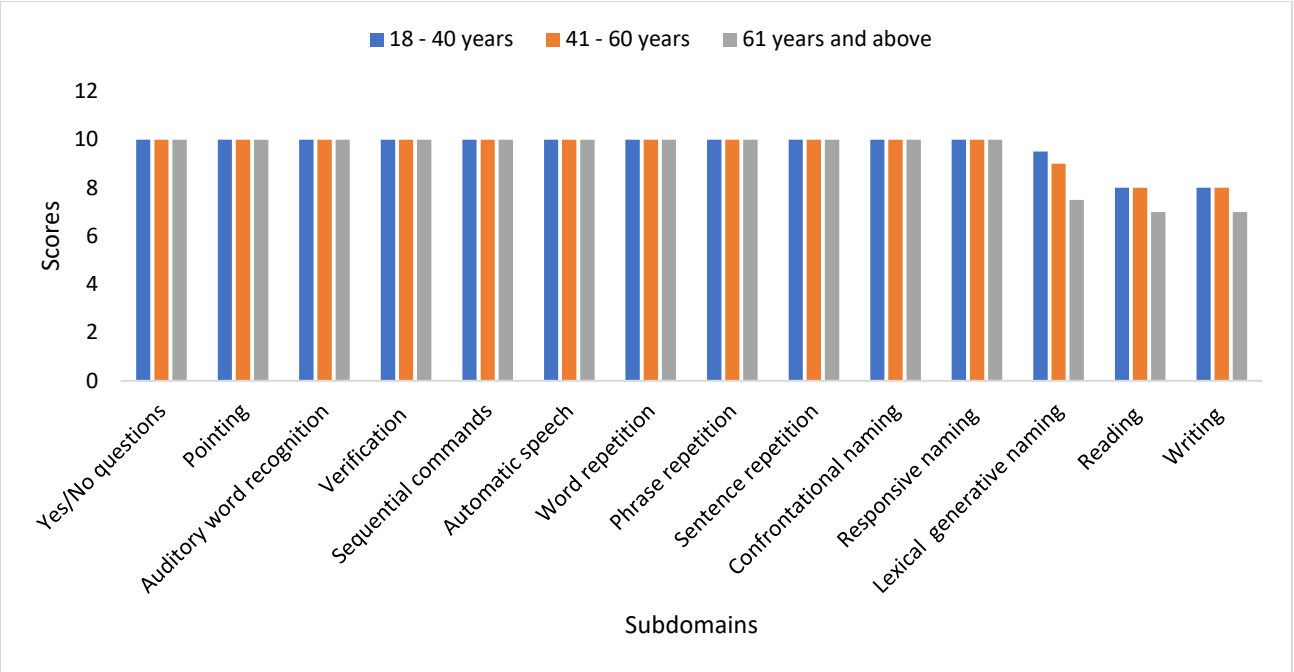
Domains	**Subdomain**	**18-40 years (N=10) Mdn (IQR)**	**41-60 years (N=10) Mdn (IQR)**	**61 years & above (N=10) Mdn (IQR)**
Auditory Verbal Comprehension	Yes/No Questions	10.00(0)	10.00(0)	10.00(0)
	Pointing	10.00(0)	10.00(0)	10.00(0)
	Auditory Word Recognition	10.00(0)	10.00(0)	10.00(0)
	Verification Task	10.00(0)	10.00(0)	10.00(0)
	Sequential Commands	10.00(0)	10.00(0)	10.00(0)

Repetition	Automatic Speech	10.00(0)	10.00(0)	10.00(0)
	Word Repetition	10.00(0)	10.00(0)	10.00(0)
	Phrase Repetition	10.00 (0)	10.00 (0)	10.00 (0)
	Sentence Repetition	10.00 (0)	10.00 (0)	10.00 (0)
Naming	Confrontational Naming	10.00 (0)	10.00 (0)	10.00 (0)
	Responsive Naming	10.00 (0)	10.00 (0)	10.00 (0)
	Lexical Generative Naming	9.50 (2)	9.00 (1)	7.50 (1)
Reading	-	8.00 (0)	8.00 (1)	7.00 (8)
Writing	-	8.00 (0)	8.00 (1)	7.00 (8)
BST-T Overall Scores	-	135.00	134.50 (4)	126.75 (15)

Note. Mdn= Median; IQR= Interquartile Range

Figure 2

Age-Wise Comparison of the Subdomain in Neurotypicals (N=30)



Note. The bar graph depicts the median scores across three different age groups in neurotypical adults (N=30)

4.4.2 Descriptive statistics for Persons with Aphasia

Persons with aphasia showed markedly reduced performance across all domains and subdomains compared with the neurotypical controls. Median and IQR values for the auditory verbal comprehension domain indicated substantial impairment: yes/no questions (Median=7.00, IQR=5), Pointing tasks (Median=5.50, IQR=6), Auditory word recognition (Median=7.00, IQR=4), Verification Task (Median=6.00, IQR=7), and Sequential Commands (Median = 3.50, IQR = 4). The total auditory verbal comprehension scores had a median of 29.00 (IQR=25).

Repetition domain performance was severely reduced across subdomains; notably, sentence repetition yielded a median of 0 with an IQR of 0, reflecting profound impairment. Naming abilities were also demonstrated, with poor performance in lexical generative naming

producing a median score of 0 (IQR = 0), and the overall naming score had a median of 1 (IQR =4). Both confrontation naming and responsive naming also demonstrated substantially lowered median values.

Reading and writing scores were likewise markedly diminished, with median values of 0 and IQR values of 2 and 1, respectively. Overall performance on the BST-T for the persons with aphasia group demonstrated a lower (Median = 36.50, IQR = 36). Median and IQR values for the aphasia group are presented in Table 10.

Table 10

Median and IQR Scores Across Domains in Persons with Aphasia Group

Domains	**Subdomain**	**Median**	**IQR**
Auditory Verbal Comprehension	Yes/No Questions	7.00	5
	Pointing	5.50	6
	Auditory	7.00	4
	Word Recognition		
	Verification Task	6.00	7
	Sequential Commands	3.50	4
Repetition	Automatic Speech	0.00	2
	Word Repetition	2.50	5
	Phrase Repetition	0.00	2

	Sentence Repetition	0.00	0
Naming	Confrontational Naming	1.00	3
	Responsive Naming	0.00	1
	Lexical Generative Naming	0.00	0
Reading	-	0. 00	2
Writing	-	0. 00	1
BST-T Overall Scores	-	36.50	36

The overall domain-specific language scores represented a clear difference between neurotypical adults (N=30) and persons with aphasia (N=8) across all five language domains, indicating strong discriminative ability of the BST-T. Neurotypical participants exhibited near-ceiling performance with minimal variability, whereas persons with aphasia showed substantially lower scores and greater dispersion, reflecting impaired language functioning secondary to neurological involvement, which are represented in Table 11

Table 11

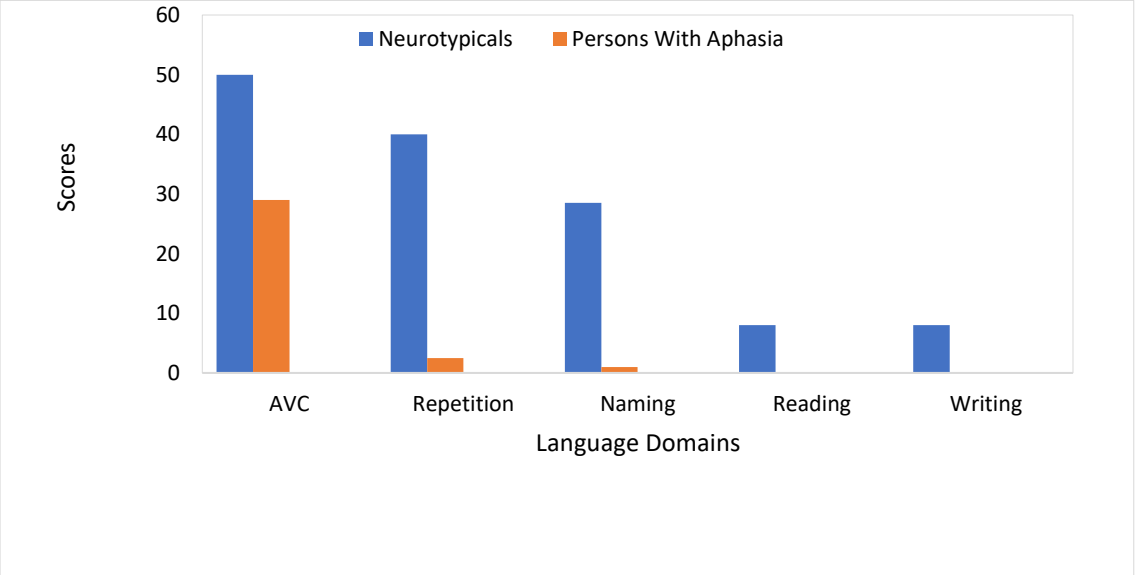
The Overall Domain-Specific Comparison Between Neurotypical Individuals and Persons with Aphasias on BST-T

Domain	Neurotypicals (N=30) Mdn (IQR)	Persons with Aphasia (N=8) Mdn (IQR)
Auditory Verbal Comprehension	50.00(0)	29.00(25)
Repetition	40(0)	2.50(9)
Naming	28.50(2)	1.00(4)
Reading	8.00(1)	0.00(2)
Writing	8.00(1)	0.00(1)

Note. Mdn = Median, IQR = Interquartile range

Figure 3

Domain-Specific Comparison of Neurotypicals and Persons with Aphasia



Note. AVC = Auditory Verbal Comprehension. Bar graph depicts the median scores across five language domains for neurotypical adults (N=30) and persons with aphasia (N=8).

4.5 Standard Group Comparison

4.5.1 Age-wise comparison on neurotypicals

A Kruskal-Wallis test was conducted to compare BST-T performance across the three age groups (18-40 years, 41-60 years, ≥ 61 years). Since the non-parametric methods were used, median and IQR values were considered for interpretation. There were no statistically significant differences were found across age groups for the auditory-verbal comprehension domain or any of its subdomains (yes/no questions, pointing task, auditory-word recognition, verification task, sequential commands, and auditory-verbal comprehension total), all $p > .05$. Likewise, the repetition domain and its subdomains (automatic speech, word repetition, phrase repetition and sentence repetition and repetition total) did not differ significantly by age ($p > .05$). However, significant age- related differences were observed in the naming domain.

Lexical generative naming differed across groups, $H(2) = 16.78$, $p < .001$. Bonferroni-corrected pairwise comparisons indicated poorer performance in the ≥ 61 years group compared with the other two groups, 18-40 years ($p < .001$) and 41-60 years ($p = .003$); no differences were found between the two age groups. Naming total scores also differed by age, $H(2) = 15.63$, $p < .001$, with the ≥ 61 years group performing significantly poorer than the two younger groups.

The reading domain showed a significant effect of age, $H(2) = 7.15$, $p = .028$; pairwise testing revealed a significant difference between the ≥61 years group and the 18-40 years group ($p = .025$). Writing scores similarly differed across age groups, $H(2) = 7.15$, $p = .028$, with the ≥61 years group scoring lower than the 18-40 years group ($p = .025$). Finally, BST-T total scores differ significantly by age, $H(2) = 15.59$, $p < .001$. Post hoc tests showed the ≥61 years group scored significantly lower than both the 18- 40 years ($p < .001$) and 41-60 years ($p = .021$).

4.5.2 Comparison between neurotypicals and aphasia groups across domains

The Mann-Whitney U test was carried out to compare the performance on the BST-T between neurotypicals and persons with aphasia.

In the auditory-verbal comprehension task, the persons with aphasia group demonstrated significantly poorer performance than the normal group across all auditory-verbal comprehension subdomains. One-sample Wilcoxon signed-rank tests indicated a significant reduction for yes/no questions, Z=-2.533, p=0.011; pointing task, Z= -2.536, p=0.011; auditory word recognition, Z=-2.552, p=0.011. The total scores significantly decreased in the persons with aphasia group, Z = -2.521, p = 0.012. These results indicate marked impairments in auditory comprehension among persons with aphasia.

In Repetition, the persons with aphasia group showed significantly poorer performance across all subdomains. One-sample Wilcoxon signed-rank tests revealed reductions for automatic speech, Z= -2.636, p=0.008; word repetition, Z=-2.565, p=0.010; phrase repetition, Z=-2.636, p=0.008; and sentence repetition, Z=-2.552, p = 0.011. Sentence repetition showed the greatest impairment within this domain.

In the naming domain, significant deficits were observed in the persons with aphasia group. One-sample Wilcoxon signed-rank tests showed reductions in confrontational naming, Z = -2. 555, p = 0.011, and responsive naming, Z= -2.636, p = 0.008. The Mann-Whitney U test demonstrated highly significant differences for lexical generative naming (U=0.00, Z = -4.366, p<0.001) and naming total scores (U=0.00, Z=-4.350, p<0.001). These findings reflect severe naming impairments in the aphasia group.

In reading and writing, the persons with aphasia group demonstrated significant differences relative to the neurotypical group, U=18.000, Z=-4.167, p<0.001 in reading, and U=16.500, Z = -4.239, p <0.001 in writing. Mann-Whitney U test revealed a statistically significant reduction in reading and writing performance across both groups.

The overall BST-T total scores demonstrated statistically significant differences between the normals and persons with aphasia groups. Mann-Whitney U analysis revealed significantly poorer overall language performance among individuals with aphasia, U=0000, Z= - 4.330, p<0. 001. These findings indicated that the BST-T was able to effectively differentiate individuals with aphasia from neurologically healthy individuals across the various language domains.

In conclusion, the BST-T demonstrated markedly reduced performance in the persons with aphasia group relative to neurologically healthy controls across all the domains. Non-parametric group comparisons indicated that age effects were primarily observed in naming, reading, and writing, which affected the overall score. The participants aged ≥ 61 years performed worse than younger neurotypical groups. Mann-Whitney U and Wilcoxon tests confirmed that persons with aphasia scored significantly lower than neurotypicals across all domains. Concurrent validity was supported by a strong, positive Spearman correlation between BST-T and LAST-T scores (rs = 0.843, p = 0.009). Preliminary short-interval test-retest assessment in an acute sample demonstrated consistent performance across domains and subdomains. Collectively, these findings indicate that the adapted BST-T reliably discriminates between individuals with aphasia and neurologically healthy adults.

Chapter V

Discussion

The present study aimed to translate, culturally and linguistically adapt, and evaluate the psychometric properties of the Bedside Screening Test for Aphasics in Tamil (BST-T). The BST-T was administered to neurotypical Tamil-speaking adults in three age groups: 18-40 years, 41 – 60 years, and ≥ 61 years, and to a group of Tamil-speaking persons with aphasia. The following discussion interprets the BST-T performance across these age groups, with a domain-specific focus on spontaneous speech, auditory verbal comprehension, repetition, naming, reading, and writing. Findings are contextualized at both the global and the Indian level of adaptation of bedside language screening assessment tools.

Content validation of the adapted BST-T

Content validation of the adapted BST-T was conducted by five Speech-Language Pathologists (SLPs) with clinical expertise in aphasia. The battery was evaluated across 20 parameters, including simplicity, familiarity, size of picture, colour and appearance, arrangement, presentation, volume, relevance, complexity framing of items, iconicity, accessibility, flexibility, trainability, stimulability, feasibility, generalization, scope of practice, scoring pattern, similar to other publications, coverage of parameters. The majority of parameters received ratings of good or excellent across all evaluators, indicating that the adapted test items retained the intended clinical purpose and linguistic relevance of the original BST-K.

Specifically, the parameters of relevance and complexity received excellent ratings from all five SLPs. Familiarity, feasibility, trainability, and overall coverage received consistently good ratings. These results reflect a strong consensus among the expert panel regarding the cultural appropriateness and clinical usability of the adapted battery.

These findings support the prior literature emphasizing the importance of culturally and linguistically appropriate assessment tools in diverse populations (Papathanasious et al.,2013). The successful adaptation of test items into Tamil, retaining the structural framework of the original BST while incorporating culturally familiar stimuli, appears to enhance the perceived usability of BST-T for the target clinical demographic.

Concurrent validity

Establishing concurrent validity against an existing validated tool is a standard requirement in the psychometric evaluation of an adapted screening instrument (Murray & Clark, 2006; Papathanasiou et al., 2013; Streiner et al., 2015). Concurrent validity of the BST-T was established by examining its correlation with the Language Screening Test in Tamil (LAST-T; Manivannan et al., 2025). The results of Spearman's rho (rs = 0.843) indicated that this comparison confirms a strong correlation between the BST-T and the LAST-T measures overlapping constructs related to language functioning in Tamil-speaking adults, thereby providing evidence for the concurrent validity of the BST-T. The BST-T encompasses a broader range of subdomains, including reading and writing, whereas the LAST -T deliberately excludes literacy-sensitive items to minimise educational bias. Despite the structural differences, a strong correlation emerged between these two test tools.

Test-Retest Reliability

Test-retest reliability is a critical psychometric property that reflects the stability of measurement over time when the underlying construct is expected to remain unchanged (Streiner et al.,2015). In the present study, test-retest reliability was assessed in a preliminary subsample of 2 persons with aphasia, approximately 10% of the persons with aphasia group, who were in the acute stage of stroke recovery. The examiner administered the BST-T on two occasions, separated by an interval of 3 to 4 days. The 3-to-4-day interval has similarly been

employed in acute-stage reliability evaluations of comparable aphasia and neurological screening tools (Thompson et al., 2005; Thommessen et al., 1999; Chen et al., 2009) and also relies on participants' availability and medical stability. This interval is both procedurally and clinically practical. Performance across all domains and subdomains of the BST-T remained consistent between the two administrations, with no clinically or statistically meaningful variation observed.

Performance Across Normative Age Groups

Auditory Verbal Comprehension

Across all three neurotypical age groups, performance on all auditory verbal comprehension subdomains: Yes/No questions, pointing task, auditory word recognition, verification tasks, and sequential commands was uniformly high in all three age groups, and no statistically significant differences were observed among age groups. These results are associated with established evidence indicating that core auditory comprehension abilities remain intact across the healthy adult lifespan (Goodglass & Kaplan, 2000). The absence of an age effect, even in the elderly population (≥ 61 years), reflects the relative neurological stability of auditory-verbal comprehension pathways in typically aging adults and provides a robust normative baseline for the BST-T.

The ceiling-level performance was comparable across the three age groups (18-40 years, 41-60 years, and ≥ 61 years) among Tamil-speaking individuals, indicating that age does not extensively influence auditory verbal comprehension within the examined range. This pattern is consistent with findings from other adapted versions of BST, including Kannada (Ramya & Goswami, 2011), Malayalam (Kanthima & Goswami, 2011), Odia (Monalisa & Goswami, 2012), and Telugu (Santhosh & Goswami, 2013). The overall results across these instruments indicate that the auditory-verbal comprehension domain provides a suitable

normative baseline and a sensitive clinical method for detecting performance deviations in persons with aphasia.

Repetition

The Repetition domain includes three subdomains: automatic speech, word repetition, phrase repetition, and sentence repetition. The repetition scores are similar to those of the auditory-verbal comprehension domain. There were no statistically significant differences among the three groups based on normative ages ($p>0.05$), and they exhibited higher performance. This indicates that the repetition system, comprising auditory-verbal comprehension and speech production, is intact among healthy adults across the lifespan in this Tamil-speaking community (Goodglass & Kaplan, 1983). The lack of decline in performance in the repetition subtests is consistent with the neuropsychological studies showing that the phonological loop mechanism for repetition is resistant to ageing (Murray & Clark, 2006).

More significantly, the sentence repetition, which imposes the high demands on verbal working memory and phonological processing, showed no performance decrements in the ≥ 61 years group relative to the other two younger groups (18-40 years and 41-60 years). This is a clinically significant finding as it establishes that sentence-level repetition failures in older Tamil-speaking adults should not be attributed to normative aging; such impairments require further clinical investigation. These findings also support the discriminant validity of repetition subdomains for aphasia screening, as elaborated in the between-group comparison.

Naming domain

In contrast to better performance in auditory comprehension and repetition, statistically significant age-related differences were observed in lexical generative naming, naming total, reading, writing, and the total scores of BST-T. The pairwise analyses employing the Kruskal-Wallis test with Bonferroni correction revealed that there was a significant difference observed

in the 61-years and above group participants, with no statistically significant differences between the other two neurotypical groups (18 – 40 years and 41-60 years).

In lexical generative naming, an age-related decline in performance was observed among those aged 61 and above, and this is well supported by the literature. Verbal fluency tasks are particularly sensitive to age-related changes in lexical-semantic access and executive functioning, including lexical retrieval speed and inhibitory control efficiency (Goodglass & Kaplan,2000). BST adaptation in Kannada, Malayalam, Odia, and Telugu similarly identified naming and lexical generative tasks as the domains most sensitive to age-related variation (Ramya & Goswami, 2011; Kanthima & Goswami, 2011; Monalisa & Goswami, 2012; Santhosh & Goswami, 2013). Performance across the age groups of 18-40 years and 41-60 years was comparable, suggesting that age-related lexical retrieval changes predominantly emerge in adults above 60 years.

Reading and writing

The age-related reduction in reading and writing performance observed among participants aged 61 and above relative to younger groups is consistent with the neurogenic language disorders literature. This acknowledges that literacy-dependent tasks are susceptible to multiple ageing-related influences, including reduced processing speed, declining working memory capacity, and differential educational attainment across generational cohorts. This has reduced the frequency of literacy-based engagement in older adults (Murray & Clark,2006; Papathanasious et al., 2013). The comparative homogeneity of performance in the younger age group versus the heterogeneity characterizing the older age group reflects increased within-group variance associated with differential educational histories, health trajectories, and linguistic exposure patterns that are more variable among older adults.

Critically, these age-related differences must be understood as normative variation rather than pathological decline, underscoring the clinical necessity of age-related normative frameworks. The Indian adaptation of the Frenchay Aphasia Screening Test (Alladi et al., 2022) adopted this approach by specifying age-related cut-off scores for individuals up to 60 years and 25 for those above 61 years, reflecting that normative ageing must be accounted for when establishing a clinical decision threshold. The age group-related normative data of BST-T provided an analogous framework for Tamil-speaking populations. Notably, prior BST adaptations across South Indian Languages have confirmed that reading and writing subdomains do not systematically affect the participants with lower educational attainment when screening outcomes are interpreted within the context of the total score and clinical history (Ramya &Goswami,2011; Kanthima &Goswami,2011; Monalisa & Goswami,2012; Santhos & Goswami,2013), supporting the appropriateness of retaining these domains within the BST-T.

Performance of the Aphasia Group

Auditory Verbal Comprehension Domain

Individuals with aphasia demonstrated statistically significant reductions across all auditory verbal comprehension subdomains of the BST-T, which has a p-value of < 0.05. These findings are consistent with the characterization of aphasia as an acquired communication disorder involving modality-specific impairments across speaking, listening, reading, and writing, which occur independently of sensory or motor deficits (Brookshire,1992; Darley,1982; Goodglass,1993). The present findings affirm that the BST-T auditory verbal comprehension subdomains effectively capture these clinically significant deficits.

Across the western screening tools reviewed, auditory comprehension tasks have consistently been identified as core components of aphasia screening. The language screening

test (LAST; Flamand Roze et al.,2011), German (Köder et al., 2016), and Chinese (Xie et al.,2018), and the Indian LAST-T (Manivannan et al.,2025), both included verbal instruction tasks that focus on comprehension abilities, consistent with the comprehension subdomains of the BST-T. The Mississippi Aphasia Screening Test (MAST; Nakase-Thompson et al., 2005), the Quick Aphasia Battery (QAB; Wilson et al., 2018), and the Aphasia Rapid Test (ART; Azuar et al., 2013) similarly assess auditory comprehension as a core domain, reinforcing the importance of comprehension assessment in bedside aphasia screening.

Repetition Domain

Within the repetition domain, the aphasia group demonstrated markedly reduced median scores across all subdomains: automatic repetition, word-level, phrase-level, and sentence-level repetition. Sentence repetition shows the greatest impairment. The progressive hierarchy of difficulties across word, phrase, and sentence repetition observed in the present study is consistent with the aphasia severity and lesion extent. Specifically, sentence repetition is particularly impaired in conduction aphasia and Broca's aphasia due to disruption of pathways connecting speech production and auditory-verbal recognition areas (Goodglass & Kaplan,1983).

The inclusion of repetition tasks at multiple linguistic levels (word, phrase, and sentence) in the BST-T aligns with the established test tools such as the BEST-2 (Fitch-West & Sands,1998), the MAST (Nakase-Thompson et al.,2005), the Ullevaal Aphasia Screening test (Thommessen et al., 1999), and the Serbian Aphasia Screening Test (Vuković et al., 2024), all of which include repetition tasks as core components. The statistically significant Wilcoxon Signed-Rank Test results for all repetition subdomains confirm that the BST-T repetition subtests' reliability differentiates aphasia from typical language functioning, consistent with findings from the BST adaptations in Kannada (Ramya & Goswami, 2011), Malayalam

(Kanthima & Goswami, 2011), Odia (Monalisa & Goswami, 2012), and Telugu (Santhosh & Goswami, 2013).

Naming Domain

The naming domain revealed severe impairments in the aphasia group across all three subdomains: confrontational naming, responsive naming, and lexical generative naming, as well as the total scores. The findings of lexical generative naming in persons with aphasia reflect the presence of severe anomia that is characteristic of aphasia, irrespective of the type. According to the Boston Classification system, anomia reflects disconnection between the conceptual representation area and the speech production area, manifesting as severe word-retrieval failures (Goodglass & Kaplan, 1983).

Naming tasks are a core component of all aphasia screening tools reviewed, including the FAST(Enderby et al.,1987), Mississippi Aphasia Screening Test (MAST; Nakase-Thompson et al., 2005), the Quick Aphasia Battery (QAB; Wilson et al., 2018), the Aphasia Rapid Test (ART; Azuar et al., 2013), LAST (Flamand-Roze et al., 2011), and the Indian LAST-T (Manivannan et al.,2025). The multi-subdomain approach to naming, encompassing confrontational, responsive, and generative naming, provides a richer differentiation of naming abilities than single-task tools, aligning with Lezak's (1983) recommended profiles that evaluate naming comprehensively.

Reading and Writing Domains

Both reading and writing were markedly impaired in the persons with aphasia group. These results highlight that acquired aphasia affects all language aspects, consistent with the established definitions that characterise aphasia as a disorder affecting multiple modalities: speaking, listening, reading, and writing (Brookshire, 1992; Darkey,1982).

The inclusion of both reading and writing domains distinguishes the BST-T from several available Tamil-language screening tools, including the LAST-T (Manivannan et al.,2025), which explicitly excludes reading and writing tasks. The BST-T approach of including these domains is consistent with the BEST-2 (Fitch-West& Sands,1998), the FAST (Enderby et al.,1987), the BAB-T (Sivagnanapandian et al.,2025), and the MAST (Nakase-Thompson et al.,2005). Furthermore, as Lezak (1983) noted, a comprehensive profile of language function necessarily includes reading and writing subtests that do not disadvantage illiterate participants (Ramya & Goswami,2011; Kanthima & Goswami, 2011; Monalisa & Goswami, 2012; Santhosh & Goswami, 2013), providing additional support for retaining these subdomains in the Tamil version.

In conclusion, the BST-T is a valid and psychometrically evaluated screening test tool for screening aphasia in Tamil-speaking adults. The BST-T effectively differentiated individuals with aphasia from neurotypical adults across all language domains, with a significant difference in total scoring. Normative data across three age groups revealed expected age-related variations in naming, reading, writing, and total scores, providing a clinical baseline. High concurrent validity with the LAST-T and test-retest reliability further support the psychometric adequacy of BST-T. Even though the findings emphasize the clinical utility of BST-T in Tamil-speaking populations, larger and more heterogeneous samples will provide a more psychometric properties foundation for BST-T.

Chapter VII

About Bedside Screening Test for Aphasics in Tamil (BST-T)

The Bedside Screening Test in Tamil (BST-T) is a linguistically translated and culturally adapted version of the Bedside Screening Test for Aphasics in Kannada (BST-K). The BST-T is a brief clinician-administered screening instrument designed to identify aphasia in native Tamil speakers aged 18 years and older. The test comprises a manual, picture cards, and everyday objects, and requires approximately 15-20 minutes to administer. This instrument assesses six core language domains and their subtests, which are essential for systematic aphasia screening, covering receptive and expressive language modalities. Administrative prerequisites, item arrangement, and scoring criteria are described below.

Participant seating and test environment

Participants in both the neurotypical group and the persons with aphasia group were seated in a quiet, well-lit setting. Neurotypical participants were seated comfortably at the table to allow easy access to the picture cards and objects. Participants with aphasia were assessed at the bedside; no fixed seating arrangements were required, and positions were adjusted according to each participant's comfort and functional limitations.

Stimulus arrangement

In the neurotypical group, the picture cards were arranged on the table in front of each participant following the order of presentation. In the persons with aphasia group, the picture cards and objects were either in the hand or at a comfortable visual distance. Items not required for a given subtest were kept out of the participant's line of sight to minimise distractions.

Test instructions and parameters

The test administration began with a brief, standardized explanation in Tamil. Participants were informed that they would be asked questions requiring verbal responses, pointing to pictures or objects, reading aloud, and writing. A practice stimulus was presented

before testing to confirm task comprehension and to ensure familiarity with the task. Instructions were delivered in Tamil, at an appropriate loudness and prosody for optimal comprehension. The examiner asked, “I am going to ask a series of questions now. You are expected to answer some questions verbally, some require pointing to the picture cards and objects, reading, and writing”. Instructions were modified and repeated if the participants appeared confused or failed to execute any domain. Each domain was administered only after the participants indicated readiness.

Bedside Screening Test for Aphasics in Tamil (BST-T)

Manual (APPENDIX III)

Description of Test Stimuli

The BST-T comprises six language domains with associated subtests. Domains and scoring procedures are explained below.

Domain1: Spontaneous Speech

This domain evaluates spontaneous language during a general conversation and includes two subtests: fluency and information content. The responses of the participants were noted based on the modality of response, which was mentioned as either verbal or non-verbal. Examiner notes document response modality (verbal or nonverbal) and language or paralinguistic features, including effortful speech, telegraphic output, speech rate, delayed responses, circumlocutions, perseverations, paraphasias (phonemic/ literal, semantic, neologistic), agrammatism, and paragrammatism. No numerical scoring is assigned to this domain; a qualitative profile of spontaneous language is recorded.

Domain 2: Auditory verbal comprehension

This domain contains five subtests: Yes/No questions, pointing, auditory word recognition, verification, and sequential commands. For each subtest, participants respond verbally or nonverbally (e.g., pointing, eye or head movement, gestures). Each domain is detailed below.

a) Yes/No questions

The participants were asked to respond to the yes/no questions the examiner was asking using verbal/nonverbal mode. E.g., “Are you reading now?” and the expected answer should be only “no” in any form of expression.

b) Pointing task

Step 1: The participants were presented with the picture card.

Step 2: The participants were expected to point to the picture cards that the examiner delivered. E.g., “Point to the fan,” and the participant's response should be “pointing to the fan.”

c) Auditory Word Recognition

The participants were presented with word stimuli in order and required to understand the spoken word and point to the word in the picture stimulus through either way by eye movement, head movement, or any other gestures or pointing. For instance, if the examiner says “light,” the response can be “looking at the light,” or “pointing at the light,” or any gestures were accepted.

d) Verification Task

Step 1: For the verification task, the picture stimuli were arranged on a single card in a manner of 3 pictures on 1 card.

Step 2: The participants received the instruction to verify the word asked from the 3 picture stimuli. E.g., if the examiner asks to show the “basket,” and the response expected was pointing to the “basket” picture from 3 picture stimuli.

e) Sequential commands.

Step 1: The objects were arranged in front of the participants within reachable distance.

Step 2: The participants were instructed to follow the command given by the clinician in the same sequential order with the objects available. E.g., if the examiner asks, “Close your eyes,” the expected response should be “closing the eyes” from the participants.

Scoring

The overall maximum score for the Auditory Verbal Comprehension domain is 50. Each of the subsections consists of 5 questions, each consisting of a score of 2, with a total score of 10.

Domain 3: Repetition

Repetition is assessed across four subtests: automatic speech, word repetition, phrase repetition, and sentence repetition. Scoring follows the three-point (0-2) scale applied to each item. The maximum total for the repetition domain is 40.

a) Automatic Speech

The participants were instructed to answer the prompts in sequence. For instance, if the examiner says, "Numbers," the participants were necessitated to "Recite the numbers."

b) Word Repetition

The participants were asked to repeat the words that were told by the examiner. E.g., if the examiner says "cup", the participants should repeat the word "cup".

c) Phrase Repetition

Participants were asked to repeat the provided phrase by the examiner. For example, if the examiner said "go there", the participants should repeat the phrase back.

d) Sentence Repetition

The participants were given a sentence and asked to repeat the sentence back after the examiner says. E.g., "The flower is beautiful" sentence was expected to be repeated by the participants.

Scoring

A total score of 40 was given for the repetition domain. Each subtest consists of a score of 2 scores for each question with questions in total. A score of 0 is given for no response, 1 is given for an incomplete or incorrect response, and 2 is given for a correct response.

Domain 4: Naming

a) Confrontational Naming

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

Step 2: The participants were given the pictures and asked to name the picture given by the examiner. For instance, if the picture card had "car", then the participants were expected to name the picture "car".

b) Responsive Naming

The examiner provided a series of questions to the participants to answer by naming with respect to the question. For example, if it were "what you can see in a hotel," the participants should say "All the possible items that the participants can see in a hotel."

c) Lexical Generative Naming

Participants were asked to name the items under one specific category as told by the examiner. For example, if the examiner says, "List the colours," then the participants are expected to say "All the possible colours that he/she can name".

Scoring

A total score of "30" was provided for the naming domain. A score of "10" was given for each subtest of naming, which includes confrontational naming, responsive naming, and lexical generative naming. Within the naming domain, in confrontational naming, the maximum score of "2" was divided for the stimulus /puːʈʈu saːʋi/ into a score of "1" for /puːʈʈu/ and a score of "1" for /saːʋi/ was allotted. Lexical generative naming is scored by quantity produced in 1 minute: a score of "0.5" for 1–5 items, "1" for 6–10 items, "1.5" for 11–15 items, and "2" for 16–20 items

Domain 5: Reading

This domain focuses on the reading skills of the participants. Reading items progress from single words to sentences printed on stimulus cards. The participants are requested to read each item aloud.

Scoring

The maximum score given for this domain was "8". A score of "8" was given for each correct response. For partial or incorrect responses, a score of "1" was given, and "0" was given for no response, respectively.

Domain 6: Writing

The participants were asked to write personal details (name, address), copying shapes and numbers, and performing simple calculations (addition and subtraction).

Scoring

A score of 8 was given for the overall writing domain, with 2 scores for each writing task. Each correct response scored as "2", and incorrect or partial responses were given the score of "1", and "0" was given for no response.

3.6. Scoring pattern

Across domains, a three-point rating scale is used for item-level scoring to quantify the responses of the participants across all domains. Domain maximum scores are: Auditory-verbal comprehension has a total score of '50', Repetition has a total score of '40', Naming has '30, Reading has a total score of '8', and Writing has a total score of '8', with spontaneous speech described qualitatively. The criteria for scoring each domain are represented in Table 7.

Table 12

Bedside Screening Test scoring criteria.

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

3.7. Administration Duration

The clinical group, which consisted of 30 adults, required 10 minutes to complete the BST-T whereas, the clinical group with 8 adults required 15 minutes to complete the test.

Chapter VI

Summary and Conclusion

The present study aimed to translate, culturally adapt, and validate the Bedside Screening Test for Aphasics in Tamil (BST-T), adapting the original Bedside Screening Test for Aphasics developed in Kannada (Ramya & Goswami). The primary goal of this study is to provide a standardised, culturally and linguistically appropriate bedside screening tool that reliably identifies the presence or absence of aphasia in Tamil-speaking adults.

More than 86 million people speak Tamil, yet the language has few practically applicable bedside screening tools that comprehensively cover major language domains. These limitations impede early detection and timely management of post-stroke aphasia in acute care and constitute the principal rationale for the present study.

The present study undertook a process of reviewing the existing test material, adaptation of BST-K into BST-T, content validation of the adapted test material, and field testing. The cultural adaptation ensured that all test stimuli, including pictures, words, phrases, and sentences, were semantically equivalent, contextually familiar, and linguistically appropriate for Tamil-speaking individuals. The BST-T encompasses six core language domains: (a) spontaneous speech,(b) auditory verbal comprehension, comprising yes/no questions, pointing task, auditory word recognition, verification task, and sequential commands; (c) repetition, comprising automatic speech, word repetition, phrase repetition, and sentence repetition; (d) naming, comprising confrontation naming, responsive naming, and lexical generative naming; (e) reading; and (f) writing. The BST combines strong clinical reliability with practical ease of use; it has been adapted into several Indian languages, including Kannada (Ramya, 2011), Malayalam (Kanthima, 2011), Odia (Monalisa, 2012), and Telugu (Santhosh, 2013).

The BST-T demonstrated strong concurrent validity, correlating closely with the LAST-T (Mannivanan et al., 2025), and test-retest reliability analysis on 10% of the clinical sample indicated good temporal reliability. Normative data were obtained from neurotypical Tamil-speaking adult groups (18 – 40 years, 41 – 60 years, ≥ 61 years). Age-group comparison revealed significant declines in the older group (≥ 61 years), with the largest decrement in lexical generative naming, consistent with cognitive-linguistic ageing effects. In the between-group comparison, the persons with aphasia group performed significantly worse than neurotypical participants across all domains (spontaneous speech, auditory-verbal comprehension, naming, repetition, reading and writing), with the greatest impairments on naming tasks, which require higher demands on lexical retrieval and executive processing.

Overall, the BST-T is a brief, practical, and psychometrically robust screening instrument for early detection of aphasia in acute care settings, which can be administered reliably to native Tamil speakers with and without aphasia in approximately 15 to 20 minutes. Its domain-specific scores offer clinically relevant information to support decisions about referral for comprehensive assessment and to guide initial management.

Study limitations

Both the persons with aphasia group and the neurotypical group were small and recruited from a limited number of sites, reducing statistical power and limiting generalizability to the wider Tamil-speaking community. Thus inferences about the BST-T's diagnostic accuracy were further limited by the clinical sample's unbalanced representation of stroke subtypes (ischemic versus hemorrhagic), lesion sites, and degrees of severity and chronicity.

Finally, concurrent validity was evaluated only against an existing screening instrument (LAST-T); the absence of comparison with comprehensive gold-standard aphasia batteries restricts the conclusion regarding the BST-T's sensitivity and specificity.

Future implications

Future research should recruit larger, more heterogeneous samples through multi-center collaboration across diverse clinical settings and hospitals in order to generate normative data stratified by age, educational attainment, literacy levels, geographic region, and dialect. Establishing such stratified norms will improve the interpretability and generalizability of BST-T scores across populations. To enhance diagnostic precision and clinical utility, researchers should assess criterion validity by comparing BST-T performance with that of comprehensive, gold-standard aphasia batteries. The BST-T should also be administered to participants with different aphasia types and at multiple post-stroke phases (acute, subacute, and chronic) to examine sensitivity to aphasia profiles and temporal changes in language function. Finally, larger-scale psychometric investigations, including inter-rater reliability, are necessary to extend and confirm the BST's measurement properties in broader clinical and community samples.

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APPENDIX I

Consent Form in Tamil

ALL INDIA INSTITUTE OF SPEECH AND HEARING (AIISH)

தகவல் வழங்கப்பட்ட சம்மதப் படிவம்

ஆய்வின் தலைப்பு: *கன்னடத்தில் உருவாக்கப்பட்ட "Bedside Screening Test for Aphasics" (BST)-ஐ தமிழுக்கு மாற்றம் செய்து அதன் செல்லுபடித்தன்மையை உறுதிப்படுத்துதல் (BST-T)*

பங்கேற்பாளரின் பெயர்: **வயது / பாலினம்:**
பிறந்த தேதி: **தொழில்:**
தொடர்பு எண்: **தேதி:**

மாண்புமிகு அய்யா / அம்மையீர்,

நான் கனிஷ்கா து, All India Institute of Speech and Hearing (AIISH), மைசூர்-இல் M.Sc. (Speech-Language Pathology) படிப்பில் பயிலும் மாணவி ஆக உள்ளேன். என் ஆய்வுத் பணியை **டாக்டர் எஸ். பி. கோஸ்வாமி**, பேராசிரியர் (Speech Pathology) அவர்களின் வழிகாட்டுதலினால் மேற்கொண்டு வருகின்றேன். ஆய்வின் ஒரு பகுதியாக, கன்னடத்தில் உருவாக்கப்பட்ட *Bedside Screening Test for Aphasics (BST)* கருவியை தமிழுக்கு மாற்றி அதன் செல்லுபடித்தன்மையை ஆராய்கிறேன். இந்த கருவி மொழி மற்றும் அறிவாற்றல் செயல்பாடுகளை மதிப்பீடு செய்வதற்காக, குறிப்பாக தாய்மொழி தமிழாகக் கொண்டுள்ள நரம்பியல் குறைபாடுகளுடன் வாழும் நபர்களுக்கு மதிப்பிட பயன்படும் வகையில் வடிவமைக்கப்படுகிறது.

மதிப்பீடு சுமார் 10–20 நிமிடங்கள் நீடிக்கும். உங்கள் பங்கேற்பால் எவ்வித எதிர்பார்க்கப்பட்ட அல்லது எதிர்பார்க்கப்படாத ஆபத்துகளும் இல்லை. உங்கள் பங்கேற்பு முழுவதும் தன்னார்வத்தின்பேரில் இருக்கும்; சேகரிக்கப்படும் அனைத்து தகவல்களும் ரகசியமாக வைக்கப்படும்

சம்மதக் குறிப்பு

இந்த ஆய்வின் நோக்கம், குறிக்கோள்கள் மற்றும் நடைமுறைகள் பற்றி எனக்கு விளக்கப்பட்டுள்ளது. எனது பங்கேற்பு முற்றிலும் விருப்பத்திற்கேற்ப என்பதையும், எந்த நேரத்திலும் அபராதம் இன்றி பங்கேற்பை மறுக்கவோ அல்லது விலகவோ முடியும் என்பதையும் புரிந்துள்ளேன்.

இந்த மதிப்பீட்டுக்கு சில நேரம் தேவைப்படலாம், மேலும் எனக்கு நேரடி நன்மை கிடைக்காமல் போகலாம் என்பதை நான் புரிந்துள்ளேன். இருந்தாலும், ஆய்வுக்காக பங்கேற்க சம்மதிக்கிறேன்.

நான், _____, கீழே கையொப்பமிடுபவர், இவ்வாய்வில் பங்கேற்க என் சம்மதத்தை வழங்குகிறேன்.
(தயவுசெய்து தேர்வு செய்யவும்): **ஏற்கிறேன் / ஏற்கவில்லை**

இடம்: _____
தேதி: _____
பங்கேற்பாளரின் கையொப்பம்: _____

APPENDIX II

Consent Form in English

ALL INDIA INSTITUTE OF SPEECH AND HEARING

Informed Consent form
Title of the study: Adaptation and Validation of Bedside Screening Test for Aphasics in Kannada to Tamil (BST-T)

Name of the Participant:
Age/Gender: **Date of Birth:**
Occupation: **Contact Number:**

Respected Sir/ Ma'am,

I am Kanishka D, currently pursuing my Master's in Speech Language Pathology at All India Institute of Speech and Hearing (AIISH), Mysore. I am doing my Dissertation under Dr. S.P. Goswami, Professor of Speech Pathology. As part of my Dissertation, I have adapted and validated the Bedside Screening Test for Aphasics in Kannada to Tamil.

The purpose of this study is to adapt and validate the Bedside Screening Test for Aphasics in Kannada to Tamil to screen the adapted tool is intended for the assessment of language and cognitive functions in individuals with acquired neurological conditions, particularly those who are native Tamil speakers.

The estimated time for the screening is approximately 10- 20 mins. There are no anticipated risks associated with your participation. Your participation is voluntary, and any information collected during the study will be kept confidential.

CONSENT FORM

I have been informed about the aims, objectives, and procedures of the study. I understand the possible risks and benefits associated with my participation. I am aware that my participation is voluntary and that I have the right to refuse participation or withdraw my consent at any time without penalty.

By agreeing to participate, I understand that I will need to allocate sufficient time for the assessments and that these may not result in any direct personal benefit.

I, _____, the undersigned, give my consent to participate in this research study.

(Agree/Disagree)

Place: Signature of the Participant

Date:

APPENDIX – III

Bedside Screening Test for Aphasics in Tamil (BST-T):

Screening Manual

Outline of BST-T Screening Manual

SI. No.	Language Domain	Subtest
1.	Spontaneous speech	c. Fluency
		d. Content
2.	Auditory verbal comprehension	f. Yes/No question
		g. Pointing Task
		h. Auditory word recognition
		i. Verification Task
		j. Sequential commands
3.	Repetition	e. Automatic speech
		f. Word level
		g. Phrase Level
		h. Sentence level
4.	Naming	d. Confrontational naming
		e. Responsive naming
		f. Lexical generative naming
5.	Reading	No subtest
6.	Writing	No subtest

ADAPTATION AND VALIDATION OF BEDSIDE SCREENING TEST FOR APHASICS IN TAMIL (BST-T)

Person's Name:		Date:
Person No:	Age/Gender:	Mother Tongue:
Education:		Clinician:

1) Spontaneous Speech

Mode of communication – Verbal/Non-verbal

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

b) Content- Observe and make a note of paraphasia (phonemic/literal, neologistic, semantic), or syntactic errors if present.

2) Auditory Verbal Comprehension

a) Yes-No Questions.

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

SI No	Test Items	Response
1.	உங்கள் பெயர் ராஜாவா? /uŋgaɭ peja:r ra:dʒa:va:/	
2.	நீங்கள் வெள்ளை நிற சட்டை அணிந்திருக்கிறீர்களா? /ni:ŋgaɭ veɭɭai nira ʂaṭṭai aɳiɳdirikkiri:rkaɭa:/	
3.	கார் வானத்தில் செல்லுமா? /ka:r va:naṭṭil sel:uˈma:/	
4.	நீங்கள் மெத்தையின் மேல் உட்கார்ந்திருக்கிறீர்களா? /ni:ŋgaɭ meṯaijin mēl uṯka:ɳdirikkiri:rkaɭa:/	
5.	காகிதம் தீயில் எரியுமா? /ka:gitam ṯi:jil erijuma:/	

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

b) Pointing Task

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

SI No	Test Items	Response
1.	ஸ்பூன் /spu:n/	
2.	மாடு /ma:ɖu/	
3.	தீப்பெட்டி /ṯi:ppeṭṭi/	
4.	பேனா /pe:na:/	
5.	நாற்காலி /na:ɾka:li/	

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

a) Auditory Word Recognition

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

SI No	Test Items	Response
1.	பூ /pu:/	
2.	கண் /kaɳ/	
3.	ஃபேன் /fe:n/	
4.	கத்தி /kaṯṯi/	
5.	மெத்தை /meṯṯai/	

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

c) Verification Task

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

SI No	Test Items	Response
1.	தட்டு, டம்ளர், ஸ்பூன் /ʈaʈʈu/, /ʈamɭar/, /spu:n/	
2.	பெஞ்ச், நாற்காலி, ஸ்டூல் /benʧ/, /na:ɾka:li/, /stu:l/	
3.	மருத்துவமனை, ரயில் நிலையம், பேருந்து நிலையம் /maruʈʈuvamaɳai/, /ɾajil nilaijam/, /pe:ɾuɳɖu ɳilaʲam/	
4.	குதிப்பது, ஓடுவது, உட்காருவது /kuðippəðu/, /o:ɖuʋəðu/, /uɖka:ɾuʋəðu/	
5.	காய்கறி, பொருள், பழம் /ka:jkaɾi/, /poɾuɭ/, /paʲam/	

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

d) Sequential Commands

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

SI No	Test Items	Response
1.	கண்களை மூடவும் /kaɳ:gaʲai mu:davum/	
2.	உங்கள் வலது கையை மேலே தூக்குங்கள் /uŋgaɭ valaʈu kajjai me:le: ðu:kkuŋgaɭ/	
3.	பேனாவை எடுத்து புத்தகத்திற்குப் பக்கத்தில் வையுங்கள் /pe:na:vai eduʈʈu puʈ:agaʈ:iɾku pakkaʈʈil ʋajjuŋgaɭ/	
4.	முதலில் பேனாவை கொடுத்து விட்டு பிறகு புத்தகத்தை மூடுங்கள் /muʈalil pe:na:vai koɖuʈʈu viʈʈu piragu puʈʈakaʈ:ai mu:duŋgaɭ/	
5.	பேனாவை கொடுத்த பிறகு டம்ளரையும் கண்ணாடியும் சேர்த்து கொடுங்கள் /pe:na:vai koɖuʈʈa piragu ʈamɭarajum kaɳɳa:ɖijum se:ɾʈʈu koɖuŋgaɭ/	

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

3) Repetition

a) Automatic speech

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

SI No	Test Items	Response
1.	மாதங்களின் பெயர்கள் கூறுங்கள் /ma:t̪aŋgaḷin pejarkaḷ ku:ɾuŋgaḷ/	
2.	ஒன்றில் இருந்து பத்து வரை எண்ணுங்கள் /oṇd̪ɾil iɾuṇdu pat̪t̪u vaɾai eɳɳuŋgaḷ/	
3.	வாரத்தில் உள்ள நாட்களின் பெயர்களைக் கூறுங்கள் /vaːɾaðɪl uḷḷa naːtkaḷin pejaɾgaḷai kuːɾuŋgaḷ/	
4.	பருவக்காலங்களின் பெயர்களைக் கூறுங்கள் /pəɾuvakkaːlaŋgaḷin pejaɾkaḷai kuːɾuŋgaḷ/	
5.	பத்தில் இருந்து பின்நோக்கி எண்ணுங்கள் /pat̪t̪il iɾuṇdu pinnoːkki eɳɳuŋgaḷ/	

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

b) Word

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

SI No	Test Items	Response
1.	வீடு /ʋiːɖu/	
2.	பள்ளி /paḷːi/	
3.	தலை /t̪alai/	
4.	கண்ணாடி /kaɳːaːɖi/	
5.	எழுபத்தொன்று /eɻubat̪ːoṇd̪ɾu/	

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

c) Phrase

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

SI No	Test Items	Response
1.	மாடு பால் தரும் /ma:ḍu pa:l t̪aṛum/	
2.	மழை வருகிறது /maɻai vaṛugiṛaðu/	
3.	இந்தியா என் நாடு /in̪dija: en na:ḍu/	
4.	வானம் நீல நிறம் /va:nam ni:la niṛam/	
5.	அவர்களுக்கு எல்லாம் தெரியும் /avaṛkaɻukku ella:m t̪eṛijum/	

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

d) Sentence

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

SI No	Test Items	Response
1.	அவர்கள் எல்லோரும் வேலைக்கு சென்றார்கள் /avaṛkaɻ ello:ṛum ve:laikku sen̪ṛa:ṛkaɻ/	
2.	சூரியன் காலையில் உதிக்கும் /su:ṛijan ka:laiyil uṭikkum/	
3.	இந்த இடம் மிகவும் அழகாக இருக்கிறது /in̪̪a iḍam migavum aɻaga:ka iṛukkiṛaṯu/	
4.	ஆசிரியர்கள் பள்ளியில் பாடம் கற்றுக் கொடுக்கிறார்கள் /a:siṛijaṛkaɻ paɭ:ijil pa:ḍam kaṯṯṛuk koḍukkira:ṛkaɻ/	
5.	மின்னுவதெல்லாம் பொன் அல்ல /minnuvaḍella:m pon alla/	

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

4) Naming

a) Confrontation naming:

Instructions: Instruct the person that flash cards will be shown and he/she has to name the picture that is presented. For ex, when you show the picture, ask "What is this "Can you name this?" Response should be verbal. Dysarthric errors are scored as correct. For stimulus 2, scoring should be given separately (/puːʈʈu/ -1 /saːʋi/-1)

SI No	Test Items	Response
1.	பூனை /puːnai/	
2.	பூட்டு சாவி /puːʈʈu saːʋi/	
3.	மரம் /maɾam/	
4.	தொலைபேசி /டெலிபோன் /t̪olaippeːsi/ /ʈelipōn/	
5.	வாளி/பக்கெட் /ʋaːɭi// /ˈbʌkɪt/	

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

b) Responsive naming

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

SI No	Test Items	Response
1.	வாழைப்பழம் என்ன நிறம்? /ʋaːɻaippaɻam enna niɾam/	
2.	நீங்கள் எதிலிருந்து தண்ணீர் குடிப்பீர்கள்? /niːŋgaɭ eṯilirun̪du taɳɳiːr kud̪ippiːrgaɭ/	
3.	நீங்கள் சமையலறையில் பார்க்கும் பொருட்களின் பெயர்களை கூறுங்கள் /niːŋgal samajalaraiyil paːrkːum poɾuʈʈkaɭin pejarkaɭai kuːɾuŋgaɭ/	
4.	நீங்கள் இப்போது பார்க்கும் பொருட்களின் பெயர்களை கூறுங்கள். / niːŋgal ipːoːd̪u paːrkːum poɾuʈʈkaɭin pejarkaɭai kuːɾuŋgaɭ/	
5.	நீங்கள் மார்க்கெட்டில் பார்க்கும் பொருட்களின் பெயர்களை கூறுங்கள் /niːŋgaɭ maːrkːeʈʈil paːrkːum poɾuʈʈkaɭin pejarkaɭai kuːɾuŋgaɭ/	

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

c) Lexical Generative Naming

Instructions: Explain the person that a question will be asked and they have to answer according to the question with respect to the number and category which is asked within the time which is told in the question. For ex: if it is to name food items, the person has to name in that category only. Repeat the commands once if the person looks confused / does not seem to hear. Dysarthric errors are scored correctly. Assign a score of 0.5 for 1–5 items, 1 for 6–10 items, 1.5 for 11–15 items, and 2 for 16–20 items named within 1 minute.

SI No	Test Items	Response
1.	காய்கறிகளின் பெயர்களைக் கூறுங்கள் /ka:jkaɾikaḷin pejarkaḷai ku:ɾuŋgaḷ/	
2.	வீட்டில் உள்ள பொருட்களைக் கூறுங்கள் vīṭṭil uḷḷa poruṭkaḷai ku:ɾuŋgaḷ/	
3.	விலங்குகளின் பெயர்களைக் கூறுங்கள் /vilaŋgugaliŋ peijaɾkalaiɒ̄ ku:ɾuŋgaḷ/	
4.	/க/ எழுத்தில் தொடங்கும் வார்த்தைகளைக் கூறுங்கள் /ka/ /eɻuṯṯil toḍaŋgum Vārthaigaḷai ku:ɾuŋgaḷ/	
5.	/ச/ எழுத்தில் தொடங்கும் மூன்று பழங்களின் பெயர்களைக் கூறுங்கள். பின்னர், இங்கு காணக்கூடிய மூன்று பொருட்களின் பெயர்களையும் ஒரு நிமிடத்திற்குள் கூறுங்கள். /sa/ eɻuṯṯil toḍaŋgum mu:ɳḍɾu paɻaŋgaḷin pejarkaḷai ku:ɾuŋgaḷ. pin:eɾ iŋgu ka:ɳakku:ḍiya mu:ɳḍɾu poɾuḷkaḷin pejarkaḷaiyum oru nimiṭattiɾkkuḷ ku:ɾuŋgaḷ/	

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

5) Reading:

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

SI No	Test Items	Response
1.	ஆ /a:/	
2.	தொலைபேசி /tolaippe:si/	
3.	மின்னுவதெல்லாம் பொன் அல்ல /minnuvadella:m pon alla/	
4.	106 /nu:tria:ru/	

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

6) Writing

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

- Ask the person to write his/her name, address, immediate family member's name, occupation name
- Ask the person to write a few numbers, days of the week/months of the year, etc., for automatically sequential writing. (Sequential variation can be considered as correct).
- Ask the person to copy letters that are written on flash cards (ku, ti, hu, si)
- Ask the person to do simple calculations (addition, subtraction, multiplication, etc.), symbols like (circle, square, rectangle, cube, etc.).

Maximum score: 8 Persons score: ----

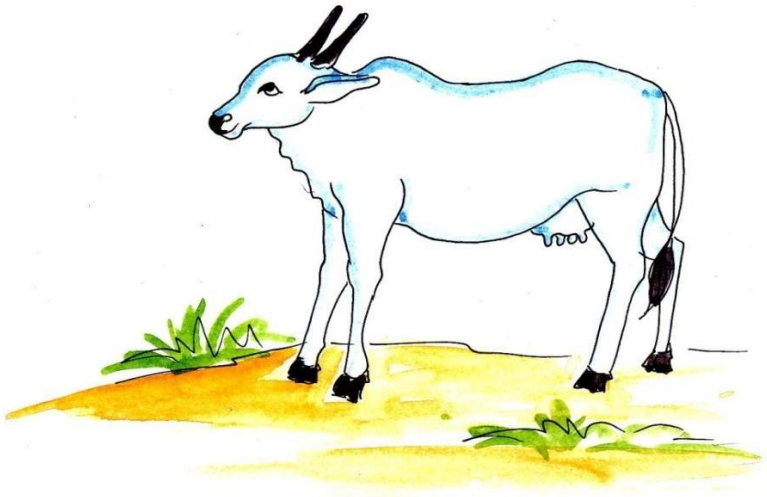
Scoring criteria:

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

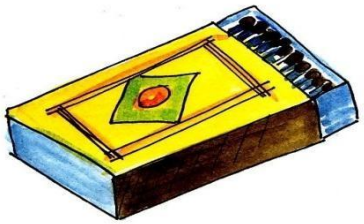
BEDSIDE SCREENING TEST FOR APHASICS IN TAMIL

(Picture cards used during administration)

Pointing task 1

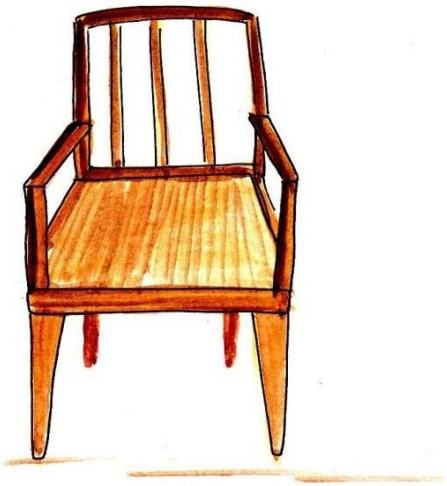


Pointing task 2



Pointing task 3

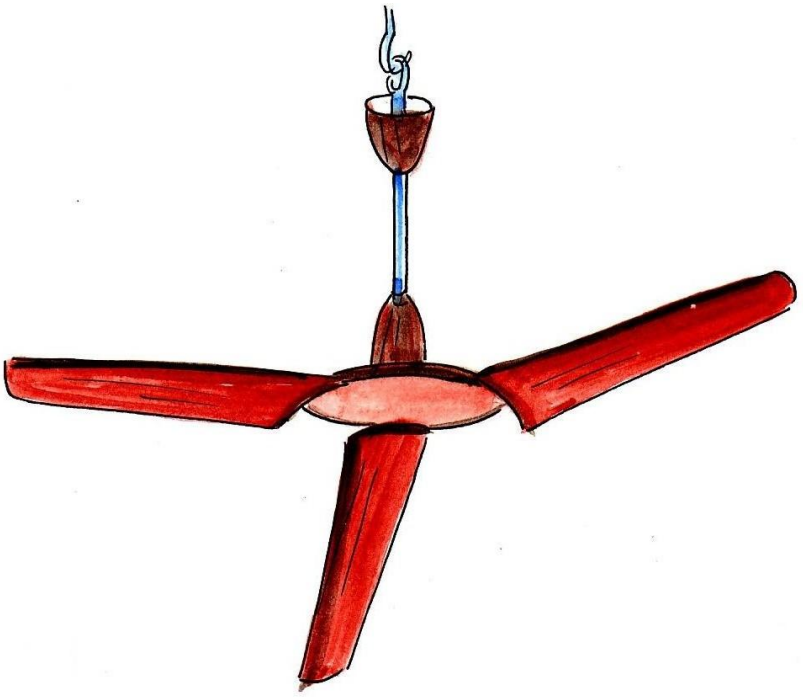
Pointing task 4



Pointing task 5

Auditory word recognition 1

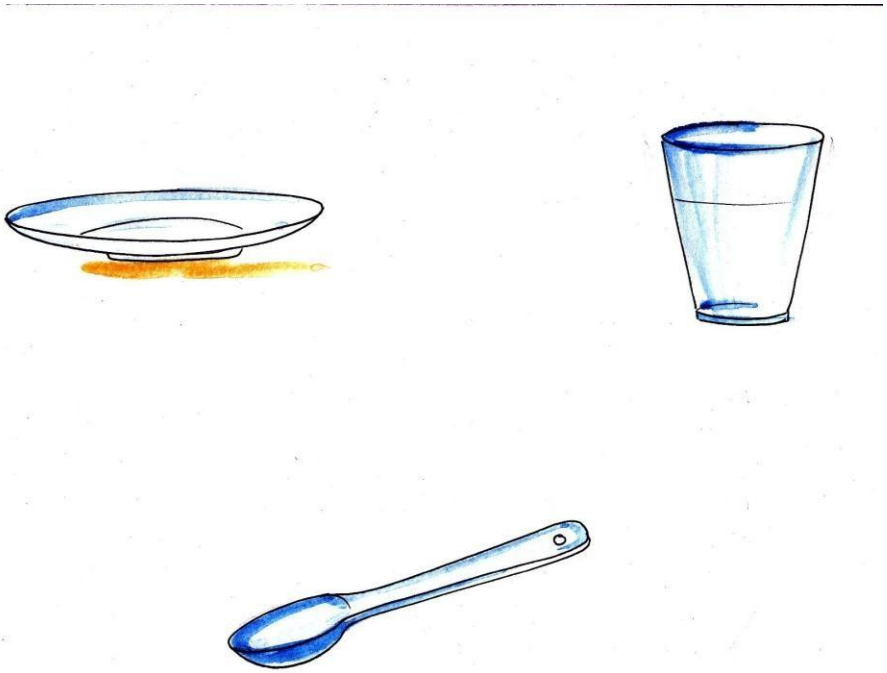
Auditory word recognition 2



Auditory word recognition 3

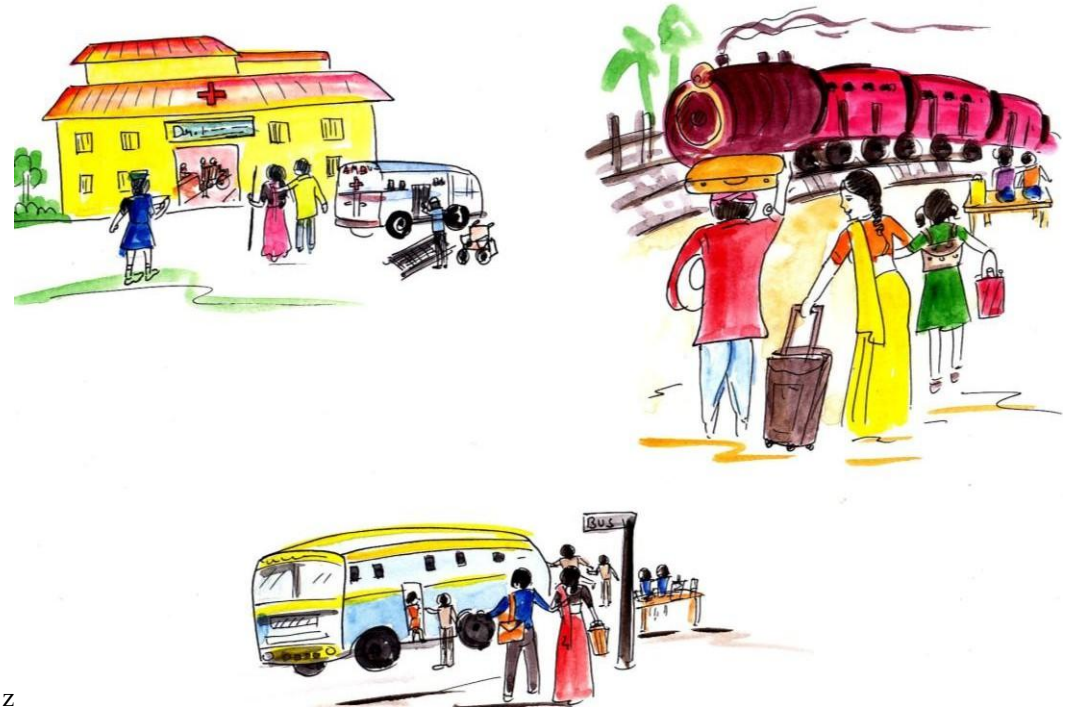
Auditory word recognition 4

Auditory word recognition 5



Verification task 1

Verification task 2



z

Verification task 3

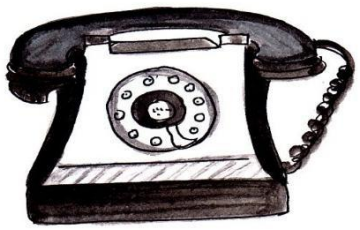
Verification task 4

Verification Task 5

Confrontation Naming 1

Confrontation Naming 2

Confrontation Naming 3



Confrontation naming 4

Confrontation naming 5

READING 1

ஆ

READING 2

தொலைபேசி

READING 3

மின்னுவதெல்லாம் பொன்னல்ல

READING 4

106

WRITING 1

கு

ஹு

சி