

**Validating Manual for Treatment of 3R (Reading,
Writing and Arithmetic) in Persons with Adult
Aphasia- in Kannada
(MTR3A2-K)**

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CHAPTER I

INTRODUCTION

Aphasia is described as “a multi-modality reduction in the capacity to decode (interpret) and encode (formulate) meaningful linguistic elements. It is manifested as difficulties in listening, reading, speaking and writing” (Darley, Aronson & Brown, 1975, as cited in Benson & Ardila, 1996). Most clinicians and investigators agree that aphasia is not a loss of language (either vocabulary or rules) but is the result of impairment in processes necessary for comprehending, formulating and producing spoken and written language (Brookshire, 2003). Aphasia will affect a person’s ability to understand and produce the spoken and written messages. Although these impairments exist, the specific pattern depends on the location and extent of the brain lesions (Murdoch, 1990).

Literacy skills involve reading, writing and mathematical skills. Reading is defined as a “cognitive process by which one derives meaning from printed symbols” (Catts & Kamhi, 1986). Writing is defined as “a system of human visual communication using signs or symbols associated by convention with units of language-meanings or sounds-and recorded on materials such as paper, stone, or clay” (Webster’s dictionary). Mathematics is defined as “the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations” by the Webster’s dictionary. While reading requires complex cognitive processes, writing includes language, thought and motor skills. The loss of the ability to read and write can have an impact on the person’s social life. Also, the loss of mathematical skills can affect the person’s activities of independence.

Read and written language represent analogous functions for a visual language system. These two components are important in carrying out the various activities of daily

living and vocation. The ability to translate an idea or concept into written language has become increasingly important in modern Indian lives. Any impairment in reading and writing may hamper his/her participation in the society and in most circumstances, changes a persons' life dramatically. Considering the present era of technology, the reading and writing has become an integral part of the system. Persons with aphasia find it difficult to cope in the society as a result of reading, writing and arithmetic impairment/s. Reserach indicates that the reading, writing and arithmetic deficits are the most common concomitants in persons with aphasia (Beeson, 2004; Benson & Ardila, 1996; Semenza, Delazer, Bertella, Grana, Mori, Conti, et. al., 2006). Thus, in the present study an attempt has been made to validate a treatment manual for reading, writing and arithmetic skills in persons with aphasia.

1.1 Need for the study

Although there have been various therapy techniques and manuals for the treatment of aphasia, majority of them refers to the western population (English language) for example, the Manual of Aphasia Therapy developed by Longerich (1968) and Manual for Aphasia therapy by Estabrooks and Albert (1991). Due to the vast ethno-cultural and language factors along with differences in orthographic and morpho-phonemic rules, the manuals available for reading and writing in the West cannot be used in India. While reviewing the literature, it was noted that there were very few rehabilitation methods with empirirical evidence for acquired reading, writing disturbances in adult persons with aphasia and most of the studies were focused on developmental dyslexia for children and language rehabilitation in persons with aphasia. Clinically, symptoms of reading and writing disturbances in persons with aphasia vary from the symptoms found in reading and writing problems of children in general. And those treatment methods prescribed for developmental dyslexia are often ineffective in treating reading and writing deficits in persons with aphasia. In the Indian context, Manual for

Treatment of Reading, Writing and Arithmetic for Persons with Adult Aphasia in Kannada (MTR3A2-K) was developed by Kruthi and Goswami (2011). This manual consists of various activities targeting to improve the skills of persons with aphasia on reading, writing and arithmetic abilities for native Kannada speakers. MTR3A2-K, Manual for Adult Non-Fluent Aphasia Therapy-in Hindi (MANAT-H, Deshpande & Goswami, 2004), Manual for Adult Non-Fluent Aphasia Therapy-in Kannada (MANAT-K, Venugopal & Goswami, 2005) and Manual for Adult Fluent Aphasia Therapy-in Kannada (MAFAT-K, Chaitra & Goswami, 2009) have been developed and these manuals focused mainly on developing materials for therapy purposes. But till date only MANAT-K (Goswami, Shanbal, Navitha & Samasthitha, 2010) and MAFAT-K (Goswami, Shanbal, Chaithra & Ranjini, 2011) were field tested and they have been proven to be effective for persons with non-fluent and fluent aphasia. By using a field tested manual that provides a direction for speech language pathologists to initiate a remediation programme for reading, writing and arithmetic deficits and subsequently monitor the progress. Also, the effectiveness of the rehabilitation for persons with aphasia can be better assessed and documented using a validated manual. Hence, this study was taken up to validate the effectiveness of the Manual for Treatment of Reading, Writing and Arithmetic in persons with Adult Aphasia in Kannada.

1.2 Aim of the study

The main aim is to validate the ‘treatment manual for reading, writing and arithmetic for persons with adult aphasia in Kannada (MTR3A2-K)’.

CHAPTER II

REVIEW OF LITERATURE

Reading and writing deficits are very common and persistent following stroke in literate adults. There have been several types of reading, writing and mathematical difficulties reported in persons with aphasia (Benson & Ardila, 1996; Murdoch, 1990).

2.1 Aphasia and reading writing disturbances

Aphasia is a language disorder which results from damage to regions of the brain which sub-serve the formulation and understanding of language and its elements, i.e. phonological, semantic, morphological and syntactic knowledge (Helm-Estabrooks & Albert, 2004). Persons with aphasia typically experience associated impairments of spoken and written language due to left perisylvian damage (Benson & Ardila, 1996; Goodglass, 1993). The impairments in reading, writing and mathematical skills vary in type and severity depending on the site and extent of the neurological insult. Consequently, for conducting research on deficits in reading and writing in persons with aphasia and treatment approaches, it is important to understand the processes involved in reading, writing and mathematical skills per se.

Reading comprehension deficits are frequent concomitants of aphasia. Reading impairment can be attributed to the language impairment in persons with aphasia. Thus, similar to the varied nature of language impairment, reading deficits are also variable depending on the site of lesion, and extent of brain damage (Benson, 1985). Reading deficits can be minimal to severe, including literal paralexias, word substitutions, additions, omissions, perseverations and poor reading comprehension (Benson & Ardila, 1996).

Writing can be a major concern for persons with aphasia. Consequent to stroke, hemiplegia will leave the individual with the non-dominant hand for functional purposes. Apart from the motor impairment in writing, there can also be additional errors in spelling, word order, sentence formation etc. In spite of the motor limitation, there have been reports of better written naming than spoken naming, suggesting that the processes for speech and writing can be differentially impaired (Basso, Taborelli, & Vignolo, 1978; Bub & Kertesz, 1982; Ellis, Miller, & Sin, 1983; Levine, Calvanio, & Popovics, 1982). Writing deficits in individuals with aphasia have been studied widely and commonly observed deficits are impaired memory of spelling for words, difficulty with irregular, infrequent and words of longer length, and poor formation of letters (Beeson, 2004). It is also reported that understanding of written words is easier than understanding spoken words for persons with aphasia (Whitworth, Webster & Howard, 2005). This is supported by Francis, Riddoch and Humphreys (2001) who suggest that visualizing the written form of spoken words makes it easier to access the word meaning.

Mathematical skills which require a person's analytical skills, reasoning and understanding, also seem to be affected in persons with aphasia. Mathematical abilities were assessed in persons with aphasia by Semenza et. al., (2006). They found that acalculia was present in different degrees in all the participants. They concluded that the mathematical impairment depends on the type of aphasia, and also that language and calculation are processed in the same (left) hemisphere.

2.2 Reading and writing: A model based explanation

There have been several models put forth to explain the processes of reading and writing. Two models that are universally accepted are the Dual Route Cascaded Model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) and the Lexical Processing Model (Caramazza, 1988; Morton, 1981 & Shallice, 1981).

A. Lexical Processing Model: The lexical processing system that is involved in reading and writing has been explained by Caramazza (1988), Morton (1981) and Shallice (1981).

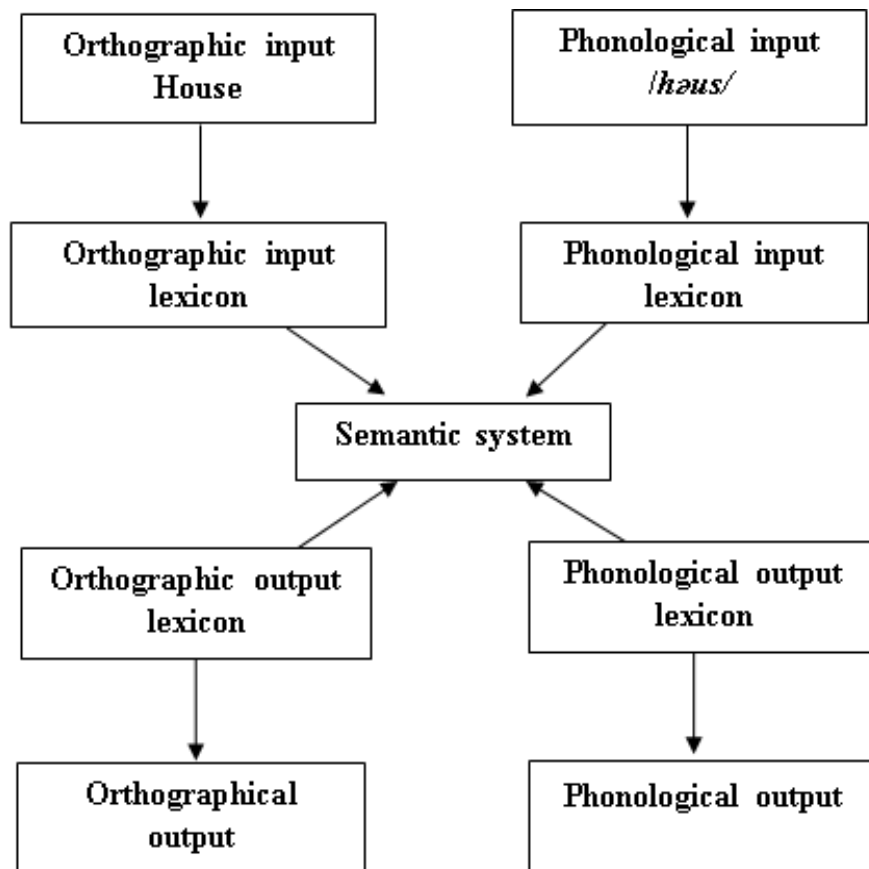


Fig. 1. Schematic representation of the lexical processing system involved in reading and writing. (Source: Caramazza, 1988; Morton, 1981 & Shallice, 1981).

According to Caramazza (1988), Morton (1981) and Shallice (1981), the processes of reading and writing involve the following systems. The input components are those involved

in comprehension of written and spoken words. The output components are those involved in production of written and spoken words. Orthographic input lexicon (OIL) includes mechanisms for recognition of written words. Phonologic input lexicon (PIL) includes mechanisms for recognition of spoken words. The lexical semantic system stores semantic representations of both written and spoken words. Orthographic output lexicon (OOL) stores orthographic representations of words. Phonologic output lexicon (POL) stores phonologic representations of words. In the process of oral reading, OIL, semantic system and POL are activated. In the process of silent reading, OIL and semantic system are activated. During spontaneous speech, semantic system and POL are activated. During spontaneous writing or written naming, semantic system and OOL are activated. For the purpose of writing to dictation, PIL, semantic system and OOL are activated. During copying OIL, semantic system and OOL are activated. In persons with Aphasia one or more of these systems can be affected leading to varied patterns of deficits.

B. The Dual Route Cascaded Model: The Dual route cascaded (DRC) model is a computational model that proposes two routes for reading, a lexical and a non-lexical route (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001). The lexical route involves accessing the representations of words in the orthographic input lexicon, and then activating the phonological output lexicon which activates the phonemes of the words to be read. The non-lexical route applies grapheme to phoneme conversion rules to convert the letters to speech sounds. Non-words can be read via the non-lexical route. Also, irregular words are regularized if processed by the non-lexical route. Based on this model, different types of acquired dyslexia have been proposed. Surface dyslexia results from impaired lexical route. Phonological or deep dyslexia results from impaired non-lexical route.

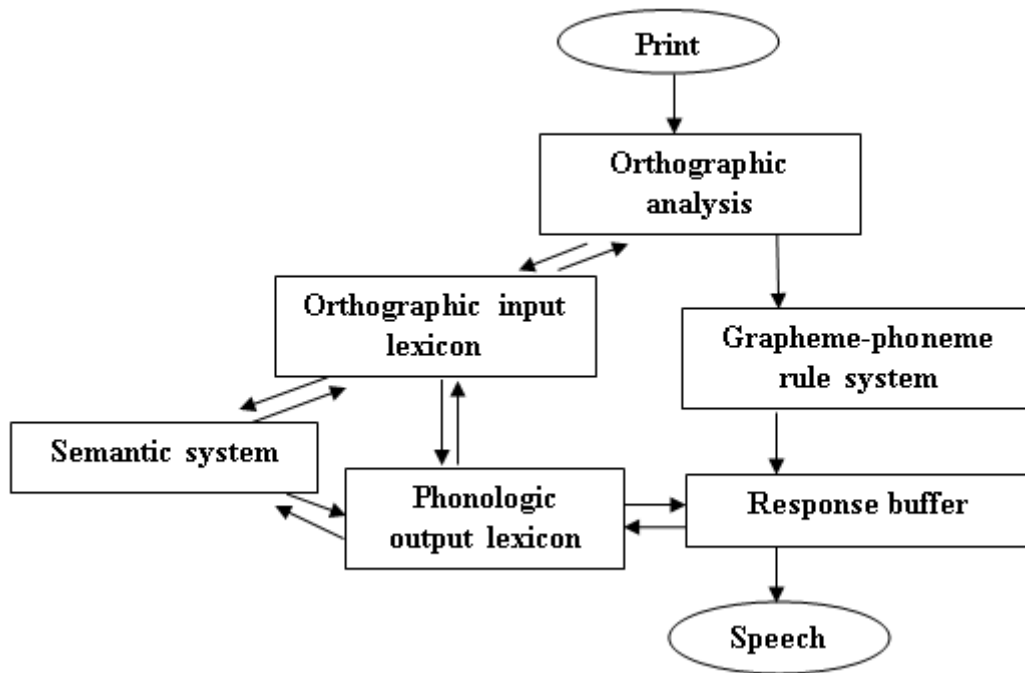


Fig. 2. The Dual Route Cascaded model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001).

(Source: David A. Balota, Melvin J. Yap, and Michael J. Cortese, 2006).

2.3 Classification of dyslexia and dysgraphia in persons with Aphasia

Classification of dyslexia in persons with aphasia begins with a general distinction between peripheral and central dyslexias. The classification of dyslexias based on the DRC model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) is as follows:

A. Surface dyslexia: The ability of reading regular words and non-words remain intact, but irregular words are regularized (Behrmann & Bub, 1992; McCarthy & Warrington, 1986). There is a selective impairment in the lexical route, but an intact non-lexical route (Marshall & Newcombe, 1980; McCarthy & Warrington, 1986; Shallice, Warrington, & McCarthy, 1983).

B. Phonological dyslexia/ Deep dyslexia: The ability of reading regular words and irregular words remain intact, but non-word reading (which does not have a lexical representation) is impaired. There is a selective impairment of the non-lexical route, but the lexical route is preserved (Patterson, 1982; Shallice & Warrington, 1980). A

characteristic feature of phonological dyslexia is the preserved ability to read pseudo-homophones (E.g. 'CHARE'), but impaired non-pseudo-homophones (E.g. 'DOAJ'), indicating processing in such persons occurs via the intact lexical route and not the impaired non-lexical route (Reynolds & Besner, 2005).

Dyslexia classification in aphasia is arbitrary and is "not informative with respect to the nature of damage that underlies the reading disorder" (Hillis & Caramazza, 1992). There is no fixed relationship between dyslexia classification and diagnostic categories of aphasia. Different types of aphasia can have the same reading impairment, and one type of aphasia such as Broca's aphasia can have different types of reading impairments (Hillis & Caramazza, 1992). Classification of dysgraphia based on the DRC model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) is as follows.

- A. Surface dysgraphia: Impaired access to the lexical-orthographical representation of a word but intact access to the phoneme-grapheme correspondence (Beauvois & Dérusné, 1981; Hatfield & Patterson, 1983).
- B. Phonological dysgraphia: Impaired access to the phoneme-grapheme conversion and can therefore spell words only by accessing stored whole-word orthographic representations (Shallice, 1981).
- C. Deep dysgraphia: Impaired access to the phoneme-grapheme conversion and the lexical route may also be impaired. Semantic substitutions and/or neologisms are produced due to impaired semantic system; this semantic involvement is the critical symptom differentiating this disorder from phonological dysgraphia (Alexander, Friedman, Loverso, & Fischer, 1992; Bub & Kertesz, 1982).

2.5 Anatomical correlates of reading writing disturbances in persons with Aphasia

The French neurologist, Dejerine (1891) reported that the cortical regions around the dominant angular gyrus are important for writing ability. Theories concerning information processes do not view different aspects of language as different skills with a certain focal localisation: 'There is no single brain centre for reading, writing, or comprehension. There are only networks of highly specific mechanisms dedicated to the individual operations that comprise a complex task' (Caramazza, 1997, p. 133). However, the neuroanatomical correlates of writing may be grouped according to the different processes identified (Rapcsak & Beeson, 2002). Extrasylvian lesions involving the left temporo-parietal-occipital junction, in particular damage to the left angular gyrus, causes difficulties such as those found in surface dysgraphia. The lesion sites reported as causing phonological dysgraphia are more varying, but perisylvian lesions dominate. The perisylvian region has been suggested as the location of a phonological network, involved also in activities other than writing (Alexander, Friedman, Loverso & Fischer, 1992), which is also supported by results from fMRI analysis of a non-brain-damaged group (Beeson & Rapcsak, 2003). With regard to semantic processing involved in writing, which is affected in deep dysgraphia, regions within the left extrasylvian frontal and temporo-parietal cortex are active. A somewhat different explanation for the semantic difficulties in deep dyslexia is the possibility of right-hemisphere reading in patients with extensive left-hemisphere damage (Coltheart, 1980, 2000).

2.5 Nature of reading and writing deficits in persons with different types of aphasia

Web and Love (1983) conducted a study to assess the reading deficits in persons with chronic aphasia. They included thirty-five persons with aphasia who were one year or longer post onset of brain injury and were given a battery of reading tests which was composed of recognition and oral reading tests for letters, words, sentences and paragraphs, and

comprehension tests for sentences and paragraphs. Results revealed a residual reading disorder in all participants, with highest error rate on comprehension tests, followed by oral reading tests, and then recognition tests. Reading ability was found to be related to overall language skill, level of education, and oral reading ability.

Recognizing sounds associated with written words is impaired in persons with Wernicke's aphasia (Hegde, 2006). There is impaired recognition of alphabet, understanding the meaning of printed words, but easy and effortless writing with well formed letters. Writing is neologistic with incorrect combination or omissions of letters. The written samples contain normal phrase and sentence lengths with word substitutions (paraphasic writing). Agrammatic writing is uncommon in these persons (Hegde, 2006). These persons with aphasia write with their dominant hand and in cursive style. The persons with Wernicke's aphasia may be unaware of their writing problems (Murdoch, 1990).

Reading aloud is intact but with word substitutions in persons with transcortical sensory aphasia. Comprehension of the read material, however may be extremely limited or totally absent. Writing contains paraphasic errors with frequent misspelling; somewhat comparable to the writing problems of persons with Wernicke's aphasia, with relatively preserved oral reading skills (As cited in Hegde, 2006).

Reading aloud is impaired in persons with conduction aphasia. Oral reading involves paraphasias, and inability to read short printed materials. Nonetheless, silent reading and comprehension of long and complex material as a novel or a scientific book is intact (Murdoch, 1990). On the other hand, writing in persons with conduction aphasia is slow and effortful with letter omission, substitutions and addition errors, but with intact grammar

(Hegde, 2006). However in persons with anomic aphasia, normal or near-normal oral reading and writing skills have been reported (As cited inHegde, 2006).

Oral reading is effortful and non-fluent in persons with Broca's aphasia. Reading aloud is poor, with their reading comprehension being similar to auditory comprehension (Benson & Ardila, 1996). Reading comprehension is considerably better than reading aloud, but most persons with Broca's aphasia find reading difficult and tend to avoid it (Benson & Ardila, 1996). Writing is sparse and effortful with omission of grammatical elements (agrammatic writing). Individual letter formation is usually clumsy, oversized and poor. The written material contains multiple misspellings and omission of letters. Since most persons with Broca's aphasia have concomitant hemiplegia, they are required to use their left hand for writing. These persons are better able to copy written material than write either to oral command or to dictation (As cited in Hegde, 2006).

Reading aloud and reading comprehension are better preserved than either speaking skills or writing skills in individuals with transcortical motor aphasia (TMA). In persons with transcortical motor aphasia-type I, reading aloud and reading comprehension is better than writing, just as spoken language comprehension is better than expression. Reading comprehension is at normal level except for syntactically complex material, but reading aloud tends to be slow and difficult to maintain (Benson & Ardila, 1996). In persons with transcortical motor aphasia-type II, reading comprehension is limited to matching of object to picture, but reading aloud may be near-normal (Rubens, 1975). Writing problems in persons with transcortical motor aphasia are generally similar to the writing problems of persons with Broca's aphasia. Sparse and clumsy writing is present with frequent misspellings (As cited in Hegde, 2006).

A total impairment in reading aloud, reading comprehension and writing has been reported in persons with mixed transcortical aphasia present. Reading aloud and reading comprehension are severely limited. Writing spontaneously is affected, but writing to dictation is preserved (Bogousslavsky, Regli & Assal, 1988).

Reading and writing deficits are parallel to the severe language deficits observed in persons with global aphasia. Writing is unintelligible. Only few letters and strokes may be preserved (As cited in Hegde, 2006). Thus, the type of reading and writing problems are highly variant among different types of aphasia. Also, the aphasia types do not follow the fixed pattern of acquired dyslexias/ dysgraphias classification.

2.6 Rehabilitation of reading writing disturbances in persons with aphasia

Aphasia rehabilitation is typically directed toward the improvement of spoken language, but reading writing is also affected. Most importantly, working on functional reading and writing may be beneficial to the individual to express immediate requirements. Similar to rehabilitation in other language modalities, treatment for reading and writing impairment may serve to strengthen impaired processes and promote the use of residual abilities. As cognitive processes are strengthened and possibly reorganized, habitual use of new and compensatory behaviours must be established. It is important to keep in mind that treatment goals are influenced by the functional needs of the persons with aphasia, therefore target words and skills are selected on the basis of personal needs of the individuals with aphasia (Beeson, 2006).

Although there are a plenty of evidence for impaired literacy skills in persons with aphasia, research on intervention for aphasia has mainly focused on improving spoken language (Beeson & Henry, 2008; Hillis & Caramazza, 1992; Mayer & Murray, 2002). There are limited treatment strategies that are specifically proposed for improving the literacy skills

of a person (Beeson, 1998; Beeson, Hirsch & Rewega, 2002; Cherney, Merbitz & Grip, 1986; Moyer, 1979; Tuomainen & Laine, 1991). As the recent communication intervention for aphasia is beginning to focus on the life participation and quality of life issues (Chapey, Duchan, Elman, Garcia, Kagan, Lyon & Simmons-Mackie, 1994; Cruice, Worrall & Hickson, 2006), it is equally important to improve the literacy skills for ensuring pre-morbid participation and functioning in life (Obregon, 2008; Strauss, 1999).

Reading and writing deficits can be addressed by focusing on word retrieval using semantic tasks or the tasks that involve the re-learning of spelling to sound correspondence rules (Kiran, Thompson, & Hashimoto, 2001).

Intervention strategies for reacquisition of reading have more of theoretical basis than empirical support. These treatments to improve reading skills are basically those used in traditional language treatment approaches. Reading ability is best judged on a silent reading task, because reading aloud demands oral production of the words without comprehension or retention of meaning (Porrazzo, 1975). Hence, the comprehension of meaning would be masked by poor speech production abilities in persons with aphasia. Nevertheless, oral reading can be used to make other observations such as occurrence of paraphasic errors, omissions and substitutions or errors that suggest visual field defect.

Pre-morbid reading skills and current interest to read will dictate the extent of treatment required in these skills. Basic and functional reading skills may be useful treatment targets for those persons who have mild or moderate degree of aphasia (Brookshire, 2003). Selecting individual-specific reading skills such as survival reading skills is an initial step of reading intervention (Rosenbek, 1989).

Strategies to facilitate reading comprehension was compiled by Brennan, Worrall and McKenna (2005) and Howe, Worrall and Hickson (2004) for persons with aphasia. The four

aphasia friendly text principles include the use of: (a) simple words and sentences, (b) large print (i.e., 18-point Arial font), (c) large amounts of white space, and (d) relevant pictures (e.g., visuographic context such as; clip art, line drawings, hand drawn sketches, etc.)

Maher, Clayton, Barrett, Schober-peterson and Rothi (1998) targeted visual orthographic analysis to improve letter by letter reading in a post stroke individual. This involved semantic access and motor cross cueing strategies to reactivate access to letters and found apparent benefit following motor-cross cueing strategy but not with semantic strategy.

Earlier, retraining in writing for persons with aphasia was assumed only as an additional treatment task for 'global stimulation' of language. However, researchers and practitioners have focused on selective intervention methods for retraining persons with aphasia in writing (Carlomagno & Iavarone, 1990 as cited in Murdoch, 1990).

Traditionally, researchers advocated two approaches for treatment of writing in persons with aphasia: lexical writing route (training via repetitive practice) and sub-lexical route (re-teaching phoneme to grapheme correspondence)(Beeson, Rising & Volk, 2003).Behrmann (1987) retrained lexical spelling route via training of homophone pairs. It resulted in improvement of homophones and irregular word spelling, possibly due to reinstatement of lexical spelling and use of a visual check mechanism which detected spelling errors. Luzzatti, Colombo, Fruscati and Vitolo (2000) conducted a study involving improvement of phonological segmentation and phonologic to grapheme conversion in an Italian with aphasia. The participant, at the end of therapy, showed near normal performance in writing, making errors only on words with non-univocal spellings. Of the two approaches, improvements in repetitive tasks carried out over a long period have been found to be more effective (cited in Whitworth, Webster & Howard, 2005).

A variety of neurological conditions can cause significant impairment to neuromuscular control of the hand, making legible writing impossible. In the case of hemiparesis of the preferred hand, writing can be shifted to the non-dominant hand. Some persons make this transition and adjust to the awkwardness with few complaints, whereas others need to be guided and provided with structured writing homework to make use of the non-dominant hand for writing. Those with right hemiparesis often have significant language impairment as well, so that central as well as peripheral processes are impaired; treatment of these persons should address both aspects of spelling and writing. The goal of treatment for peripheral writing impairments is to improve the accuracy of letter selection and the graphomotor control necessary to form legible spelling. Treatment may serve to improve the impaired skills or may involve the development of strategies to compensate for the impairment (Beeson, Rising & Volk, 2003).

Reading and writing are relatively more researched areas in persons with aphasia as compared to arithmetic. Both language and arithmetic are logical, generative systems in which elements are combined by rules to produce statements. Brain lesions that cause receptive or Wernicke's aphasia are often associated with impairment of the ability to solve arithmetic problems. Although aphasia and acalculia often are associated, acalculia can also exist independently (Beeson & Rapcsak, 2003).

Basso and Cattaneo (2011) evaluated 33 papers published between 1979 and 2007 based on treatment for reading, writing and acalculia. Based on the review report on treatment for reading, researchers have observed that two reading routes (lexical and sub-lexical) were treated either separately or simultaneously depending on the disorder. Treatment varied from English contrasting to Italian, where there is a complex relation between the phonology and orthography. In Italian, it was possible to read almost all words using the sublexical route by applying the grapheme to phoneme conversion rules. In some

studies, the treatment for letter by letter dyslexia consisted of semantic judgement of the word presented in a tachistoscopic form. Less clearly identifiable treatments were followed by other studies. Similar to studies based on cognitive model of functional damage, these studies also considered single cases. Treatment duration varied from 10 days to months (31) and the therapy sessions were also variable with a maximum of 355 sessions, with individual session duration being variable.

Analyzing 20 studies published between 1974 to 2005 on treatment for writing, most of the articles were based on the two-way model of writing proposed based on the principle of cognitive neuropsychology and the two writing routes. Most studies presented single cases or series of two or three cases, four studies reported the results of small groups (from 5 to 10 patients). Treatment duration was variable, from a minimum of six to a maximum of about 200 sessions, as was duration of single sessions (up to two hours per session). Often the two writing routes (lexical and sub-lexical) were treated simultaneously; in other studies, treatment was directed toward the damaged component (orthographic lexicon or orthographic buffer). In some persons with severe aphasia, an attempt was made to reconstruct a small vocabulary to enable communication.

Seven single case studies between 1980 and 2007 were identified for treatment of acalculia. The ability to transcode from one code to another (from Arabic numerals to numbers or from written number-words to phonology) was treated in five persons, re-learning of numbers in three persons, multiplication procedures in two persons and calculation procedures in four persons. In many studies, the calculation procedures were treated after reacquisition of transcoding abilities.

The literature on treatment for reading and writing disorder secondary to aphasia is limited. The intervention strategies proposed for reading and writing impairments associated

with aphasia are either combined or individually targeted. However, few approaches have been proposed which target the reading and writing deficits individually (Cherney, Merbitz & Grip, 1986; Moyer, 1979; Beeson, 1999).

2.7 Intervention for reading impairment in persons with Aphasia

To improve reading at text level, an approach called Oral Reading for Language in Aphasia (ORLA) was proposed by Cherney, Merbitz and Grip (1986). This approach involves reading of passages by individuals with aphasia guided by clinicians. They found increased reading accuracy and good reading comprehension when administered on ten persons with aphasia. Another similar approach proposed by Moyer (1979), was the Multiple Oral Re-reading (MOR). This approach has also been found to be effective for improving reading rate in acquired reading disorders (Beeson, 1998; Moyer, 1979; Tuomainen & Laine, 1991).

Corresponding to the single word spelling in individuals with aphasia, many researchers have examined both lexical and phonological approaches. Lexical approaches include retraining specific orthographic representations for target words and most probably rely on repeated copying and recall of target words (Beeson, 1999). Phonological treatments for spelling focus on retraining phonological awareness or specific sound to letter correspondence so that spellings may be assembled (Hillis & Caramazza, 1994), or emphasize the use of phonological information to support a problem solving approach to spelling (Beeson, Rewega, Rapcsak & Vail, 2000). While phonological treatments offer the greatest potential for generalized improvement in spelling, lexical treatments result in item-specific improvement. However, lexical treatments may be the best approach when phonological abilities appear to be too weak for remediation and have been shown to have

strong therapeutic value when used with individuals with severe language impairment (Beeson, Rising & Volk, 2003).

Orjada and Beeson (2005) published an article on concurrent treatment of reading and spelling in a single case study of an individual with chronic aphasia, alexia and agraphia which consisted of a combination of Oral Reading Treatment (ORT) and Copy and Recall Treatment (CART) that was conducted for 10 weeks. Personally relevant scripts were created and served as the text for treatment. In order to determine the progress and maintenance of treatment gains, repeated probes at the beginning of each session were used. Their results indicated a large treatment effect obtained for reading accuracy of personally relevant scripts and spelling of target words and treatment gains were maintained at follow up probes. Pre- and post treatment measures indicated significant improvement in reading and spelling with an increase in the grammatical complexity of spoken language.

2.8 Intervention for writing impairment in persons with Aphasia

Haskins (1976) proposed a hierarchy of skills for writing intervention as follows:

- Say the sound a letter represents and have the person point to the correct printed letter.
- Name an alphabet and have the person point to the correct printed letter.
- Say a word and have the person point to the correct printed word.
- Have the person trace the printed letters of the alphabet.
- Have the person copy the printed letters.
- Have the person write letters and then words on dictation.
- Have the person copy sentences.
- Have the person write sentences to dictation.
- Design additional steps as necessary.

Although there have been several studies conducted on different treatment strategies for improving writing skills in persons with aphasia, there is limited documentation about successful intervention strategies for writing difficulties in persons with aphasia (Beeson & Hillis, 2001). There has been strong support for lexical-semantic approaches for individuals with mild to moderate aphasia (Aliminosa, McCloskey, Goodman-Schulman, & Sokol, 1993; Carlomagno, Iavarone, & Colombo, 1994; Hillis, 1989) and those with severe aphasia, including severe Wernicke's, Broca's, and global aphasia (Beeson, 1999; Robson, Marshall, Chiat, & Pring, 2001; Robson, Pring, Marshall, Morrison, & Chiat, 1998). Beeson, Hirsch, & Rewega (2002) proposed a technique based on the lexical-semantic approach to writing treatment, the Copy and Recall technique. This involves repeated copying of words in the presence of pictured stimuli. This was followed by recall of words by written picture naming. Beeson et al. (2002) used CART on an individual with severe Broca's aphasia for three months with two sessions per week. He observed that the individual relearned the spelling of 46 words.

Another approach proposed by Beeson et al. (2002) is the Anagram and Copy technique (ACT). This involves arrangement of component letters of a word followed by copying of the target word repeatedly. The arrangement of letters places less demand on the individual when compared to spontaneous writing or written naming. This also allows trial and error learning of ordering the letters. Beeson, Rising and Volk (2003) have found that both ACT and CART facilitate relearning of written words for communication in persons with aphasia.

Ball and Riesthal (2011) investigated the treatment efficacy of modified versions of ACT and CART in persons with severe aphasia. They examined these modified treatment methods in junction with spoken naming repetition in three individuals with severe aphasia

and in ACT sessions they used visual and auditory stimuli and home practice videos in CART sessions. The treatment included three months programme and probes of spoken and written performance were taken at the onset of each session, and during baseline, treatment and follow-up maintenance. At the end of the study, all the participants resulted in improving their ability to write the stimuli. This study provided the evidence for effectiveness of ACT and CART methods in improving written naming skills in persons with severe aphasia.

2.9 Summaryofthereview

The review of literature indicates that reading, writing and arithmetic deficits are consequences of brain damage in persons with aphasia (Benson & Ardila, 1996; Goodglass, 1993). These deficits are among the other more researched deficits such as motor impairment, sensory deficits and communication disturbances. However, the impact of reading, writing and arithmetic deficits in a person's daily life is immense. Thus, there is a need to treat these deficits specifically to enable the person with aphasia to participate in all the everyday activities and social situations as efficiently as possible. However, the literature review reveals that there is limited research in line forthe treatment of reading, writing and arithmetic disturbances in persons with aphasia (Beeson, Hirsch, &Rewega, 2002; Cherney, Merbitz & Grip, 1986; Moyer, 1979). Thus, there is a need to conduct more studies for the treatment of reading, writing and arithmetic deficits in persons with aphasia, especially in the Indian context.

CHAPTER III

METHOD

The present study aimed at validating the manual for treatment of reading, writing and arithmetic (3R) in Kannada speaking persons with aphasia. The manual for treatment of 3R was reviewed and modifications were incorporated in certain activities and procedures. The modified manual was field tested on ten persons with adult aphasia in the age range of 24 to 75 years. The details of the participants and procedures are elaborated in this chapter.

3.1 Participants

Nine men and two women (group-A), with aphasia in the age range of 24 to 75 years and five men and five women (group-B) in the age range of 21 to 30 years participated in the study. However, one person with aphasia discontinued after three sessions as there was change in her language preference for treatment in reading and writing. Hence, ten persons with aphasia and ten neurotypical individuals participated in the present study. The participants in group A were identified as having aphasia through hospitals, neurological clinics as well as from All India Institute of Speech and Hearing. They were diagnosed with aphasia using adapted version of Western Aphasia Battery in Kannada (Chengappa & Vijayashree, 2007). Three of the participants were diagnosed with Wernicke's Aphasia, two with Conduction Aphasia, three with Broca's Aphasia, one with Anomic aphasia and one with Global Aphasia. Study was carried out by adhering to the appropriate ethical procedures as stated by All India Institute of Speech and Hearing, Mysore. All the participants were explained about the purpose of the study and the procedure involved. A verbal and written consent was taken from the participants as well from their caregiver or spouse.

3.2 Inclusionary criteria

The participants in group A were native speakers of Kannada language. They had their minimum 10th standard education with Kannada as medium of instruction. All the participants had aphasia secondary to stroke with lesions confined to left hemisphere. The participants had no known history of pre-morbid neuro-illness, psychiatric disorders, sensory and cognitive deficits. The socioeconomic status of the participants varied from lower to middle.

The demographic details of the person with aphasia are presented below in Table 1.

Table 1

Demographic details of persons with aphasia.

Sl. No.	Age (years)	Sex	Time post onset	Type of aphasia	Pre-morbid vocation
1.	33	M	20 days	Wernicke's Aphasia	Teacher
2.	60	M	1 month	Wernicke's Aphasia	Accountant
3.	62	M	1 month	Wernicke's Aphasia	Business
4.	58	M	2 months	Conduction Aphasia	Farmer
5.	66	M	6 months	Conduction Aphasia	Engineer
6.	75	M	6 months	Broca's Aphasia	Teacher
7.	36	M	9 months	Broca's Aphasia	Computer operator
8.	36	M	6 months	Broca's Aphasia	LIC agent
9.	24	F	6 months	Anomic Aphasia	Student
10.	22	M	2 years	Global Aphasia	Student

The reference group (group-B) consisted of university students with a minimum of 10th standard education with Kannada as the medium of instruction. All the participants were native speakers of Kannada and had normal speech, language and communication skills. The

participants had no history of reading and writing difficulties, no history of pre-morbid neuro-illness, psychiatric disorders and/or cognitive decline, no sensory and/or cognitive deficits.

3.3 Procedure

The present study was carried out in two phases. Phase 1 included reviewing and making required modifications to the Manual for Treatment of Reading, Writing and Arithmetic for Adult Aphasics in Kannada (MTR3A2-K), developed by Kruthi and Goswami (2011). Phase II included the field testing of the modified manual. Ten persons with aphasia were given treatment using this manual. Each participant attended a total of 15 reading, writing and arithmetic treatment sessions, each session lasting for duration of one hour.

Phase I: Modification of the manual

Preparation of stimuli: Manual for Treatment of Reading, Writing and Arithmetic for Adult persons with Aphasia in Kannada (MTR3A2-K), developed by Kruthi and Goswami (2011) was reviewed. The manual contained three domains namely reading, writing and arithmetic. After reviewing the documented principles and guidelines for aphasia therapy through visual mode of language (i.e. reading and writing) prescribed in the literature, the manual was checked for hierarchy of levels and activities in each of three domains and re-organized accordingly. The manual was also provided with necessary modifications to the levels and activities wherever necessary.

The broad three domains and the levels listed below were finalized:

- Reading
 - Level I
 - Level II
 - Level III

- Writing
 - Level I
 - Level II
 - Level III
- Arithmetic
 - Level I
 - Level II
 - Level III

Each level of these domains was further sub-divided into several sections:

Reading level I

In this domain concepts related to pre-reading skills and basic letter reading abilities were considered. The sections covered under this domain are as follows:

1. Orientation to reading material
2. Following directions
3. Recognition of signs
4. Recognition of alphabets

1. Orientation to reading material

- A. Eye gaze on printed word
- B. Left to right progression
- C. Touch the word
- D. Paragraph glancing

2. Following instructions

- A. One-step command
- B. Two-step command

3. Recognition of signs

- A. Action verbs
- B. Common logos

4. Recognition of letters

- A. Letter matching
- B. Letter identification
- C. Letter puzzle
- D. Count the letter

Reading level II

Focus of this level is to facilitate reading at word level by involving the person with aphasia to carry out various activities. It has the following sections:

- 1. Monosyllables
- 2. Words

1. Monosyllables

- A. Find the beginning syllable
- B. Find the ending syllable
- C. Find the syllable in a given word
- D. Rhyming words

2. Words

- A. Word identification
- B. Word completion
- C. Jumble/rearrange
- D. Plurals
- E. Tenses

F. Synonyms

G. Antonyms

Reading level III

This domain was aimed to improve reading abilities (both loud reading and reading comprehension) at sentences and discourse level and consists of two sections

1. Sentence level
2. Discourse level reading comprehension

1. Sentence level

- A. Sentence reading
- B. Sentence completion
- C. Sentence verification
- D. Sentence sequencing
- E. Sentence construction

2. Discourse level reading comprehension

- A. Passage 1
- B. Passage 2
- C. Passage 3
- D. Passage 4

Writing level I

Activities under this level are mainly aimed at improving some of the functional writing skills. This level constitutes of sections for helping rebuilding the stability and movement in the muscles of wrist, hand and finger through various exercises, improving the hand strokes for Kannada 'aksharas' by working on the 33 straight and curved letter shapes

and also functional writing skills like writing/signing name, writing address, phone number and appointment timing etc.

1. Strengthening activities
2. Functional writing skills
3. Writing readiness tasks

1. Strengthening activities

- A. Hand strengthening activities
- B. Finger strengthening activities
- C. Wrist stability activities
- D. Finger dexterity activities
- E. Teaching pencil grasp

2. Functional writing skills

- A. Writing/signing name
- B. Writing address on postal card
- C. Filling bank forms

3. Writing readiness tasks

- A. Tracing
- B. Joining dots
- C. Copying lines
- D. Copying letters
- E. Copying syllables

Writing level II

This level focuses on teaching writing at syllable and word level by keeping note on letter legibility, letter alignment and space between letters. Sections are as follows:

1. Copying words
2. Dictation
3. Word completion
4. Word verification
5. Word fluency

1. Copying

- A. Bi/ Tri- syllabic
- B. Multi-syllabic

2. Dictation

- A. Bi/ Tri- syllabic
- B. Multi-syllabic

3. Word completion

- A. Bi/ Tri- syllabic
- B. Multi-syllabic

4. Word verification

- A. Bi/tri- syllabic
- B. Multi-syllabic

5. Word fluency

- A. Lexical fluency task
- B. Phonemic fluency task

Writing level III

This level was developed to improve the writing at sentence and paragraph level. The following sections were included under this domain:

1. Sentence level
2. Higher writing skills

1. Sentence level

- A. Sentence copying
- B. Sentence completion
- C. Sentence verification
- D. Sentence sequencing
- E. Sentence construction

2. Higher writing skills

- A. Punctuation
- B. Question construction
- C. Picture description
- D. Narration/creative writing

Arithmetic level I

This level focuses on improving the basic mathematical concepts and functional calculation. Following sections were included under this domain:

- A. Identification of numbers
- B. Identification of geometrical shapes
- C. Identification of mathematical signs
- D. Concept of zero
- E. Concept of counting
- F. Concept of time
- G. Concept of currency
- H. Concept of measurement

Arithmetic level II

This level attempts to improve the four mathematical operations at one, two and three digit level. The sections consist of:

1. Addition
2. Subtraction
3. Multiplication
4. Division

1. Addition

- A. Single digit addition
- B. Double digit addition
- C. Multiple digit addition

2. Subtraction

- A. Single digit Subtraction
- B. Double digit Subtraction
- C. Multiple digit Subtraction

3. Multiplication

- A. Single digit Multiplication
- B. Double digit Multiplication
- C. Multiple digit Multiplication

4. Division

- A. Single digit division
- B. Double digit division
- C. Multiple digit division

Arithmetic level III

This is an advanced level aiming at channelling all the persons with aphasia towards making use of all the reading, writing and arithmetic skills trained in integrating and using them in practical daily life situations. At this level the clinician also works on transferring the learnt skills in some social communication situations. This level contains following sections.

- | | |
|---------------------|---------------------|
| A. Hospital setting | E. Work place |
| B. Family gathering | F. Travelling |
| C. Restaurants | G. Paying bills |
| D. Vegetable market | H. bank transaction |

It is also suggested that the sections under this domain can be tailor made to the person with aphasia depending on the needs, interests, vocational and social demands placed on him/her.

Phase II: Field testing

In phase II, the field testing of MTR3A2-K was carried out. 11 persons with aphasia were individually provided therapy for reading, writing and arithmetic skills, however, one discontinued therapy and finally ten were considered for the study. All the participants of group A were involved in the treatment sessions. The treatment sessions started with assessment of baseline in all the three domains and the therapy lasted for 15 sessions, each session lasting for one hour without any break. Once baseline evaluation was completed, appropriate goals were chosen from the manual, and only those performances on corresponding sub-sections were scored and analysed. However, the type of aphasia varied among the participants and hence, during the therapy sessions some of the activities were customized either by varying the levels of the activity or by adding more stimulus in

number. Participants were treated either at their home or at AIISH, Mysore based on the convenience of the participants.

The manual also incorporated some major modifications in its presentation. As mentioned earlier, in the manual the levels were re-organized and few more materials, activities and measurement scales were integrated. This was done keeping in mind the additional requirements based on the reading and writing deficits noted in the persons with aphasia. And also while taking therapy a need was felt to incorporate following additional modifications.

- The letters/words/sentences were presented as cards (for each stimulus), while the card measuring approximately 14x21 inches. The words were typed in BRH-Kannada font in Baraha software and colour of the font in printed word card was maintained as black with white background. The print was in bold and the sizes of the font varied from aksharas to long sentences, size-100 for aksharas, size-50 for words and size- 24 was maintained for long sentences. Each card contained a maximum of two stimuli.
- Individual pictures were again presented in cards measuring 14x21 inches with maximum of two pictures in each card.
- For the level –I of ‘writing’ domain, a booklet was designed which comes along with the manual. This booklet contains pages that are designed differently for each level of the writing activity which varies in line spacing and some pages specific to the activity described in the manual.
- An exclusive scoring procedure along with score sheets were designed for writing domain separately for writing level –I and level –II and III.
- An additional tool kit to improve the muscles strength of hand that is directly involved in writing was incorporated in the manual. The tool kit helps in carrying out exercises

to enhance the mobility and stability of the muscles of wrist, fingers and hand. This in turn helps in improving the writing posture, alignment, spacing and letter construction and finally to improve the penmanship.

The manual was also administered on Group B consisting of ten individuals with normal speech, language and communication skills with normal ability to read, write and calculate. The treatment was not implemented on this group of participants. The performance of the both group A and B was compared.

3.4 Response recording

All ten persons with aphasia were provided with 15 speech and language therapy sessions, each session lasting for an hour using MTR3A2 –K. Activities carried out in each therapy session was scored using the score sheets designed for respective domain. The exemplar treatment recording sheets are illustrated in Appendix 2.

3.4a Treatment recording sheet

This manual has three types of treatment recording sheets for reading, arithmetic and writing domains separately.

Reading and arithmetic domain- treatment recording sheet-I: For the reading and arithmetic domains, the treatment recording sheet-I (Adapted from: MAFAT-K) is provided in Appendix 2. It is expected that the clinician follows these sheets to record the target activity, mode of presentation of the stimuli, mode of responses, target skills, number of trials and percentage of the correct responses. Clinician can give a maximum of ten trials for a specific activity.

Treatment recording instructions for reading and arithmetic domains: The activity of section/sub-section and the item number have to be mentioned in the first two columns. The stimulus mode [e.g., grapheme + auditory + gestural (G+A+G) or grapheme (G) alone]

should be mentioned in the third column. The response modality used by the persons with aphasia for the given stimulus has to be mentioned in the fourth column. The fifth column should include the target response. A maximum of ten trials can be given until the person with aphasia exhibits desired response, and can be scored under each trial column. Finally, the percentage of the responses should be noted. A minimum of 50% correct score should be obtained in order to pass this activity.

In the **writing domain**, two different score sheets are designed for strengthening activities and writing activities. These sheets are designed as the activities are being assessed with respect to different parameters.

Writing domain- treatment recording sheet-II: For strengthening activities, the treatment recording sheet-II is provided in Appendix 2. In the treatment recording sheet-II, the strengthening activities are rated with respect to the parameters namely, strength, smoothness/rhythm, completeness and quickness of the response for activities.

Treatment recording instructions for writing (sheet-II): Clinician has to note down the activity, stimulus number and response in the respective columns. A maximum of two trials can be marked on the score sheet and the percentage score can be written in the next column. Percentages of all the activities of each section can be totaled and written in the total percentage column.

Writing domain- treatment recording sheet-III: For all the remaining sections of the writing domain (pre-writing skills, functional writing and writing activities), the treatment recording sheet-III is used as provided in Appendix 2. In this sheet, the activities on pre-writing skills are rated based on the parameters namely, smoothness/rhythm, completeness and quickness. The writing activities are rated based on letter legibility, spacing and alignment.

Treatment recording instructions for writing (sheet-III): The activity, stimulus number and response have to be noted in the respective columns. Clinician can mark upto two trials and the percentage score should be calculated in the next column. The total percentage of all the activities should be calculated and written in the next column.

3.4.bScoring

The purpose of scoring the responses here is to provide objectivity to the tasks. This also provides feedback to the person with aphasia regarding his/her performance.

In reading and arithmetic domains, *treatment recording sheet-I* has to be used for all the activities. If a complete correct intelligible response is present, score '2' (two) will be given. A score of '1' (one) will be given for a partially correct/ intelligible response. Score '0' (zero) will be given for incorrect/unintelligible and/or no response. Scoring pattern can be made more flexible by the clinician according to the individual's performance. For example, if the response of an individual is between no response and partially correct/intelligible response, clinician can introduce scoring $\frac{1}{2}$ (half) for such responses. A score of $1\frac{1}{2}$ (one & half) can be given, if the response is between partially intelligible and fully correct intelligible response. This has to be considered while calculating the percentage.

In writing domain- *treatment recording sheet-II*: for all the strengthening activities the clinician has to score '0' (zero) for inadequate, '1' (one) for partially adequate and '2' (two) for adequate under all four parameters of each trial.

In writing domain- *treatment recording sheet-III*, the clinician has to score '0' (zero) for inadequate, '1' (one) for partially adequate and '2' (two) for adequate under all three parameters of each trial in pre-writing (writing readiness) activities. Scoring of '0' (zero) for

inappropriate, '1' (one) for partially appropriate and '2' (two) for appropriate should be done under all three parameters of each trial in functional writing and writing activities.

Note: Before starting with the stimulus set given for each activity, clinician is instructed to give at least two practice items. These practice items will familiarise the person with aphasia for a given task.

3.5 Statistical analysis

The performance of the participants on the 1st (Baseline), 7th (Mid) and 15th (Post) therapy sessions were considered for statistical analysis. The individual scores of the 1st, 7th and 15th therapy sessions for each participant in different sub-sections of the manual was analyzed using SPSS 18.0 software. A comparison was made among performances of individuals with each type of aphasia across reading, writing and arithmetic domains. Analysis of statistically significant difference among the performances of first, seventh and fifteenth sessions of reading, writing and arithmetic treatment was also done. A time series research design was followed. Non-parametric tests were used for statistical analysis of the data. The details of the manual are explained in Chapter 4. The results and discussion of the present study are included in Chapter 5.

CHAPTER IV

MANUAL FOR TREATMENT OF READING, WRITING AND ARITHMETIC FOR PERSONS WITH ADULT APHASIA- IN KANNADA (MTR3A2-K)

About MTR3A2 –KANNADA

MTR3A2-Kannada consists of three main domains.

Reading: This domain aims at improving reading skills in persons with aphasia. The domain contains three levels. This domain's focus is to improve both reading aloud and reading comprehension at functional as well as advanced levels. The activities under these levels are designed to improve reading at syllables, word, sentences and discourse.

Writing: The aim of this domain is to help persons with aphasia to write legibly and neatly, and to teach them to express their needs and ideas adequately through this modality. This domain contains three levels aiming to improve functional writing, writing readiness and writing at letters, words, and sentence and in discourse level. The activities also focus on improving penmanship/handwriting; improving syntax in writing, and generation of ideas for writing.

Arithmetic: This domain aims to improve mathematical skills in persons with aphasia and thus, help them in everyday activities including simple mathematics. This domain contains three levels to teach functional and advanced calculations along with transferring the learnt skills to daily life situations. The sections and sub-sections contain activities to improve mathematical concepts, counting, concept of time and money concepts and its usage.

In all the domains, stimulus and response mode hierarchy, scoring and progression criteria are mentioned for each sub-section. Visual and orthographic stimuli are provided for

the activities of all sub-sections. Writing level I has a section for hand functioning activities. Hence, the manual has a kit along with these booklets which contains the materials for strengthening exercises which helps in improving the muscle strength which involve in the activity of writing. For all the activities of writing level II and level III and certain activities of writing level I, the booklet IV has sheets of different line spacing as given in Appendix 1. Depending on the level of the activity, these sheets can be utilized.

Strategies to use

The activities in this manual are self explanatory. They are divided into levels in the order of increasing complexity and a description is also provided regarding how to carry out the activity. However, this manual also provides the clinicians with some of the strategies which can be useful, if implemented at appropriate places depending on each individual with aphasia. Some may benefit with some type of strategies as the pathogenesis and clinical manifestations vary to greater degrees.

1. **Thinking aloud:** Internal preoccupation can be brought down by thinking aloud while reading. The auditory feedback through thinking aloud will help enormously with planning, pace, sequencing, sustained attention and need for clarification.
2. **Adding sensory feedback to flashcards:** For some learners, it is easy to recall position in space. This link often leads to full memory of the item. Kinesthetic and auditory feedback will help improve memory.
3. **Touch the page:** Encourage the person with aphasia to touch the page while reading by underlining, highlighting. This tactile connection increases the sensory feedback and builds memory for the word. The reader can touch the page with a pen, end of a pencil, index card or even with their fingertips.

4. **Reading fluency:** After learning to read by decoding the printed word letter by letter, reading fluency should be focused by practicing reading poetry/ reading dialogue. Give permission to substitute an abbreviated nickname for long names.
5. **Black background:** For persons with aphasia having significant visual perceptual difficulties, letters in white against a black background is a beneficial format.
6. **Color coding:** Color code the key letters/words while reading a sentence. This will help as a cue for the presence of that specific letter/word and draw his/her attention on the word.
7. **Tachistoscope:** Tachistoscope is a fancy name for an unlined index card/sheet of paper with a cutout in the shape of a small window. The size of the window can be customized or open ended. When the window is placed on the problem/text being studied, it blocks out extraneous stimuli and increase attention on visual detail.
8. **Strikethrough:** For persons with aphasia who have fine motor issues, while self-correcting the writing mistakes, striking through is a better alternative for erasing. While saving time, it gives a picture of number and types of self-corrections.
9. **Repetition:** It is a repair strategy in which person with aphasia is encouraged to ask for repetition of the presented stimuli when he/she does not comprehend.
10. **Rephrasing:** It is a repair strategy which either a clinician or a person with aphasia can use. In this strategy the complex stimuli is simplified or is broken down into several parts.
11. **Reducing the presentation of the rate of stimuli:** The clinician is expected to slow down the presentation of the stimulus in order to facilitate the comprehension ability of persons with aphasia.

12. Reducing the rate of speaking: This strategy can be used either by the clinician or by persons with aphasia where the rate of speaking is slowed down. This will improve the self monitoring and also intelligibility of speech.

It is expected that the clinician demonstrates, illustrates, instructs or adhere to these strategies for improving the overall communication skills. Further the clinician is also expected to provide appropriate model, realistic feedback and communication opportunities. These above mentioned strategies can be used either in isolation or in combination. Clinicians are free to add any other strategy which they feel will facilitate reading, writing and arithmetic.

**Contents of Manual for Treatment of Reading, Writing and Arithmetic for Persons
with Adult Aphasia- In Kannada (MTR3A2-K)**

Reading

Level I:

- A. Orientation to reading material
 - a. Eye gaze on printed word
 - b. Left to right progression
 - c. Touch the word
 - d. Paragraph glancing
- B. Following instructions
 - a. One-step command
 - b. Two-step command
- C. Recognition of signs/ logos
 - a. Action verbs
 - b. Daily logos
- D. Recognition of alphabets
 - a. Letter matching
 - b. Letter identification
 - c. Letter puzzle
 - d. Count the letter

Level II:

- A. Monosyllables
 - a. Find the beginning sound
 - b. Find the ending sound
 - c. Rhyming words
 - d. Find the syllable in given word
- B. Words
 - a. Word identification
 - b. Word completion
 - c. Jumble/rearrange
 - d. Plurals
 - e. Tenses
 - f. Synonyms
 - g. Antonyms

Level III:

A. Sentence level

- a. Sentence reading
- b. Sentence completion
- c. Sentence verification
- d. Sentence sequencing
- e. Sentence construction

B. Discourse level reading comprehension

- a. Passage 1
- b. Passage 2
- c. Passage 3
- d. Passage 4

Writing

Level I

A. Strengthening activities

- a. Hand strengthening activities
- b. Finger strengthening activities
- c. Wrist stability activities
- d. Finger-dexterity activities
- e. Teach the pencil grasp

B. Functional writing skills

- a. Writing/Signing his/ her name
- b. Writing name & address on postal card
- c. Filling bank forms

C. Writing readiness tasks

- a. Tracing
- b. Joining the dots
- c. Copying lines
- d. Copying letters
- e. Copying syllables

Level II

- A. Copying words
- B. Dictation
- C. Word completion
- D. Word verification
- E. Word fluency

Level III

Section 1: Sentence level

- A. Sentence copying
- B. Sentence completion
- C. Sentence verification
- D. Sentence sequencing
- E. Sentence construction

Section 2: Higher writing skills

- A. Punctuation
- B. Question construction
- C. Picture description
- D. Narration/creative writing

Arithmetic

Level I: (Functional calculation)

- A. Identification of numbers
- B. Identification of geometrical shapes
- C. Identification of mathematical signs
- D. Concept of zero
- E. Concept of counting
- F. Concept of time
- G. Concept of currency
- H. Concept of measurements

Level II: Advanced calculations

- A. Addition
- B. Subtraction
- C. Multiplication
- D. Division

Level III:

- | | |
|---------------------|---------------------|
| A. Hospital setting | E. Work place |
| B. Family gathering | F. Travelling |
| C. Restaurants | G. Paying bills |
| D. Vegetable market | H. Bank transaction |

Points to Ponder (Adapted from: MANAT-H)

Creating a good communicative environment

- Communicate in a quiet, well lit and ventilated room.
- Limit the number of people, avoid large groups.
- Encourage the person with aphasia to communicate.
- Recognize and reinforce communication gains.
- Do not ask the person with aphasia to talk and do something else at the same time.
- Respect the privacy of the person with aphasia.
- Keep the person with aphasia informed about what is happening.
- Be aware of fatigue.
- Encourage the person with aphasia to be independent.
- Keep the person with aphasia occupied.
- Be sensitive to the person with aphasia as a person first, as an aphasic individual second.

As a speaker

- Talk slowly.
- Avoid rising your voice.
- Use appropriate language in the form of:
 - Short sentences
 - Simple sentences

- Familiar words
- Do not bombard the person with aphasia with too many questions.
- Stress the important words in sentences.
- Accompany a message with gestures or repeat if the person with aphasia does not understand.

As a listener

- Listen and do not interrupt.
- Be patient.
- Enough time should be given to the person with aphasia to respond.
- Accept language errors.

Progression criterion list

- First, start with the functional level (level I) of reading, writing and arithmetic domains.
- Within each level of all domains, follow the criteria of 50% to move to next section and subsequent sub-sections within each level.
- Progression criteria for moving from level I to the level II, and level II to the level III in each domain is 75%.
- Overall, the person with aphasia must score at least 75% in all the domains in order to further improve the reading, writing and arithmetic skills.

General guidelines to carry out reading activities:

- ✓ Hold/Place the reading material at appropriate distance from person with aphasia.
- ✓ Place the reading material in the vicinity of the visual field of the person with aphasia.
- ✓ Font size can be increased based on visual difficulty.

- ✓ Background colour can be changed to black for persons with more visual problems.
- ✓ Follow the stimulus and response mode hierarchy.
- ✓ Reduce distractions
- ✓ Develop interest in activity by making him look at his name in post letters, personal documents, and hospital reports.
- ✓ Make sure the person with aphasia is not giving fleeting responses. The eye gaze on the printed word should be for adequate duration.
- ✓ Clinician should demonstrate each activity by giving enough time for the person with aphasia to observe and understand the activity.

General guidelines to carry out writing activities:

- ✓ Check for hand preference of person's with aphasia. In persons with right side paresis initially left hand is preferred and with recovery of strength in right hand, person can switch over to right side hand for writing.
- ✓ For first, make an assessment while he writes, by comparing the writing when he is given support at shoulder, support at wrist or when a band is tied around the fingers for a better tripod grip.
- ✓ Check for sitting and writing positions of person with aphasia. Straight/up-right sitting posture with proper control of arms and lower extremities should be practiced as warm-up before starting to write.
- ✓ Make the person with aphasia sit on a high chair in erect posture and can keep his hands on the table for support. The table should be at his chest level. The writing board should be slanted in 45 degree.
- ✓ For a better grip a cylinder, tape or a thread can be wrapped around the writing device.
- ✓ Hold/Place the writing material at appropriate distance from person with aphasia.

- ✓ Place the writing material in the vicinity of the visual field of the person with aphasia.
- ✓ Tilt the writing paper towards the dominant hand (or hand used for writing) of the person with aphasia. For proper paper positioning, tape the paper in correct position or use clipboard to keep the paper from slipping.
- ✓ Initially train the person with aphasia to write in lined sheets with highlighted margins. In later stages person with aphasia can be trained to write in blank sheets.
- ✓ Use black or any primary colours for writing.
- ✓ Follow the stimulus and response mode hierarchy.
- ✓ Reduce distractions
- ✓ Develop interest in activity by making him write his name in post letters, gift covers, wishing cards, and personal documents.
- ✓ Clinician should demonstrate each activity by giving enough time for the person with aphasia to observe and understand the procedure.

Reading and writing materials:

- Along with the stimuli of the manual, use news papers, magazines also as an additional reading materials.
- For all the writing activities, use primary colour markers in the beginning stage for persons with aphasia. And then move on to writing in sketch pens, wide pencil and then regular sized pencil/pen. Follow this hierarchy.
- Only for some persons with aphasia having good pencil grasp and visual acuity, skip the initial levels and start with writing in pencil/pen itself.
- The material for writing should be white blank sheets and also the sheets in work booklet III. For all of the below mentioned activities follow the hierarchy as stated below.

- Start with blank sheets with big boxes and successively decrease the box size in decreasing levels then the blank sheets with highlighted margins followed by lined sheets and finally the blank sheets (given in work booklet III).

Note: If the performance in any of the domains is above 75% at the baseline level itself, it is still advised that the deficits be worked upon to enhance the overall literacy skills to the maximum extent.

READING

LEVEL I: FUNCTIONAL READING

This level contains following sections:

- A. Orientation to reading material
- B. Following commands
- C. Recognition of signs/logos
- D. Recognition of alphabets

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75%

Strategies to use: Appropriate strategies can be used (refer pages 17-18). These should be used to strengthen the responses.

A. Orientation to reading material

The focus of this section is to orient the person with aphasia to reading material and reading procedure.

Stimulus hierarchy:

- Combination of grapheme, auditory and gestural (G+A+G)
- Combination of grapheme and auditory/gesture(G+A/G)
- Grapheme (G)

Response hierarchy:

- Eye gaze/eye movement (EG/EM)
- Pointing/gesture (P/G)

This section is divided into following sub-sections.

- Eye gaze on printed word
- Left to right progression
- Touch the word
- Paragraph glancing

Note: Pictures are not required for this section. However, word card/stimuli are provided for this section wherever applicable.

a. Eye gaze on printed word

Level 1: Clinician models the person with aphasia to look at the card/stimulus and reading it aloud.

e.g., "ÉÆÃgÀAiÀÄå /bOrayya/

Level 2: By keeping the word card/stimuli/stimulus on the desk, ask the person with aphasia to look at the word.

e.g., E°è £ÉÆÃr/illi nODi/

Level 3: Keep the word card/stimuli on the desk. Person with aphasia is expected to look at the card without being asked for.

Stimuli: The stimuli for this section includes name cards of person with aphasia, his family members' name, friends' name and profession related words.

Following is an example illustrating a person with aphasia, who is a teacher by profession.

I.

- | | | |
|--------------------------|------------------------|-------------------------|
| 1. Name | "ÉÆÃgÀAiÀÄå | /bOrayya/ |
| 2. Spouse name | „ÀgÉÆÃd | /sarOja/ |
| 3. Daughter/son's name | eÉÆåÃw/ fÃªÀfi | /jyOti/ jIvan/ |
| 4. Sister/brother's name | AiÀÄ±ÉÆÃzsÀ/§,ÀªÀgÁdÄ | /yashOdha/basavarAju/ |
| 5. Friend's names | AiÀÄ®è¥Àà/ZÀAzÀæ±ÉÃRgi | /yallappa/caMdrashEKar/ |

II. Teaching Profession relevant words

1. ¥ÀÄ,ÀÛPÀ /Pustaka/
2. ±Á-É /Shale/
3. PÉÆoÀr /koThaDi/
4. ©¹AiÀÄÆI /bisiyUTa/
5. ±Á- Á °À£À /shAlA vAhana/
6. ,À°À²PÀëQ /sahashikShaki/
7. ©. E. M D'üÃ,ÀÄ /bi. i. o AphIsu/
8. ªÀÄSÉÆãÃ¥ÁzsÁå /muKYOpAdhyAyaru/
9. ,ÁPÁøj £ËPÀgÀgÀ /sarkAri noukarara saMgha/
10. ,ÀAWÀ /shikShakara tarabEti kEMdra/
- ²PÀëPÀgÀ vÀgÀ·ÉÄw PÉÄAzÀæ

b. Left to right progression

This sub-section aims to develop the readiness towards reading.

Level 1: Ask the person with aphasia to look at the word while clinician slides a blank card on top of the word slowly from left to right direction.

Level 2: Keep the word card/stimuli on the table. Ask the person with aphasia to look at the word from left to right direction.



Stimuli:

- | | |
|--|---|
| 1. §ðß /Banni/ | 11. ·ÁV®Ä /bAgilu/ |
| 2. K£ÄÄ /Enu/ | 12. D,ÀàvÉæ /Aspatre/ |

- | | |
|----------------------------------|--|
| 3. HI /UTa/ | 13. ^a ÄzÄ°Äß /madyAhna/ |
| 4. gÄeÉ /Raje/ | 14. PÄ£ÄßqÄPÄ /kannaDaka/ |
| 5. ^a ÄiÁvÉæ /mAtre/ | 15. vÄ ⁻ ÉçA§Ä /talediMbu/ |
| 6. æzÉæ /Nidre/ | 16. £Ä ^a ÄÄ,ÁÌgÄ /namaskAra/ |
| 7. E®è /Illa/ | 17. ^u ÄAiÄÄAPÁ® /sAyaMkAla/ |
| 8. °É _u ÄgÄÄ /Hesaru/ | 18. ç£Ä¥ÄwæPÉ /dinapatrike/ |
| 9. CAUÄr /aMgaDi/ | 19. §,ï æ ⁻ ÁÝt /bas nildANA/ |
| 10. ^u ÄÄAPi /byAMk/ | 20. «ÄÄ£ÄÄ ^a ÄiÁgÄl /mInumZArATa kEMdra/
PÉÄAzÄæ |

c. Touch the word:

This sub-section aims to increase the sensory feedback to the person with aphasia.

Level 1: Model the person with aphasia to touch the word and move index finger below the word in reading fashion.

Level 2: Ask the person with aphasia to touch the word and move index finger below the word in reading fashion.

Stimuli: Same as that for eye gaze on printed word and left to right progression activities.

d. Paragraph glancing

Level 1: This passage contains sentences aligned in lines and the last word of the sentence and beginning word of next sentence is colour coded.

Task: Ask the person with aphasia to look at the passage and follow as clinician reads the passage aloud.

Stimuli: (This paragraph is adapted from RAP-K)

**MAzÁ£É/EAzÄÄ PÁ®zÄ°è MAzÄÄ Hj£Ä°è M§â^{1/4}ÄÄ °ÉAUÄ,ÄÄ EzÄÝ^{1/4}ÄÄ.
C^aÄ^{1/2}UÉÆ§â^aÄÄUÄ EzÄÝ£ÄÄ.
C^aÄ£ÄÄ MAzÄÄ ç£Ä ±Á⁻É-ÄAzÄ ¥ÄÄ,ÄÛPÄ MAzÄ£ÄÄß PÄzÄÄÝ
vÄAzÄ£ÄÄ.**

vÁ-Ä CªÀ£À£ÄÄß "ÉÉAiÄÄÄªÀ §zÀ®Ä "M¼ÉiAiÄÄ PÉ®Ä ªAiÁrzÉ
ªÄÄUÀ£É" JAzÄÄ °ÉÆUÀ½zÄ¼ÄÄ.

EzÄjAzÀ D °ÄÄqÄÄUÀ²UÉ PÀ¼ÄîvÀ£Ä ªAiÁqÄÄªÄÄzÉÄ
M¼ÉiAiÄÄzÉÄ£ÉÆÄ Jª¹vÄÄ.

CAçªAzÀ CªÀ£ÄÄ ,ÀtÚ ¥ÄÄiÖ PÀ¼ÄîvÀ£ÄUÀ¼Ä£ÄÄß
ªAiÁqÄvÉÆqÄVzÀ£ÄÄ.

/oMdAnoMdu kaLadalli oMdu Urinalli obbaLu heMgasu iddaLu.

avaLigobba maga iddanu.

avanu oMdu dina shaaleyiMda pustaka oMdannu kaddu taMdanu.

tAyi avanannu baiyyuva badalu "oLLeYa kelasa maDide magane" eMdu hogaLidaLu.

idariMda A huDuganige kaLLatana maDUvudE oLLeYadEnO enisitu.

aMdiniMda avanu saNNa puTTa kaLLatanagaLannu maDatoDagidanu./

Level 2: This paragraph has sentences in continuation without colour coding. Ask the person with aphasia to read the following passage.

Stimuli:

EzÄÄ ,ÉÆÄªÄÄ£ÄªÄ¼ÄiAiÄÄ d£ÄjVgÄÄªÄªÄ MAzÉÄ MAzÄÄ CAUÄr.
CAUÄrAiÄÄªÄè §UÉ§UÉAiÄÄ ,ÁªAiÁ£ÄÄUÀ½ªÄªÄ ªÄªÄ¥ÁgÁPÁiV vÁPÄiR
vÄÆPÄzÄ "ÉÆiÄÖUÀ¼ÄÄ ,ÀeÁÓV ªAwªÉ. Eªè gÄAUÄtÚ CAUÄrAiÄÄ
ªAiÁªÄªÄ. EªÄ£ÄÄ vÄgÁPÁjUÀ¼Ä£ÄÄß PÉ.f. -ÉPÄzÄªÄè PÉÆqÄÄvÁÛ£É
ªÄÄvÄÄÛ ªÄªÄ, JuÉÚAiÄÄAxÄ ,ÁªAiÁ£ÄÄUÀ¼Ä£ÄÄß ªÄj£ÄªÄè
C¼ÉAiÄÄªÄvÁÛ£É.

/idu sOmanahaLLiya janarigiruva oMdE oMdu aMgaDi. aMgaDiyalli bagebageya

sAmAnugaLive.vyApArakkAgi takkaDi tUkada boTTugaLu sajjAgi niMtive. illi raMgaNNa

aMgaDiya maIika. ivanu tarakArigaLannu ke.ji. lekkadalli koDuttAne mattu hAlu,

eNNeyamtha sAmAnugaLannu iTarinalli aLeyuttAne./

Note: These passages are given in the manual. However, clinician is free to use bigger font size and present in stimulus card if necessary.

B. Following instructions

Task: The clinician will ask the person with aphasia to follow the instructions given with reference to visual stimuli (materials required word card/book, blank pages, cover, stapler, gum and stamp).

Level 1: One-step command

1. F PÁqjð £ÉÆÃr /I kaarD nODi/
2. F ¥É£Àß£ÀÄß ºÀÄÄnÖ /I pennannu muTTi/
3. ¥ÀÄ,ÀÛPÀªÀ£ÀÄß /pustakavannu tereyiri/
vÉgÉ-Äj
4. ¥ÀÄ,ÀÛPÀªÀ£ÀÄß /pustakavannu mucciri/
ªÀÄÄaÑj
5. ºÁ¼ÉAiÀÄ£ÀÄß wgÀÄV¹ /hALeyannu tirugisi/
6. PÉÆ£ÉAiÀÄ ¥ÀÄ¹ªÀ£ÀÄß /koneya puTavanna nODi/
£ÉÆÃr
7. »Aç£À ¥ÀÄ¹ªÀ£ÀÄß £ÉÆÃr /hiMdina puTavanna nODi/
8. ºÁ¼ÉUÀ¼À£ÀÄß MnÖUÉ /hALegaLannu oTTige maDici/
ªÀÄÄra
9. F ¥ÀzÀzÀ PÉ¼ÀUÉ UÉgÉ /I padada keLage gere eLeyiri/
J¼É-Äj
10. F PÀªÀgÀ£ÀÄß vÉgÉ-Äj /I kavaranu tereyiri/

Level 2: two-step command

1. F ¥É£Àß£ÀÄß PÁrð£À ºÉÄÄ-É Er /I pennannu kArDina mEle iDi/
2. §®UÀqÉ EgÀÄªÀ PÁqÀð£ÀÄß /balagaDe iruva kArDannu muTTi tOrisi/
ªÀÄÄnÖ vÉÆÃj¹
3. ºÉÄÄº£À, º£Àºè §® /mElina sAlinalli bala tudiyanna nODi/
vÀÄçAiÀÄ£ÀÄß £ÉÆÃr
4. PÉ¼ÀV£À, º£Àºè JqÀUÀqÉ /keLagina sAlinalli eDagaDe nODi/
£ÉÆÃr

5. F °Á¼ÉAiÀÄ£ÄÄß JgÀqÄÄ ,Áj /I hALeyannu eraDu sAri maDici/
^aÄÄra
6. F °Á¼ÉAiÀÄ£ÄÄß PÀvÀÛj¹ JgÀqÄÄ /I hALeyannu kattarisi eraDu BAgA mADi/
^ˆsÁUÀ ^aÀiÁr
7. F °Á¼ÉAiÀÄ£ÄÄß ^aÄÄra PÀ^aÀgï /I hALeyannu maDici kavAr oLage iDi/
M¼ÀUÉEr
8. F ,ÁÖ÷ãA¥À£ÄÄß PÀ^aÀgï ^aÉÄÄ-É /I sTYAMpannu kavAr mEle aMTisi/
CAn¹
9. F JgÀqÄÄ ,ÁÖ÷ãA¥iUÀ¼À£ÄÄß /I eraDu sTYAMp gaLannu kavAr mEle aMtisi/
PÀ^aÀgï ^aÉÄÄ-É CAn¹
10. F °Á¼ÉUÀ¼À£ÄÄß MnÖUÉ ,ÉÛj¹ ¦i /I hALegaLannu oTTige sErisi pin mADi kavAr
^aÀiÁr PÀ^aÀgï M¼ÀUÉEr oLage iDi/

C. Recognition of signs/ logos

This section is divided into following sub-sections.

a. Action verbs

b. Daily logo

Stimulus hierarchy:

- Combination auditory and visual (A+V)
- Verbal (V)

Response hierarchy:

- Pointing/gesture (P/G)

a. Action verbs

Level 1: Show the pictures of different action verb along with the word card/stimulus. Person with aphasia is expected to point to the stimuli named by clinician.

e.g.: E^aÄÄUÀ¼À°è °ÄÄqÄÄUÀ w£ÄÄßwÛgÄÄ^aÀ avÀæ vÉÆÛj¹/ivugaLalli huDuga tinnuttiruva citra tOrisi/

Level 2: Ask the person with aphasia to perform/act out an action to the action verb.

e.g.: E°ègÀÄªÀAvÉªÀiÁr vÉÆj¹/illiruvaMte mADi tOrisi/

Stimuli:

- | | | | | | |
|---|-----------------|--------------|----|-----------------|-------------|
| 1 | w£ÀÄªÀªÀzÀÄ | /tinnuvudu/ | 6. | NzÀÄªÀªÀzÀÄ | /Oduvudu/ |
| . | | | | | |
| 2 | PÀÄrAiÀÄªÀªÀzÀÄ | /kuDiyuvudu | 7. | £ÀqÉAiÀÄªÀªÀzÀÄ | /naDeyuvudu |
| . | Ä | / | | Ä | / |
| 3 | ªÀÄ®UÀÄªÀªÀzÀÄ | /Malaguvudu | 8. | PÀÆgÀÄªÀªÀzÀÄ | /kUruvudu/ |
| . | | / | | | |
| 4 | Áß£À | /snAna | 9. | £ÀUÀÄªÀªÀzÀÄ | /Naguvudu/ |
| . | ªÀiÁqÀÄªÀªÀzÀÄ | mADuvudu/ | | | |
| 5 | §gÉAiÀÄªÀªÀzÀÄ | /Bareyuvudu/ | 10 | C¼ÀÄªÀªÀzÀÄ | /aLuvudu/ |
| . | | | | | |

Note: Pictures are provided for this activity.

b. Daily logos

Level 1: Show the pictures of different logos along with the word card/ stimulus and the person with aphasia is expected to point to the picture named by clinician.

Stimuli:

- | | | |
|----|----------------|-------------------|
| 1. | mÁæ!üPí a£Éí | /TrAphik cinhe/ |
| 2. | OµÀçü CAUÀr | /auShadhi aMgaDi/ |
| 3. | PÀ,ÀzÀ §ÄnÖ | /kasada buTTi/ |
| 4. | C¥ÁAiÀÄªÀªÀzÀÄ | /apAya cihne/ |
| 5. | J,ï. n. r §Ævï | /es. Ti. Di bUt/ |
| 6. | CAZÉ ¥ÉnÖUÉ | /aMce peTTige/ |
| 7. | §,ï ¢ ÁÝt | /bas nildANa/ |
| 8. | J.n. JªÀïï | /e.Ti.em/ |

Level 2: Say the usage of a logo and ask the person with aphasia to point to the logo and the word card/stimulus.

Note: Pictures are provided for this activity.

D. Recognition of alphabets

This section contains following sub-sections:

- a. Letter matching
- b. Letter identification
- c. Letter puzzle
- d. Count the letter

Stimulus hierarchy:

- Combination of grapheme and auditory(G+A)
- Grapheme alone (G)

Response hierarchy:

- Pointing/gesture (P/G)
- Verbal (V)

a. Letter matching

I. Grapheme to grapheme match

Task: Four letter card/stimulus/stimuli will be kept on the table. Clinician will have one letter card/stimulus in his/her hand facing towards person with aphasia and reads it aloud. Person with aphasia will be asked to point to the same letter as mentioned by the clinician out of the given choices.

II. Grapheme to soundmatch

Level 1: Present the letter card/stimulus while naming it aloud. Ask the person with aphasia to indicate yes for correct grapheme to sound match and no for incorrect grapheme to sound match.

Level 2: Present the letter card/stimulus. Ask the person with aphasia to name the letter.

Stimuli: For I and II use stimuli set A and B (mentioned below)

Set A. Orthographically dissimilar letters

- | | | | |
|------------|---------------------|------------|--------|
| 1. F /f/ | M /m/ | 6. ± /ʃa/ | ® /la/ |
| 2. U /ga/ | Z /ca/ | 7. ° /ha/ | K /E/ |
| 3. Ai /ya/ | z /da/ | 8. ¥ /pa/ | t /Na/ |
| 4. £ /na/ | E /i/ | 9. z /da/ | ¸ /sa/ |
| 5. P /ka/ | ^a Ä /ma/ | 10. v /ta/ | Ü /ga/ |

Set B: Orthographically similar letters

- | | | | |
|------------|---------|------------------------|------------|
| 1. C /a/ | D /A/ | 6. ^a Ä /va/ | ¥Ä /pa/ |
| 2. O /au/ | d /ja/ | 7. Ai /ya/ | gÄhÄ /jha/ |
| 3. vÄ /ta/ | PÄ /ka/ | 8. l /Ta/ | t /Na/ |
| 4. zÄ /da/ | qÄ /Da/ | 9. gÄ /ra/ | oÄ /Tha/ |

5. ɤʌ /na/ ʃʌ /sa/ 10. ɣsʌ /pha/ xʌ /tha/

Note: Not all the letters are included in this activity. However clinician is free to add other letters of ‘varnamaala’ after the attainment of target response level.

b. Letter identification

Level 1: Present the letter card/stimulus while naming it aloud. Ask the person with aphasia to indicate yes for correct and no for incorrect.

Level 2: Present the letter card/stimulus and ask the person with aphasia to name the letter.

c. Letter puzzle

This section has two sets of letter card/stimulus and these letters are in parts. A Plates(numbered 1 to 10) contains upper half of letters and B plates (numbered 11 to 20) contains lower half of letters. The task is to make the letter with the given choices of letter plates.

Level 1: Keep the model letter on the table and read it aloud. Give the respective numbered plates of the letter and ask the person with aphasia to make the letter by joining the plates.

Level 2: Give two plates of the letter along with one foil plate. Ask the person with aphasia to make the letter and read it aloud.

Stimuli:

- | | |
|-------------------------------------|-------------------------------------|
| 1. gʌ ra Plates no. (1+11) | 11. Pʌ ka Plates no. (3+19) |
| 2. zʌ da Plates no. (1+12) | 12. Wʌ gha Plates no. (3+20) |
| 3. Uʌ ga Plates no. (1+17) | 13. N O Plates no. (4+12) |
| 4. zsʌ dha Plates no. (1+13) | 14. ʃ la Plates no. (5+11) |
| 5. ɤʌ na Plates no. (2+14) | 15. Zʌ cha Plates no. (6+13) |
| 6. ʌ va Plates no. (2+15) | 16. C a Plates no. (7+11) |
| 7. ʃʌ sa Plates no. (3+14) | 17. L ai Plates no. (8+15) |
| 8. ɣʌ pa Plates no. (3+15) | 18. J e Plates no. (9+15) |
| 9. ɣsʌ pha Plates no. (3+16) | 19. M o Plates no. (10+15) |
| 10. μʌ bha Plates no. (3+18) | |

Note: Letters which are having more common orthographic structures are included in this section. It is up to clinician's flexibility to train the remaining letters also through this activity. The letter plates for above mentioned letters are given in the manual.

d. Count the letter

Level 1: Give the sentence card to person with aphasia and ask him to point/underline the letter throughout the sentence which the clinician names.

e.g: F^aÁPÀåzÀ^oè 'PÀ' CPÀëgÀ EgÀÄ^aÀ⁻Éè®è CrUÉgÉ J¼É¬Äj
/I vAkyadalli 'ka' akShara iruvallalla aDigere eLeyiri/

Level 2: Ask the person with aphasia read aloud the letter and count the number of times it is occurring in the sentence.

e.g: F^aÁPÀåzÀ^oè 'PÀ' CPÀëgÀ^aÀ£ÀÄß eÉÆÄgÁV NzÀÄvÁÛ⁻ÉPÀÌ^aÀiÁr
/I vAkyadalli 'ka' akSharavannu jOrAgi OduttAlekká mADi/

Stimuli:

1. E EzÀÄ E^o
/I//idu ili/
2. § Ä §¼Ä¥ÄzÀ^oè §gÉ.
/Ba//bA baLapadalli bare/
3. PÀ PÀ«vÁ¼Ä PÀ£ÀßqÁPÀ PÀ¥ÄÄà
/Ka//kavitALa kannaDaka kappu/
4. °À D°Á! °ÀÄ«£À °Á®Ä
/Ha//AhA! hasuvina hAlu/
5. £À £ÀjAiÀÄ£ÀÄß £ÉÆÄr £À«®Ä £ÀQÌvÄÄ
/Na//nariyannu nODi navilu nakkitu/
6. IQIQ °ÀwÛgÀ I°É⁻ i EmÉÖ.
/Ta//kiTaki hattira Tavel iTTe/
7. ¥Á ¥Á^aÀ£À ¥Á¥ÄÄ«UÉ ¥ÁoÀ °ÉÄ¼ÄÄvÁÛ¼É
/pa//pAvana pApuvige pATha hELuttALe/
8. ^aÄÄ ^aÀiÁ£À^aÄ¼ÉAiÄÄ^oè £É£ÉzÀÄ^aÄ£ÉUÉ §AzÀ¼ÄÄ
/Ma/ /mAnasa maLeyalli nenedu manege baMdaLu/
9. D D±À^aÄvÄÄÛ DAiÄÄð D°ÉÄÄ⁻É DI DqÀ®Ä °ÉÆÄzÀgÄÄ
/A//Asha mattu Arya AmEle ATa ADalu hOdaru/

10. D d@ð¼À dqÉ Vjd¼À dqÉVAvÀ §°À¼À GzÀÝ.
/Ja/ /jalajaLa jaDe girijaLa jaDegiMta bahaLa udda/
11. gÀ gÀ« gÀAUÁAiÀÄtzÀ°è ¥À¼ÀVzÀ £ÀÄjvÀ PÀ-ÉUÁgÀ.
/ra/ /ravi raMgAyaNadalli paLagida nurita kalegAra/
12. vÀ ,ÁjvÀ vÀPÀÌrAiÀÄ°è vÀgÀPÁjAiÀÄ vÀÆPÀ °ÁQzÀ¼ÀÄ.
/Ta/ /sarita takkaDiyalli tarakAriya tUka hAkidaLu/
13. £À £ÀAiÀÄ£À °Ä£ÉAiÀÄ°è °AiÁ«£ÀPÁAiÀÄ gÀ,ÁAiÀÄ£À
°AiÁrzÀ¼ÀÄ.
/na/ /nayana maneyalli mAvinakAya rasAyana mADidaLu/
14. bÀ bÉ! F bÀ½ªÄ¼ÉAiÀÄ°è bÀwæAiÉÄÄ E®èzÉ
£ÀqÉAiÀÄªªÄªÉÄ.
/Ca/ /Ce! I CaLimaLeyalli CatriyE illade naDeyuvudE/
15. UÀ ,ÁUÀgi UÀUÀ£À½UÉ MAzÀÄ UÀAmÉ -ÉÄmÁV
°ÉÆÄUÉAzÀ£ÀÄ.
/ga/ /sAgar gaganaLige oMdu gaMTe IETAgI hOgeMdanu/
16. gÀhÄ gÀhÄjAiÀÄ ,AzÀÄÝ gÀhÄÄ¼ÄÄgÀhÄÄ¼ÄÄ, °ÀtzÀ ,AzÀÄÝ
gÀhÄtgÀhÄt.
/jha/ /jhariya saddu jhuLujhuLu, haNada saddu jhaNajhaNa/
17. t PÉ® ,AzÀ°è ¥ÀÆtð ¥ÀjtÁw °ÉÆAzÀÄªÄzÀÄ ,ÀtÚ
«µÀAiÀÄªÄ?
/Na/ /kelasadalli pUrNa pariNiti hoMduvudu saNNa viShayavE?/
18. ¨sÀ ¨sÀªÀ£ÉUÀ¼À ,AA¥ÀÆtð C©üªÀQÛUÉ ¨sÀµÉ GvÀÛªÀÄ
ªAiÁzsªªÄ.
/Ba/ /BAvanegaLa saMpUrNa abhivyaktige BAShe uttama mAdhyama/
19. ±À ±ÀA¨sÀªªÄvÀÄÛ ±Áj C±ÉÆÄPÀ£À CmÉÆÄjPÁëzÀ°è
±Á-ÉUÉ °ÉÆÄzÀgÀÄ.
/sha/ /shaMBu mattu SAri ashOkana aTOrikShAdalli SAlege hOdaru/
20. R gÉÄSÁ ,ÀRvì SÁgÀ CAvÀ °ÉÄ¼ÁÛ£ÉÄ J-Áè SÁ°ªAiÁrzÀ¼ÀÄ.
/Ka/ /rEKA saKat KAra aMta hELtAnE eLLA KAli mADidaLu/

Note: These sentences have been included in the manual. The clinician is free to use bigger font size if necessary.

READING: LEVEL II

This level is divided into following sections:

A. Monosyllables

- | | |
|-----------------------------|------------------------------------|
| a. Find the beginning sound | c. Find the syllable in given word |
| b. Find the ending sound | d. Rhyming words |

B. Words

- | | |
|------------------------|-------------|
| a. Word identification | e. Tenses |
| b. Word completion | f. Synonyms |
| c. Jumble/rearrange | g. Antonym |
| d. Plurals | |

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75%

Stimulus mode hierarchy:

- Combination of auditory, visual and graphic (A+V+G)
- Combination of auditory and graphic (A+G)
- Graphic (A)

Response mode hierarchy

- Pointing (P)
- Combination of pointing and verbal (P+V)
- Verbal (V)

A. Monosyllables:

a. Find the beginning sound

Level 1: This level consists of 10 stimuli. Each stimulus has a set of three word cards along with pictures. The clinician is expected to have one card along with its picture in his/her

hand. Other two word card/stimulus with pictures will be kept on the table facing the person with aphasia.

Task: Read the card aloud. Ask the person with aphasia to point to the picture of the word which has same sound in the beginning position.

e.g.: E^aÀÁUÀ¼À°è 'aÀÄ' çAzÀ ±ÀÄgÀÄ^aÁUÀÄ^aÀ avÀæ vÉÆÃj¹.

/ivugaLalli 'ma' diMda shuruVAguva citra tOrisi./

Stimuli:

- | | | | | | | |
|-----|-------------------|---------|----------------------|---------|------------------------|--------|
| 1. | ^a ÀÄgÀ | Mara | ^a ÀÄ£É | Mane | E° | Ili |
| 2. | D£É | Ane | DUÀ,À | Agasa | £É® | Nela |
| 3. | Q« | Kivi | « ^a ÀiÁ£À | kiTaki | QIQ | vimAna |
| 4. | PÉÆÃ
½ | kOLi | N ⁻ É | kOTu | PÉÆÃ
lÄ | Ole |
| 5. | VqÀÄ
UÀ | giDuga | PÉÆqÀ° | giDa | VqÀ | koDali |
| 6. | «ÄÃ£
ÄÄ | mInu | «ÄÃ,É | mIse | C½®Ä | aLilu |
| 7. | “Á« | bAvi | “ÁV®Ä | bAgilu | VtÂ | giNi |
| 8. | ±Á ⁻ É | Shale | §®Æ£À
Ä | balUnu | ±ÀAR | SaMKa |
| 9. | PÉÆP
ÀìgÉ | Kokkare | ZÀ¥Àà° | cappali | PÉÆq
É | koDe |
| 10. | mÉÆ à | Toppi | mÉÆAU
É | ToMge | ^a ÀÄA
ZÀ | maMca |

Note: Pictures are provided for this activity.

Level 2: This level consists of 10 stimuli. Each stimulus has a set of three word cards each. The clinician is expected to have one card in his/her hand. Other two word card/stimulus will be kept on the table facing the person with aphasia.

Task: Read the card aloud. Ask the person with aphasia to point to the word card/stimuli on the table which has same sound in the beginning position.

e.g.: E^aÀÁUÀ¼À°è 'D' çAzÀ ±ÀÄgÀÄ DUÉÆ ¥ÀzÀ vÉÆÃj¹.

/ivugaLalli 'A' diMda shuru Ago pada tOrisi./

Level 3: Keep the card on the table. Ask the person with aphasia to read the syllable.

Stimuli: For both level 2 and 3.

- | | | | | | | |
|-----|--|-------------------|------------------------------|------------|--------------------------|----------|
| 1. | ɸÉÆÃ ^a À
À | /nOvu/ | ɸÉÆÃ1Ä | nOTu | ɸÀ«®Ä | navilu |
| 2. | ¸ÁUÀgÀ | /sAgara/ | ¸ÁjUÉ | sArige | ¸ÄÄAz
ÀgÀ | suMdara |
| 3. | °ÉÆÃ½U
É | /hOLige/ | °ÉÆÃ§½ | hObaLi | °À¹gÄÄ | hasiru |
| 4. | PÉÊ | /Kai/ | CAUÁ®
Ä | aMgAlu | PÉÊ ⁻ Á¸
À | kailAsa |
| 5. | ©Ã¸ÀtÂ
UÉ | /bIsaNige/ | ©ÃgÄÄ | bIru | ©¹®Ä | bisilu |
| 6. | ^a ÉÆÃ¸À
UÁgÀ | /mOsagAra/ | ^a ÉÆÃ°Àɸ
ÁQë | mOhanAkShi | «ÄÄɸÀ
ÄUÁgÀ | mInugAra |
| 7. | ¥À±ÄÄ¥
ÀQëUÀ
¼ÄÄ | /pashupakShigaLu/ | ¥ÀgÀ ^a Ài
ÁvÄä | paramaatma | C¥ÀdAi
ÄÄ | apajaya |
| 8. | ¥ÀæPÀÈ
w | /prakRuti/ | ¥Àæ±ÄÄ
¸É | prashaMse | ¸ÉÆÀÄl
PÀ | spOTaka |
| 9. | ±ÉÊPÀët
ÂPÀ | [shaikShaNika] | ±ÉÊ ^a À | Shaiva | ^a ÄÄ±Ä | vaMsha |
| 10. | ^a Áã ^a ÉÆÃ
°À | vyAmOha | ^a Áã¥ÁgÀ | vyApAra | ^a ÀiÁUÀ
ð | mArga |

b. Find the ending sound

Level 1: This level consists of 10 stimuli. Each stimulus has a set of three word cards along with pictures. The clinician is expected to have one card along with its picture in his hand. Other two word card/stimulus with pictures will be kept on the table.

Task: Read the card aloud. Ask the person with aphasia to point to the picture which has same sound in the ending position.

Stimuli:

- | | | | | | | |
|----|---------------------|----------|------------------|--------|-------|--------|
| 1. | PÀ ^a ÄÄ® | /Kamala/ | ^a ÉÆ® | /mola/ | «ÃuÉ | /vINe/ |
| 2. | °ÀÆf | /hUji/ | ¸ÀÆf | /sUji/ | PÉÆÃ½ | /kOLi/ |

- | | | | | | | |
|-----|----------|------------|----------|------------|---------|-----------|
| 3. | DgÀÄ | /Aru / | PÁgÀÄ | /kAru/ | ZÉAqÀÄ | /ceMDu/ |
| 4. | PÀtÄÚ | /kaNNu/ | °ÀtÄÚ | /haNNu/ | °ÉÆ¼É | /Mole/ |
| 5. | MAmÉ | /oMTe/ | UÀAmÉ | /gaOTe/ | vÀPÀÏr | /takkaDi/ |
| 6. | °ÄÄrPÉ | /maDike/ | °ÁZÀtÄUÉ | /bAcaNige/ | £À°è | /Nalli/ |
| 7. | PÉÆ¼Ä®Ä | /koLalu/ | °Á®Ä | /hAlu/ | °ÄÄAÏÏÄ | /maMTapa/ |
| 8. | °ÄÄgÄ¼ÄÄ | /maraLu/ | £ÉgÄ¼ÄÄ | /neraLu/ | °ÄÄ,Ä | /haMsa/ |
| 9. | zÁ,Ä°Á¼Ä | /dAsavALa/ | ¥Áj°Á¼Ä | /pArivALa/ | fAPÉ | /jiMke/ |
| 10. | agÀvÉ | /Cirate/ | °ÀtvÉ | /haNate/ | °Á°ÄÄ | /hAvu/ |

Note: Pictures are provided for this activity.

Level 2: This level consists of 10 stimuli. Each stimulus has a set of three words cards. The clinician is expected to have one card in his hand. Other two word card/stimulus will be kept on the table.

Task: Read the card aloud. Ask the person with aphasia to point to the word card/stimuli on the table which has same sound in the ending position.

Level 3: Keep the card on the table. Ask the person with aphasia to read the ending syllable.

Stimuli:

- | | | | | | | |
|----|-------------------|---------------|----------------|---------------|-----------------|----------------|
| 1. | PÁ°Ää | /kAvya/ | PÀ°Ä£Ä | /kavana/ | °sÄ°Ää | /Bavya/ |
| 2. | «ÄgÄ°°Á°Ä
Ä | /vIrabAhu/ | §°ÄÄgÄÆ! | /bahurUpi/ | ÄÄ¼ÄÄ°
ÄÄ | /suLuhu/ |
| 3. | PÄgÄÄ£Á
qÄÄ | /karunADu/ | zÄ£ÄPÄg
ÄÄ | /Danakaru/ | zÄÏÖPÄq
ÄÄ | /daTTakADu/ |
| 4. | §AdgÄÄ°s
ÄÆ«Ä | /baMjaruBUmi/ | °sÄÆ«Äv
Ä¬Ä | /BUmitAyi/ | gÄxÄ,ÄÏ
ÄÛ«Ä | /rathasaptami/ |
| 5. | C±Äé°ÉÄ
ÄzsÄ | /ashvamEdha/ | °ÉÄÄzsÄ« | /mEdhAVvi/ | °AUÄ°sÉÄ
zsÄ | /liMgaBEDha/ |
| 6. | Ä°ÄÄÄz
Äæ | /Samudra/ | PÄvÄÛ®
Ä | /Kattalu/ | ¥ÄÆtðZÄ
AzÄæ | /pUrNacaMdra/ |
| 7. | Ä°ÄiÄ£Ä
ÄUÄ¼ÄÄ | /sAmAnugaLu/ | CQI°ÄÄÆ
mÉ | /akkimUTe/ | PÄrØUÄ¼
ÄÄ | /kaDDigaLu/ |
| 8. | ZÄIÄ°ÄnP | /caTuvaTike/ | °É¼ÄçAU | /beLadiMgaLu/ | °ÉÆ°PÉ | /hOlike/ |

	É	À¼ÄÄ		
9.	zÀÆgÀzÀ ±Àð£À	/dUradarshana/	¥ÀæzÀ±À ð£À	/pradarshana/
			¥ÀæzÀQë uÉ	/pradakShiNe/
10.	G'â£ÀPÁ¬ Ä	/uppinakAyi/	SÁ¬Ä-É	/KAyile/
			zÉÆqÀØ· Á¬Ä	/doDDabAyi/

c. Rhyming words

Level 1: Read the word pair along with keeping the word card/stimulus on the table. Ask the person with aphasia to say if they sound alike or not.

Level 2: Give different word card/stimulus and ask the person with aphasia to group them to sounding alike.

Stimuli:

1. £Á¬Ä - PÁ¬Ä /nAyi – kAyi/
2. °Á®Ä - PÁ®Ä /hAlu – kAlu/
3. vÀmÉÖ - §mÉÖ /taTTe – baTTe/
4. ¥É£ÀÄß - ·É£ÀÄß /pennu – bennu/
5. HI - DI /UTa – Ata/
6. J-É - §-É /ele – bale/
7. ·ÉÃgÄÄ - vÉÃgÄÄ /bEru – tEru/
8. ^aÄÄÆgÄÄ - DgÄÄ /mUru – Aru/
9. °À®Äè - PÀ®Äè /hallu – kallu/
10. §¼Ä¥Ä - §,Ä^aÄ /baLapa - basava/

Note: Pictures are not provided for this activity.

d. Find the syllable in given word

Level 1: Keep the three word card/stimulus on the table and read them aloud. Ask the person with aphasia to underline the common syllable which is present in all the cards.

Level 2: Give all three word card/stimulus. Ask the person with aphasia to find the syllable which is present in all the cards and name it aloud.

Stimuli:

1. UÀrAiÀiÁgÀ aÀÄÈzÀAUÀ /gaDiyAra//mRRudaMga//sAraMga/
 ,ÁgÀAUÀ
2. °É½iZÀÄQÌ aQÌ° °É¼ÀîQÌ /beLLicukki//cikkili//beLLakki/
3. EnÖUÉ PÀnÖUÉ °ÉÄnÖ®Ä /iTtIge//kaTtIge//meTtIlu/
4. JA°sÀvÉÛÄ¼ÄÄ /eMBattELu//kALukaDDi//haraLu/
 PÁ¼ÄÄPÀrØ °ÀgÀ¼ÄÄ
5. °ÄÄÆV£À£ÀvÄÄÛ /mUginanattu//ippatamUru//mUlaMgi/
 E¥ÀàvÀ°ÄÄÆgÄÄ
 °ÄÄÆ®AV
6. JwÛ£ÀUÁr °ÀwÛ°ÄÄgÀ /ettinagaaDi//hattimara//deepadabatti/
 çÄ¥ÀzÀ§wÛ
7. £ÉÄgÀ-É°ÀtÄÛ J-ÉCrPÉ /nEralehaNnu//eleaDike//lekkapatra/
 -ÉPÀÏÀvÀæ
8. ©½bÀwæ °ÄÄAwæ°sÀ°£À /biLiCatri//maMtriBavana//kutaMtri/
 PÄÄvÀAwæ
9. ¥ÉÆÄµÀPÀgÄÄ µÀlàç /pOShakaru//ShaTpadi//viShakAri/
 «µÀPÁj
10. C¥À°Á,Àå,À,Áå°Áj gÀ°À,Àå /apahAsya//sasyAhAri//rahasya/

Note: Pictures are not provided for this activity.

B. Words

a. Word identification

Level 1: Give the word card/stimuli along with the picture card and ask the person with aphasia to indicate yes/no if the picture and the word means the same or not.

Level 2: Give the picture card and ask the person with aphasia to select the respective word card/stimuli for the picture.

Level 3: Read the word card/stimuli and say it aloud.

Stimuli: [Source Manual for Adult Fluent Aphasia Therapy-In Kannada (MAFAT-K)]

(a) **body parts**

1. vÀ-É	Tale	9. °À®Äè	Hallu
2. PÀvÀÄÛ	kattu	10. PÉÊ	Kai
3. PÀtÄÚ	kaNNu	11. PÁ®Ä	kAlu
4. Q«	kivi	12. °ÉÆmÉÖ	hoTTe
5. °ÀÄÆUÄÄ	mUgu	13. °É£ÄÄß	bennu
6. °Á¬Ä	bAyi	14. °ÉgÀ¼ÄÄ	Bralu
7. vÄÄn	tuTi	15. PÀÆzÀ®Ä	kUdalu
8. £Á°UÉ	nAlige		

(b) **Gadgets**

1. ¥sÁ&£ÄÄ	phyAnu	4. gÉÄrAiÉÆÄ	rEDiyO
2. n.«.	Ti.vi.	5. lüæqiÓ	phriDj
3. ¥sÉÆÄ£ÄÄ	phOnu		

(c) **Furniture**

1. °ÉÄÄdÄ	mEju	4. QIQ	kiTaki
2. PÄÄað	kurchi	5. °ÁV®Ä	bAgilu
3. °ÀÄAZÀ	maMca		

(d) **Animals**

1. £Á¬Ä	nAyi	9. D£É	Ane
2. °ÉPÄÄÌ	Bekku	10. °ÄÄ°	huli
3. °À,ÄÄ	Hasu	11. °A°Ä	siMha
4. J°ÉÄä	emme	12. E°	ili
5. PÉÆÄ½	kOLi	13. °ÉÆ®	Mola
6. °ÉÄÄPÉ	mEke	14. °Á°ÄÄ	hAvu
7. PÄÄzÄÄgÉ	kudure	15. PÀ¥Éà	kappe
8. PÉÆÄw	kOti		

(e) **Vehicles**

1. §,ÀÄì	bassu	7. fÃ¥ÄÄ	jIpu
2. PÁgÀÄ	kAru	8. ,ÉÊPÀ-ï	saikal
3. DmÉÆ	ATo	9. °ÀqÀUÀÄ	haDagu
4. ,ÀÆIlgi	skUTar	10. gÉÊ®Ä	Railu
5. °ÉÊPÀÄ	baiku	11. « ^a ÀiÁ£À	vimAna
6. -Áj	lAri	12. JwÛ£ÀUÁr	ettinagADi

(f) Vegetables

1. mÉÆ ^a ÉÆmÉ	TomoTo	9. °ÉÄt¹£ÀPÁ-Ä	meNasinakAyi
2. D®ÆUÀqÉØ	AlUgaDDe	10. °ÉAqÉPÁ-Ä	beMDekAyi
3. FgÀÄ½î	IruLLi	11. J-ÉPÉÆÄ,ÀÄ	elekOsu
4. PÁâgÉmï	kyAreT	12. °ÀÆPÉÆÄ,ÀÄ	hUkOsu
5. ,ËvÉPÁ-Ä	sautekAyi	13. æA°É°ÀtÄÚ	niMbehaNNU
6. °ÄÄÆ®AV	mUlaMgi	14. PÄÄA§¼ÀPÁ-Ä	kuMbaLakAyi
7. °ÄÄgÀÄ½PÁ-Ä	huruLikAyi	15. °ÁUÀ®PÁ-Ä	hAgalakAYi
8. §mÁtÂ	baTANi		

(g) Colours

1. PÉA¥ÄÄ	keMpu	6. ©½	biLi
2. °À¹gÀÄ	hasiru	7. PÄ¥ÄÄà	kappu
3. °À¼À¢	haLadi	8. PÄAzÀÄ	kaMdu
4. æÃ°	neeli	9. UÄÄ-Á©	gulAbi
5. PÉÄ,Àj	kEsari	10. £ÉÄgÀ¼É	nEraLe

Note: Pictures are provided for this activity.

b. Word completion

Level 1: Give the word card/stimulus along with the picture card/stimulus. Ask the person with aphasia to supply the missing syllable appropriately to make a word by choosing from the given choices.

e.g.: vÀ_ (¥É, -É, mÉ)

ta_ (pe, le, Te)

Note: Stimuli and picture from the sub-section a. Word identification are used for this level.

Level 2: Give the word card/stimulus and ask the person with aphasia to supply the missing syllable and make a word.

Stimuli:

- | | | | | |
|-----|------------|------------|-----------------------------|---------------|
| 1. | ZÀ_° | ca_li | (¥Ààppa, jri, °ÁbA) | ZÀ¥Àà° |
| 2. | «_£À | vi_na | (PÁkA,ªÀiÁmA) | ªÀiÁ£À |
| 3. | _«gÀ | _vira | (AiÀiÁyA, ,ÁsA) | ,Á«gÀ |
| 4. | GUÀÄ_ | ugu_ | (ªÀÄma, gÀÄru) | GUÀÄgÀÄ |
| 5. | ªÀÄgÀ¼ÀÄ | mara_Lu | (UÀga, PÀka) | ªÀÄgÀUÀ¼ÀÄ |
| 6. | zÉÃªÀ_£À | dEva_na | (,ÁÜsthA, ,ÀåsyA) | zÉÃªÀ,ÁÜ£À |
| 7. | PÀ_UÀ¼ÀÄ | ka_gaLu | (®Àèllu,tÄÜnnu) | PÀtÄÜUÀ¼ÀÄ |
| 8. | ©ÃUÀzÀ_ | bIgada_ | (PÉÊkai,¥ÉÊpai) | ©ÃUÀzÀ PÉÊ |
| 9. | _®zÀ_gÀ | _lada_ra | (D, UÀga,ªÀÄma, zÉÃdE) | D®zÀªÀÄgÀ |
| 10. | _gÉ_¬Ä | _re_yi | (PÁkA, ,ÉÆÃsO, °ÁbA, ¼ÀÄLu) | ,ÉÆÃgÉPÁ¬Ä |
| 11. | ¥ÀæzÀ__ | Prada | (±Àðrsha,ªÀÄma, £Àna) | ¥ÀæzÀ±Àð£À |
| 12. | _w©A_ | _tibiM_ | (¥Àæpra, § ba, °ÁbA) | ¥Àæw©A§ |
| 13. | ,ÀA__AiÀÄ | saM__ya | (¥Àæpra, °sÁbhA, zÁdA) | ,ÀA¥ÀæzÁAiÀÄ |
| 14. | DvÀä_gÀ_ | Atma_ra_ | (UËgou, AiÉÆÃyO,ªÀva) | DvÀäUËgÀªÀ |
| 15. | _wªÀAvÀ | _ti_vaMta | (¥Àæpra, °sÁbhA, °ÁbA) | ¥ÀæwªÀsÁªÀAvÀ |
| 16. | ªÀÈ_,ªÀÄÆ_ | vRu_samU_ | (PÀèkSha, °Àha, UÀga) | ªÀÈPÀè,ªÀÄÆ°À |
| 17. | _zÀÄå_¥À | _dyu_pa | («vi,ªÀÄma, çÝÄdI) | «zÀÄåçÝÄ¥À |
| 18. | !Ã_¥ÀPÀgÀ_ | pI_pakara_ | (oÉÆÃThO, AiÉÆÃyO, tNa) | !ÃoÉÆÃ¥ÀPÀgÀt |

19. _PÉÆÃ¥À_UÀ _kOpa_ga (- ÉÆÃIO, - ÉÆÃPÉÆÃ¥ÀAiÉÆÃUÀ
 "sÁbhA,
 AiÉÆÃyO)
20. C_ZÀA_PÀÈ_ A_caM_kRu_ (zsÀðrdha, CzsÀðZÀAzÁæPÀÈw
 AiÉÆÃyO
 zÁædrA, wti)

c. Jumble/rearrange

Level 1: Give the jumbled word card and read it aloud. Keep the picture card/stimulus one the table. Ask the person with aphasia to rearrange the syllables and make a word.

e.g.: «Qviki Q«kivi

Note: Stimuli and picture from the sub-section A. Word identification are used for this level.

Level 2: Give the jumbled word card/stimulus and ask the person with aphasia to rearrange and make a word.

Stimuli:

- | | | | |
|---------------|-----------|-------------|-------------|
| 1. IH | TaU | (HI | UTa) |
| 2. £ÉªÀÄ | Nema | (ªÀÄ£É | mane) |
| 3. UÀªªÀÄ | Guma | (ªÀÄUÀÄ | magu) |
| 4. I-ÉÆÃ | TalO | (-ÉÆÃI | IOta) |
| 5. £ÀÄß¥É | nnupe | (¥É£ÀÄß | pennu) |
| 6. ¥À¼À§ | paLaba | (§¼À¥À | baLapa) |
| 7. gÀªªÉÆ,À | rumosa | (ªÉÆ,ÀgÀª | mosaru) |
| 8. °ÀgÀÄ | Siharu | (°À¹gÀÄ | hasiru) |
| 9. AiÀiÁrUÀgÀ | yADigara | (UÀrAiÀiÁgÀ | gaDiyAra) |
| 10. vÀPÁgÀj | takArari | (vÀgÀPÁj | tarakAri) |
| 11. ªÀiÁUÀð | mrAga | (ªÀiÁUÀð | mAga) |
| 12. IWÀ£É | Taghane | (WÀI£É | ghaTane) |
| 13. ,À®àPÀA | salpakaM | (,ÀAPÀ®à | saMkalpa) |
| 14. SÁ£ÉPÁð | khAnekAr | (PÁSÁð£É | kArkhaNe) |
| 15. °ÁªªÀªgÀ | hAvyavara | (ªªªª°ÁgÀ | vyavahaAra) |

16.	C!Û®àvÀÈ	aartilpatRu	(C®àvÀÈ!Û	alpatRupti)
17.	lÄÖCPÀZÀÄÑ	TTuakaccu	(CZÄÄÑPÄlÄÖ	accukaTTu)
18.	¤£À©dqÀ	ninabijaDa	(d£À¤©qÀ	jananibiDa)
19.	¥Àw°ÀdæPÀÈ,À	pratihajakRusa	(¥ÀæPÀÈw,À°Àd	prakRutisahaja)
20.	-ÉÆÃj¥ÀPÀÄ±À	lOripakusha	(PÀÄ±À-ÉÆÃ¥Àj	kushalOpari)

d. Plurals

Level 1: Give the word card/stimuli and read it aloud. Ask the person with aphasia to point to the picture as clinician reads.

Level 2: Give the picture card and ask the person with aphasia to select the appropriate word card/stimuli of the plural form.

Stimuli:

1	^a ÄÄgÀUÀ¼ÄÄ	maragaLu
2	PÀtÄÚUÀ¼ÄÄ	kaNNugaLu
3	gÀ,ÉÛUÀ¼ÄÄ	rastegaLu
4	^a ÄÄ£ÉUÀ¼ÄÄ	manegaLu
5	¥ÄÄ,ÀÛPÀUÀ¼ÄÄ	pustakagaLu
6	¨ÉgÀ¼ÄÄUÀ¼ÄÄ	beraLugaLu
7	^a ÄÄPÀì¼ÄÄ	makkaLu
8	°ÉAUÀ,ÀgÄÄ	heMgasaru
9	°ÄÄqÄÄUÀgÄÄ	huDugaru
10	°ÄÄqÄÄVAiÄÄgÄÄ	huDugiyaru

Note: Pictures are provided for this activity.

e. Tenses

Level 1: Clinician reads the sentence and picture cards will be kept on the table. Person with aphasia will be asked to point to the picture which depicts the sentence clinician reads.

Level 2: Ask the person with aphasia to read the card and point to the respective picture.

Stimuli:

- | | | |
|---|--|--------------------------------|
| 1 | °ÄÄqÄÄV §gÉAiÄÄÄvÁÛ¼É | huDugi bareyuttALe |
| | °ÄÄqÄÄV §gÉAiÄÄÄwÛzÁÝ¼É | huDugi bareyuttiddALe |
| | °ÄÄqÄÄV §gÉzÀ¼ÄÄ | huDugi baredaLu |
| 2 | CUÀ,À §mÉÖ MUÉAiÄÄÄvÁÛ¼É | agasa baTTe ogeyuttAne |
| | CUÀ,À §mÉÖ
MUÉAiÄÄÄwÛzÁÝ¼É | agasa baTTe ogeyuttiddAne |
| | CUÀ,À §mÉÖ MUÉzÀ¼ÄÄ | agasa baTTe ogedanu |
| 3 | °ÄÄqÄÄUÀ DI DqÄÄvÁÛ¼É | huDuga ATa ADuttAne |
| | °ÄÄqÄÄUÀ DI DqÄÄwÛzÁÝ¼É | huDuga ATa ADuttiddAne |
| | °ÄÄqÄÄUÀ DI DrzÀ | huDuga ATa ADida |
| 4 | °ÄÄqÄÄVAiÄÄÄ ðÃgÄÄ
PÄÄrAiÄÄÄvÁÛ¼É | huDugiyu neeru kuDiyuttALe |
| | °ÄÄqÄÄVAiÄÄÄ ðÃgÄÄ
PÄÄrAiÄÄÄwÛzÁÝ¼É | huDugiyu neeru kuDiyuttiddALe |
| | °ÄÄqÄÄVAiÄÄÄ ðÃgÄÄ
PÄÄrzÀ¼ÄÄ | huDugiyu neeru kuDidaLu |
| 5 | °ÉAUÀ,ÄÄ ¥ÁvÉæ
vÉÆ¼ÉAiÄÄÄvÁÛ¼É | heMgasu pAtre toLeyuttALe |
| | °ÉAUÀ,ÄÄ ¥ÁvÉæ
vÉÆ¼ÉAiÄÄÄwÛzÁÝ¼É | heMgasu pAtre toLeyuttiddALe |
| | °ÉAUÀ,ÄÄ ¥ÁvÉæ vÉÆ¼ÉzÀ¼ÄÄ | heMgasu pAtre toLedaLu |
| 6 | °ÄÄqÄÄUÀ¼ÄÄ QIQ
vÉUÉAiÄÄÄvÁÛ¼É | huDuganu kiTaki tegeyuttAne |
| | °ÄÄqÄÄUÀ¼ÄÄ QIQ
vÉUÉAiÄÄÄwÛzÁÝ¼É | huDuganu kiTaki tegeyuttiddAne |
| | °ÄÄqÄÄUÀ¼ÄÄ QIQ vÉUÉzÀ¼ÄÄ | huDuganu kiTaki tegedanu |
| 7 | CªÀ¼ÄÄ ¨Á¼É°ÀtÄÜ
w¼ÄÄßvÁÛ¼É | avanu bALeHaNNU tinnuttAne |
| | CªÀ¼ÄÄ ¨Á¼É°ÀtÄÜ | avanu bALeHaNNU tinnuttiddAne |

	w£ÀÄßwÛzÁÝ£É	
	CªÀ£ÀÄ ªÁ¼ÉªÀtÄÛ wAzÀ£ÀÄ	avanu baLehaNnu tiMdanu
8	DªÀ¼ÄÄ §mÉÖ PÀvÀÛj,ÄÄvÁÛ¼É	AvaLu baTTe kattarisuttALe
	DªÀ¼ÄÄ §mÉÖ PÀvÀÛj,ÄÄwÛzÁÝ¼É	AvaLu baTTe kattarisuttiddALe
	DªÀ¼ÄÄ §mÉÖ PÀvÀÛj¹z¼ÄÄ	AvaLu baTTe kattarisidaLu
9	ªÄÄUÄÄ ªÆªÄÄ QÃ¼ÄÄvÀÛzÉ	magu hUvu kILuttade
	ªÄÄUÄÄ ªÆªÄÄ QÃ¼ÄÄwÛzÉ	magu hUvu kILuttide
	ªÄÄUÄÄ ªÆªÄÄ QÃ½vÄÄ	magu hUvu kILitu
10	CªÀ£ÀÄ ª®Äè GdÄÓvÁÛ£É	avanu hallu ujjuttAne
	CªÀ£ÀÄ ª®Äè GdÄÓwÛzÁÝ£É	avanu hallu ujjuttiddAne
	CªÀ£ÀÄ ª®Äè GfÓzÀ£ÀÄ	avanu hallu ujjidanu

Note: Pictures are provided for this activity.

f. Synonyms (adapted from MAFAT-K)

Level 1: keep the picture card/stimulus on the table and read the word cards. Ask the person with aphasia to point to the word cards which means the same.

Level 2: Ask the person with aphasia to read the word card/stimulus and pick the one's which mean the same.

Stimuli:

1	ªÄÄ£É: UÄÈª,ªÄÄAZÄ	mane: gRuha, maMca
2	ªvÄÄÛ: KgÄÄ, JvÄÄÛ	hattu: Eru, ettu
3	aPÄÏ: ªtÛ, ¥ÄÄIÖ	cikka: saNNa, puTTa
4	zÄÄqÄÄØ: PÄ,ÄÄ, PÄtÄÛ	duDDu: kAsu, kaNnu
5	DPÄ±Ä: DgÄÄ, DUÄ,Ä	AkAsha: Aru, Agasa
6	ªªÄÄAiÄÄ: ¥É£ÄÄß, WÄAmÉ	samaya: pennu, ghaMTe

- | | | |
|----|------------------------------|------------------------|
| 7 | PÁqÀÄ: °ÁªÀÅ, CgÀtä | kADu: hAvu, araNya |
| 8 | PÄÄwÛUÉ: °ÉÆmÉÖ,
PÉÆgÀ¼ÄÄ | kuttige: hoTTe, koraLu |
| 9 | zÉÃªÀ, ÁÜ£À: UÄÄr, çÃ¥À | dEvasthAna: guDi, dIpa |
| 10 | ,ÁUÀgÀ: £Àç, ,ªªÄÄzÀα | sAgara: nadi, samudra |

Note: Pictures are provided for this activity.

g. Antonyms (adapted from MAFAT-K)

Level 1: Read the word and ask the person with aphasia to point to the card which has opposite meaning to the word read by clinician.

Level 2: Ask the person with aphasia to read the words and match the one's with opposite meaning.

Level 1: Stimuli (10)

- | | | |
|----|-----------------------------|-------------------------|
| 1 | zÉÆqÀØzÄÄ: aPÀìzÄÄ,
GzÀÝ | doDDadu: chikkadu, udda |
| 2 | ªÄÄÄAzÉ: §®, »AzÉ | muMde: bala, hiMde |
| 3 | ,ÀtÚ: zÀ¥Àà, PÀ¥ÀÄà | saNNa: dappa, kappu |
| 4 | GzÀÝ: UÄÄAqÄÄ, VqÀØ | Udda: gunDu, giDDa |
| 5 | ªÉÄÄ-É: PÉ¼ÀUÉ, M¼ÀUÉ | mEle: keLage, oLage |
| 6 | M¼ÀUÉ: D£ì, °ÉÆgÀUÉ | oLage: An, horage |
| 7 | ªwÛgÀ: zÀÆgÀ,ªÄÄÄAzÉ | hattira: doora,muMde |
| 8 | UÀnÖ: ªÉÄvÀÛ£É, ©¹ | gaTTi: mettane, bisi |
| 9 | ªÉ½UÉÎ: gÁwæ, PÀ¥ÀÄà | beLiGGe: raatri, kappu |
| 10 | ªsÁgÀ: ªAUÄÄgÀ,ªwÛgÀ | bhAra: hagura, hattira |

Level 2: Stimuli (10)

- | | | |
|---|--------------------------|------------------------|
| 1 | ,ÀvÀå- C,ÀvÀå, ©½ | satya- asatya, biLi |
| 2 | ,ÀAvÉÆÃµÀ-zÄÄR,
PÀµÀÖ | saMtOSha-dukha, kaShTa |

3	laabha-naShTa, sukha
4	Jaya-apajaya, sihi
5	suMdara-kuroopa, dappa
6	jaaNa-daDDa, pustaka
7	sari-tappu, suLLu
8	Uttara-dakShiNa, pUrva
9	bala-eDagaDe, mEle
10	jaaNa-daDDa, suMdara

Note: Pictures are not provided for this activity.

READING: LEVEL III

This level contains following two sections.

A. Sentence level

- | | |
|--------------------------|--------------------------|
| a. Sentence reading | d. Sentence sequencing |
| b. Sentence completion | e. Sentence construction |
| c. Sentence verification | |

B. Discourse level reading comprehension

- Passage 1
- Passage 2
- Passage 3
- Passage 4

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75% of the total score

Stimulus mode hierarchy:

- Combination of auditory, visual and graphic (A+V+G)

- Combination of auditory and graphic (A+G)
- Graphic only (A)

Response mode hierarchy

- Pointing (P)
- Combination of pointing and verbal (P+V)
- Verbal only (V)

A. Part 1

This section consists of following sub-sections: Sentence copying

- a. Sentence completion
- b. Sentence verification
- c. Sentence sequencing
- d. Sentence construction

Sentence reading

Level 1: Give the sentence card and read the sentence aloud while keeping the respective picture on the table. Ask the person with aphasia to read it as well.

Stimuli:

- | | | |
|----|---|---|
| 1 | EzÄÄ PÁ®Ä. | idu kAlu |
| 2 | EzÄÄ zÉÆqÀØ ºÄÄ£É. | idu doDDa mane |
| 3 | £Á¬ÄUÀ¼ÄÄ ºÉÆUÀ¼ÄÄwÛªÉ. | nAYigaLu bogaLuttive |
| 4 | ºÉPÄÄÏ ºÁ®Ä PÄÄrAiÄÄÄwÛzÉ. | bekku hAlu kuDiyuttide. |
| 5 | §QÄn£Äºè ºÄgÄÄ E®è. | bakITinalli nIru illa. |
| 6 | EzÄÄ ¥É£ÄÄß ºÄÄvÄÄÛ
¥ÄÄ,ÄÛPÄ. | idu pennu mattu pustaka |
| 7 | CªÄ£ÄÄ ¥ÄvÄæ
§gÉAiÄÄÄwÛzÁÝ£É. | avanu patra bareyuttiddAne. |
| 8 | Cª¼ÄÄ VqÀPÉÏ ºÄgÄÄ
ºÁPÄÄwÛzÁÝ¼É. | avaLu giDakke nIru hAkuttiddALe. |
| 9 | UÉÆÄqÉAiÄÄ ºÉÄÄ-É
PÄª-ÉAqÄgï vÄÆUÄÄ ºÁQzÁÝgÉ. | gODeya mEle kyAleMDar tUgu hAkiddAre. |
| 10 | ªÄÄPÄÏ¼ÄÄ ºÄÄ¼ÉAiÄÄºè bÄwæ
»rzÄÄ £ÄqÉAiÄÄÄwÛzÁÝgÉ. | makkaLu maLeyalli Catri hiDidu
naDeyuttiddAre. |

Level 2: Give the sentence card and the picture card. Ask the person with aphasia to read the sentence aloud.

Level 3: Ask the person with aphasia to read the sentence.

a. Sentence completion

Level 1: Give the sentence card with a missing word. Clinician will read the sentence aloud. Next, show the picture card and ask the person with aphasia to look at the card and choose the right word out of choices.

Stimuli:

- | | | |
|---|---|--|
| 1 | gÉÆÄr£À°è PÉA¥ÄÄ PÁgÄÄ ¢AwzÉ.
rODinalli keMpu kAru niMtide. | (PÉA¥ÄÄ, PÄ¥ÄÄà, ¢Ä°)
(keMpu, kappu, nIli) |
| 2 | °ÄÄqÄÄV PÄÄaðAiÄÄ°è PÄÄ½vÄÄ °ÄtÄÜ
w£ÄÄßwzÁÝ¼É.
huDugi kurciyalli kuLitu haNNu tinnutiddALe. | (DI, °ÄtÄÜ, ¥ÁI)
(ATa, hannu, pATa) |
| 3 | °ÄÄqÄÄUÀ vÄ-ÉAiÄÄ °ÉÄÄ-É °Ä¹gÄÄ §tÚzÀ
mÉÆÄ! zsÀj¹zÁÝ£É.
huDuga taleya mEle hasiru baNNada TOpi
dharisiddAne. | (°ÄÄqÄÄUÀ, °ÄÄqÄÄV,
ªÄÄUÄÄ)
(huDuga, huDugi, magu) |
| 4 | nÄ«AiÄÄ °ÉÄÄ-É °ÄÆ«£Ä °ÉÆPÉÌ EnÖzÁÝgÉ.
TIviya mEle hUvina bokke iTTiddAre. | (°ÉÄÄ-É, PÉ¼ÄÜÉ,
M¼ÄÜÉ)
(mEle, keLage, oLage) |
| 5 | D QIQUÉ PÉA¥ÄÄ §tÚzÀ ¥ÄgÄzÉUÀ¼Ä£Äß
vÄÈV ©nÖzÁÝgÉ. ªÄÄvÄÄÜ CzÀgÄ
°Ä¼ÉUÀ¼ÄÄ ªÄÄªÄªÄÉ.
A kiTakige keMpu baNNada paradegaLanna tUgi
biTTiddAre. mattu adara hALegaLu muccive. | (ªÄÄªÄªÄªÄÉ, vÉgÉçªÄÉ,
ªÄÄªÄªÄªÄÉ)
(muccive, teredive, muridive) |
| 6 | ±Á- ÁªÄÄPÄ¼ÄÄ ,ªÄªÄªÄªÄÜç zsÀj¹ ,Á- ÁV
¢AvÄÄ, PÉÊªÄÄVzÄÄ ¥ÄæxÀð£É
ªÄiÁqÄÄwÛzÁÝgÉ.
shAlAmakkaLu samavastra dharisi sAlAgi niMtu,
kaimugidu prArthane mADuttiddAre. | (¥ÄæxÀð£É, HI, DI)
(prArthane, UTa, ATa) |
| 7 | ªÉÄÄ£ÄªÄªÄ-É vÄmÉÖAiÄÄ vÄÄªÄªÄ
°ÄtÄÜUÀ½ªÄÉ. CªÄªÄUÀ¼ÄªÄªÄªÄ-É
£ÉÆtUÀ¼ÄÄ °ÄgÄqÄÄwÛªÄÉ.
mEjina mEle taTTeya tuMbA haNNugaLive. avugaLa
mEle noNagaLu hArADuttive. | (ªÄÄªÄªÄªÄªÄÉ, PÄÄ½wzÉ,
PÄÄ½wzÁÝgÉ)
(malagide, kuLitide, |

- | | | |
|----|--|--|
| 8 | C ^a À¼ÄÄ §mÉÖ | kuLitiddAre)
(MUÉAiÀÄÄwÛzÁÝ¼É,
°ÀjAiÀÄÄwÛzÁÝ¼É,
w£ÀÄßwÛzÁÝ¼É) |
| | avaLu baTTe | (ogeyuttiddAle,
hariyuttiddAle, tinnuttiddAle). |
| 9 | ZÁ®PÀ£ÄÄ d£ÀjAzÀ vÄÄA©gÄÄ ^a À §,Ài£ÄÄß
^a ÉÄUÀ ^a ÁV Nr,ÄÄwÛzÁÝ£É. | (d£ÀUÀ½AzÀ,
^a ÄÄPÀ¼AzÀ,
¥ÁætÄUÀ½AzÀ) |
| | cAlakanu janariMda tuMbiruva bassannu vEgavAgi
ODisuttiddAne.
giNiyu paMjaradalli ide. | (janagaLiMda, makkaLiMda,
prANigaLiMda) |
| 10 | °Ä,ÄÄ ^a ÄÄ ^a ÄÄ ^a ÉÄÊzÁ£AzÀ°è,ÉÆA¥ÁzÀ°À¹gÄÄ
°ÄÄ®è£ÄÄß ^a ÉÄÄAiÄÄÄwÛzÉ. | (°ÄÄ®è£ÄÄß, °ÄÄ°èAzÀ,
°ÄÄ°èUÉ) |
| | hasu soMpAda hasiruhullannu mEyuttide. | (hullannu, hulliniMda, hullige) |

Level 2: This level consists of sentences with multiple missing words and pictures are not being provided. Give the sentence card with the missing word and the choices. Clinician reads them aloud and asks the person with aphasia to choose the right word by underlining the word and reading it aloud.

Stimuli:

- | | | |
|---|---|---|
| 1 | CrUÉUÉ E®èzÉ M¼ÉîAiÄÄ gÄÄa
.....
aDigegeillade oLLeya ruci | (,ÀPÀ¼gÉ, G¥ÄÄà, EzÉ, E®è)

(sakkare, uppu, ide, illa) |
| 2 |UÉ §tÚ-§tÚzÀ JAzÀgÉ vÄÄA ^a ÄÄ
µÀÖ.
..... ge baNNa-baNNa eMdare tuMba
ShTa. | (°ÄÄPÀ¼¼ÄÄ, CfÓUÉ, nÄ.«.,
DlzÀ,Á ^a ÄÄiÁ£ÄÄ)

(makkaLu, ajjige, TI.vi., ATadasAmAnu) |
| 3 | ¥Àæw ^a vÄÄ ^a ÄÄiÁqÄÄ ^a ÄÄzÀjAzÀ
zÉÄ°AzÀ ZÉ£ÁßVgÄÄvÀÛzÉ.
pratinitya mADuvudariMda dEhada
..... cennAgiruttade. | (DgÉÆÄUÄâ, ^a ÄÄAiÄÄiÁ ^a ÄÄ,
,ÀPÀ¼gÉ)

(ArOgya, vyAyAma, sakkare) |
| 4 | C ^a ÀgÄÄ °ÉÆÄV vÀgÀPÁj ^a ÄÄvÄÄÛ
..... PÉÆAqÄÄvÄÄAzÀgÄÄ. | (§,ï ^a ÁÝt, ,ÄAvÉ, OµÀçü, °ÀtÄÜ) |

- avaru hOgi tarakAri mattu (bas nildANa, saMte, auShadhi, haNNU)
koMDutaMdaru.
- 5 ^aÄÄÆgÄÄ ç£ÀUÀ½AzÄ (°ÄÄ±ÁgÄÄ, dégÀ, CAUÀr,
EzÄÄYzÄjAzÄ §½ qÁPÀÖgi)
°ÉÆÄUÀ°ÉÄPÀ-ÄvÄÄ.
- mUru dinagaLiMda iddudariMda (hushAru, jvara, aMgaDi, DAKTar)
..... baLi hOgabEkAyitu.
- 6 ^aÉÄÊ, ÄÆj£À°è °sÁj EAZÁV (°ÄÄ¼É, °ÄÄ¼É±ÄgÄÄ,
ÄPÀµÄÄÖ ±ÉÄRgÀuÉAiÀiÁVzÉ. ©gÄÄUÁ½, °ÄÄtÄÜ)
- maisUrinalli bhAri iMdAgi sAKaShTu (maLe, maLenIru, birugALi, maNNU)
..... shEKaraNeyAgide.
- 7 D vÄÄvÄÛvÄÄçUÉ °ÄvÄÛ®Ä (°ÉIÖzÄ, ÄUÀgÄ,
..... AiÄÄÄ°APÀgÄÄ °ÄÄÄAzÉ ÉÆÄvÄÄ°ÉÆÄzÄ, GvÁì»)
§AzÄgÄÄ.
- Atuttatudige hattalu yuvakaru (beTTada, sAgara, sOtuhOda, utsAhi)
muMde baMdaru.
- 8 PÉI ^aÄÄÄAZÉAiÉÄÄ (°ÉÄ¹UÉPÀ®, °ÄÄ¼ÉUÁ®,
^aÄÄ£ÉAiÄÄ°è , ÄArUÉ, °Ä¥Ä¼Ä, ZÄ¥Áw)
Gìà£ÄPÀ-ÄUÄ¼Ä£ÄÄß ^aÄiÁrqÄÄvÄÛgÉ.
- kke muMceyE maneyalli (bEsigekAla, maLegAla, happaLa,
saMDige, uppinakAyigaLannu 9mADiDuttAre. capAti)
- 9 ¥Äj, ÄgÄ PÀr°ÉÄ ^aÄiÁqÄ®Ä (ÉAzÄAiÄÄð, °ÄiÁ°£Äå, ¥Áè¹ÖPi,
§¼ÄPÉAiÄÄ£ÄÄß ±µÉÄçü¹ PÄUÄzÄ)
- §¼ÄPÉAiÄÄ£ÄÄß gÄÆrü ^aÄiÁqÄ°ÉÄPÄÄ.
- parisarakaDime mADalu (souMdarya, mAlinya, plAsTik, kAgada)
baLakeyannu niShEdhisi baLakeyannu
rUDhi mADabEku.
- 10 gÄ, ÉÛ ¥Á°, ÄÄ°ÄÄzÄjAzÄ FUÄ (ÄASÉå, ±AiÄÄ°ÄÄ, ÄAZÁgÄ,
DUÄÄwÛgÄÄ°Ä , ÄASÉå C¥ÄWÁvÄ)
- ±AiÄÄAvÄæt ^aÄiÁqÄ§°ÄÄzÄÄ.
- rastepAlisuvudariMda Iga Agittiruva (saMKye, niyama, saMcAra, apaghAta)
..... saMKye niyaMtraNa mADabahudu.

Note: Pictures are not provided for this activity.

b. Sentence verification

Level 1: Give the sentence card along with picture and read it aloud. Ask the person with aphasia to indicate whether the sentence read by the clinician is right/wrong.

Stimuli:

- | | | |
|----|---|---|
| 1 | §,ÀÄiUÀ¼ÄÄ °ÉÆÃUÀÄwÛzÉ. | bassugaLu hOguttide. |
| 2 | V⊘ ¥ÀdgÀzÀ°è EªÉ. | gini pajaradalli ive. |
| 3 | °ÀQÌ UÀÆr£À ªÉÄÄ-É
°ÁgÀÄwzÉ. | Hakki gUDina mEle hArutide. |
| 4 | °ÉAUÀ,ÄÄ ¥ÉÆgÀPÉ »rzÄÄ
PÀ,À UÄÄr,ÄÄwÛzÁÝ¼É. | heMgasu porake hiDidu kasa guDisuttiddALe. |
| 5 | ªÄÄUÄÄ vÀmÉÖAiÉÆ¼ÀÜÉ
ªÄÄ®VzÉ. | magu taTTeyoLage malagide. |
| 6 | PÀvÀÛ°£À DUÀ,ÄzÀ°è
ZÀAzÀæ-£ÀPÀëvÀæUÀ¼ÄÄ
«Ä£ÄÄUÄÄwÛªÉ. | kattalina Agasadalli caMdra-nakShatragaLu
minuguttive. |
| 7 | vÀmÉÖAiÉÆ¼ÀÜÉ ⊘Äj£À
-ÉÆÄI EªÉ. | taTTeyoLage nIrina lOTa ive. |
| 8 | CªÀ£ÄÄ ªÄÄgÀç PÉ®UÀqÉ
PÀÆ¼ÄÄwzÁÝ£É. | avanu maradi kelagaDe kULutiddane. |
| 9 | CªÀgÀÄ ¥sÉÆÄ⊘VAvÀ
ªAiAvÀ£ÁqÄÄvÁÛgÉ. | avaru phOnigiMta mAtanADuttAre. |
| 10 | CªÀ¼ÄÄ CAZÉ ¥ÉnÖUÉ-ÄAzÀ
¥ÀvÀæ °ÁPÄÄwÛzÁÝ£É. | avaLu aMce peTTigeyiMda patra hAkuttiddAne. |

Note: Pictures are provided for this activity.

Level 2: Give the sentence card and ask the person with aphasia to read it and indicate whether the sentence read by the clinician is right/wrong.

Level 3: If the sentences are wrong, ask the person with aphasia to correct it and say.

c. Sentence sequencing

Level 1: This activity contains three stimuli with three sequential picture cards/stimuli along with the word card/stimulus for each picture.

Give one set of picture cards/stimuli along with its word card/stimuli which are arranged in different order.

Task: Clinician will read the word card/stimulus and the person with aphasia is expected to look at the picture and arrange the sentences in an appropriate sequence.

Level 2: Give the three picture cards/stimuli and the respective word card/stimulus. Ask the person with aphasia to read the cards and keep them below the respective picture.

Stimuli:

Set 1	<p>°ÀÈzÀP£ÀÄ CªÀ£ÀÄ °Á¹UÉAiÉÆAzÀ EzÉÝÄ¼ÄÄwÛzÁÝ£É.</p> <p>ªÀÈzÀP£ÀÄ °À®è£ÀÄß GdÄÓwÛzÁÝ£É.</p> <p>ªÀÈzÀP£ÀÄ wAr w£Äß®Ä mÉÃ§-ïªÉÄÄ-É PÄÄ½wzÁÝ£É.</p>	<p>vRuddhanu hAsigeyoMda iddELuttiddAne.</p> <p>vRuddhanu hallannu ujjuttiddAne.</p> <p>vRuddhanu tiMDi tinnalu TEbal mEle kuLitiddAne.</p>
Set 2	<p>°ÉAUÀ,ÄÄ CAUÀr-ÄAzÀ °Á®Ä PÉÆ¼ÄÄwÛzÁÝ¼É.</p> <p>°ÉAUÀ,ÄÄ CrUÉªÄÄ£ÉAiÄÄ°è nÃªÄiÄqÄÄwÛzÁÝ¼É.</p> <p>°ÉAUÀ,ÄÄ CwyUÀ½UÉ nÃ PÉÆqÄÄwÛzÁÝ¼É.</p>	<p>avaLu aMgaDiyiMda hAlu taruttiddALe.</p> <p>avaLu aDigemaneyalli TI mADuttiddALe.</p> <p>avaLu atithigaLige TI koDuttiddALe.</p>
Set 3	<p>CªÀ£ÀÄ zÁjAiÄÄ°è £ÄqÉAiÄÄwÛzÁÝ£É.</p> <p>CªÀ£À PÁ°UÉ £Á-Ä PÄZÄÄÑwÛzÁÝ£É.</p> <p>ªÉÈzÀâgÄÄ CªÀªUÉ ZÄÄZÄÄÑªÄÄzÄÄÝ PÉÆqÄÄwÛzÁÝgÉ.</p>	<p>Avanu dAriyalli naDeyuttiddAne.</p> <p>Avana kAlige nAyi kaccuttide.</p> <p>Vaidyaru avanige cuccumaddu koDuttiddAre.</p>

Note: Pictures are provided for this activity.

d. Sentence construction

Level 1: Give the picture card to the person with aphasia provide the key words to help him construct a sentence and say it aloud

Stimuli:

- | | | |
|---|--|------------------------------|
| 1 | DPÀ±À ª-É §t. | Akasha nile baNa. |
| 2 | PÀUÉAiÄÄ §tÚ PÄ¶ÄÄà. | kageya baNNa kappu. |
| 3 | PÉgÉAiÄÄ ªÄj£À°è
«ÄÄ£ÄÄUÀ¼ÄÄ FeÁqÄÄwÛªÉ. | mInu nirinali ijuttaDe. |
| 4 | °ÄÄqÄÄUÀ °ÁâUïªÄÄvÄÄÛ
HlzÀ qÀ©â »rzÄÄ,ÄÆÈ°UÉ
°ÉÆÄUÄÄwÛzÁÝ£É. | Avanu sAlege hOguttane. |
| 5 | EzÄÄ LzÄÄ
ªÉgÄ¼ÄÄUÄ½gÄÄªÄ PÉÈ. | idu aidu beraLugaLiruva kai. |

- | | | |
|----|---|---|
| 6 | <p>°ÄÄUÄÄ UÉÆA·É »rzÄÄ DI
DqÄÄwÛzÁÝfé.</p> | magivu jArubaMDi Aduttide. |
| 7 | <p>mÉÄ§-i °ÉÄÄ-É ¶ÄÄ, ÄÛPÄ
°ÄÄvÄÄÛ °ÄâUÿ EzÉ.</p> | A bYAginali puttakagaLu ive. |
| 8 | <p>D VqÄzÄ vÄÄÄ·Á PÄ-ÄUÄ¼ÄÄ
E°É.</p> | A giDada tuMbA kAyigaLu ive. |
| 9 | <p>°ÄÄqÄÄUÄ £Ä-ÄAiÄÄ vÄ-É
,Ä°ÄgÄÄwÛzÁÝfé.</p> | appuvige nayiyeMdare tubA pIti. |
| 10 | <p>°ÉAUÄ, ÄÄ §mÉÖ E!Ûç
°ÄiÁqÄÄwÛzÁÝ¼É.</p> | avaLu baTTegolannu Istri mADi iDuttidALe. |

Note: Pictures are provided for this activity.

Level 2: Give a set of key words to the person with aphasia and ask him to construct a sentence and say it aloud.

B. Discourse level Reading comprehension

This section has four passages.

Level 1: Keep the passage in front and ask the person with aphasia to follow the sentences as the clinician reads it aloud. Next, clinician will read aloud the statements and person with aphasia is expected to indicate whether the statement is right/wrong.

Level 2: Keep the passage in front and ask the person with aphasia to follow the sentences as the clinician reads it aloud. Ask the following questions. Person with aphasia should mark the answer word out of choices given.

Note: This passage will be retained in the manual. Only the statement and question cards will be presented as sentence cards.

Stimuli:

Passage 1: «dAiÄÄ °ÄÄvÄÄÛ PÄÄgÄÄqÄ (Adapted from RAP-K)

/vijaya mattu kuruDa/

MAzÄÄ ç£Ä «dAiÄÄ ±Á-ÉUÉ °ÉÆÄUÄÄwÛzÁÝféÄÄ. zÁjAiÄÄ°è
vÄÄÄ·Á d£ÄgÄÄ, °Ä°Ä£ÄUÄ¼ÄÄ NqÄqÄÄwÛzÁÝ°ÄÄ. C°è M§â
PÄÄgÄÄqÄ °ÉÆÄUÄÄwÛzÁÝféÄÄ. C°Ä£Ä°ÄÄÄAzÉ MAzÄÄ UÁffÄ
ZÄÆgÄÄ ©çÝvÄÄÛ. «dAiÄÄ£ÄÄ CzÄ£ÄÄß £ÉÆÄrzÄ£ÄÄ. °ÉÄUÄfé

C°èUÉ °ÉÆÃzÀ£ÄÄ. D UÁf£À ZÀÆgÀ£ÄÄß zÀÆgÀ J,ÉzÀ£ÄÄ. £ÄAvÀgÀ CªÀ£ÄÄ ±Á-ÉUÉ °ÉÆÃzÀ£ÄÄ.

/oMdu dina vijaya shAlege hOguttiddanu. dAriyalli tuMbA janaru, vAhanagaLu ODADuttiddavu. alliobba kuruDa hOguttiddanu. Avana muMde oMdu gAjina cUru biddittu. vijayanu adallu nODidanu. bEgane allege hOdanu. A gAjina cUrannu dUra esedanu. naMtara avanu shAlege hOdanu./

Statements:

1. «dAiÀÄ£ÄÄ ±Á-ÉUÉ °ÉÆÃUÀÄwÛzÀÝ£ÄÄ. vijayanu shAlege hOguttiddanu.
2. zÁjAiÀÄ°è vÄÄAªÁ d£ÀgÄÄ NqÁqÄÄwÛzÀÝgÄÄ. dAriyalli tuMbA janaru ODADuttiddaru.
3. zÁjAiÀÄ°è PÀ°è£À ZÀÆgÄÄ ©çÝvÄÄÛ. dAriyalli kallina cUru biddittu.
4. «dAiÀÄ£ÄÄ UÁf£À ZÀÆgÀ£ÄÄß C°èAiÉÄÄ ©lÖ£ÄÄ. vijayanu gAjina cUrannu alliyE biTTanu.
5. ±ÀAPÀgÀ£ÄÄ £ÄAvÀgÀªÄÄ£ÉUÉ °ÉÆÃzÀ£ÄÄ. shaMkaranu naMtara manege hOdanu.

Questions:

1. AiÀiÁgÄÄ ±Á-ÉUÉ °ÉÆÃUÀÄwÛzÀÝgÄÄ? YAru shAlege hOguttiddaru?
2. zÁjAiÀÄ°è AiÀiÁgÄÄ NqÁqÄÄwÛzÀÝgÄÄ? dAriyalli yAru ODADuttiddaru?
3. UÁf£À ZÀÆgÄÄ J°è ©çÝvÄÄÛ? gAjina cUru elli biddittu?
4. «dAiÀÄ£ÄÄ UÁf£À ZÀÆgÀ£ÄÄß K£ÄÄªÀiÁrzÀ£ÄÄ? vijayanu gAjina cUrannu Enu mADidanu?
5. £ÄAvÀgÀ «dAiÀÄ£ÄÄ J°èUÉ °ÉÆÃzÀ£ÄÄ? naMtara vijayanu ellige hOdanu?

Passage 2: CPÀâgîªÄÄvÄÄÛ ©ÃgÀ§®è
/akbar mattu bIraballa/

M^aÉÄä ©ÃgÀ§®èèÀÄ CPÀâgÀèÀ D,ÁÜèÀPÉÌ vÀqÀ^aÁV §AzÀèÀÄ. CPÀâgÀèÀÄ KPÉ vÀqÀ^aÁiÁrZÉ JAzÁUA ©ÃgÀ§®èèÀÄ ^aÄÄUÄÄ C¼ÄÄwÛvÄÄÛ, ÄÄ^aÄÄäpj¹ §gÀ®Ä vÀqÀ^aÁ-ÄvÄÄ JAzÀèÀÄ. CPÀâgÀèÀÄ èÁèÁVzÀÝgÉ MAzÄÄ «ÄµÄzÀ°è Ä^aÄiÁzsÁèÄÏÄr,ÄÄwÛzÉÝ JAzÀèÀÄ. CzÀPÉÌ ©ÃgÀ§®èèÀÄ °ÁUÄzÀgÉ ÏÄjÁQë,ÉÆÄt, èÁèÀÄ ^aÄÄUÄÄ, «Ä^aÄÄ vÄAzÉ, CzÉÄèÀÄ ^aÄiÁqÄÄwÛÄgÉÆÄ ^aÄiÁr JAzÄÄ eÉÆÄgÁV C¼ÄvÉÆqÄVzÀèÀÄ. CPÀâgÀèÀÄ Ä^aÄiÁzsÁèÄÏÄr,Ä®Ä KèÄÄ ÄÉÄPÄÄ JAzÀèÀÄ. ©ÃgÀ§®èèÀÄ PÄ§Äâ ÄÉÄPÉèÀß®Ä, PÄ®èÀ °ÉÆgÉ vÄj¹zÀèÀÄ. vÄÄAqÄÄ ^aÄiÁrPÉÆqÄÄÉÄPÉAzÄÄ °ÄoÄ »rAiÄÄÄvÁÛ ©ÃgÀ§®èèÀÄ eÉÆÄgÁV CvÄÛèÀÄ. PÄ§èÀÄÄB vÄÄAqÄÄ ^aÄiÁr PÉÆqÄÄ-ÄvÄÄ. CzÀèÀÄÄB èÉÆÄr ©ÃgÀ§®èèÀÄ èÈÄÆB eÉÆÄgÁV CvÄÛèÀÄ. ^aÄÄvÉÛÄèÀÄ-ÄvÄÄ JAzÄÄ CPÀâgi PÉÄ½zÁUA èÀèÀUÉ ErÄ PÄ§Äâ ÄÉÄPÄÄ JAzÄ. CzÀPÉÌÄèÀÄvÉ JAzÄÄ ErÄ PÄ§Äâ PÉÆqÄ®Ä, ©ÃgÀ§®èèÀÄ èÉ®zÄ ^aÉÄÄ-É °ÉÆgÄ¼ÄqÄÄvÁÛ èÀèÀUÉ CzÉÄ PÄ§Äâ Er^aÄiÁr PÉÆqÄÄÉÄPÉAzÄÄ CvÄÛèÀÄ. DUÄ CPÀâgÀèÀÄ, zÄ^aÄÄÄiÄÄÄ ^aÄÄ°ÄgÁiÄÄ, «èÀèèÀÄÄB Ä^aÄÄzsÁèÄÏÄr,Ä®Ä DUÄzÄÄ. èÁèÀÄ ÄÉÆÄvÉ JAzÀèÀÄ. DUÄ ©ÃgÀ§®èèÀÄ JzÄÄÝ PÄÄ½vÀèÀÄ. J®ègÀÆ ZÄÏÄ¼É vÄnÖzÀgÄÄ.

/omme bIraballanu akbarana AsthAnakke taDavAgi baMdanu. akbaranu Eke taDamADide eMdAga bIraballanu magu aLuttittu, summanirisi baralu taDavAyitu eMdanu. akbaranu nAnAgiddare oMdu nimiShadalli samAdhAnapaDisuttidde eMdanu. adakke bIraballanu hAgadare parIkShisONa, nAnu magu, nIvu taMde, adEnu mADuttIrO mADi eMdu jOrAgi aLatoDagidanu. akbaranu samAdhAnapaDisalu Enu bEku eMdanu. bIraballanu kabbu bEkennalu, kabbina hore tarisidanu. tuMDu mADikoDabEkeMdu haTha hiDiyutta bIraballanu jOrAgi attanu. kabbannu tuMDu mADi koDalAyitu. adannu nODi bIraballa innU jOrAgi attanu. mattEnAyitu eMdu akbar kELidAga nanage iDI kabbu bEku eMda. adakkEnaMte eMdu iDI kabbu koDalu, bIraballanu nelada mEle horaLADutta nanage adE kabbu iDimADi koDabEkeMdu attanu. Aga akbaranu, dammayya maharAya, ninnannu samadhAnapaDisalu Agadu. nAnu sOte eMdanu. Aga bIraballanu eddu kuLitanu. ellarU cappALe taTTidaru./

Statements:

1. M^aÉÄä ©ÃgÀ§®èèÀÄ CPÀâgÀèÀ D,ÁÜèÀPÉÌ ÄÉÄUÄèÉ §AzÀèÀÄ. /omme bIraballanu akbarana AsthAnakke bEgane baMdanu./
2. ©ÃgÀ§®èèÀÄ ^aÄÄUÄÄ C¼ÄÄwÛvÄÄÛ, ^aÄÄ®V¹ §gÀ®Ä vÀqÀ^aÁ-ÄvÄÄ JAzÀèÀÄ. /bIraballanu magu aLuttittu, malagisi baralu taDavAyitu eMdanu./
3. CPÀâgÀèÀÄ èÁèÁVzÀÝgÉ MAzÄÄ «ÄµÄzÀ°è Ä^aÄiÁzsÁèÄÏÄr,ÄÄwÛzÉÝ JAzÀèÀÄ. /akbaranu nAnAgiddare oMdu nimiShadalli samAdhAnapaDisuttidde eMdanu./
4. ^aÄÄvÉÛÄèÀÄ-ÄvÄÄ JAzÄÄ CPÀâgi PÉÄ½zÁUA èÀèÀUÉ ErÄ PÄ§Äâ ÄÉÄPÄÄ JAzÄ. /mattEnAyitu eMdu akbar kELidAga nanage iDI kabbu bEku eMda./

5. DUÀ CPÀâgÀfÀÄ, zÀ^ÀÄäAiÀÄâ ^ÀÄ°ÀgÁAiÀÄ, ðfÀßfÀÄß
 ,À^ÀÄzsÁfÀÿÀr,À®Ä DUÀzÀÄ. fÁfÀÄ ,ÉÆvÉ JAzÀfÀÄ.
 /Aga akbaranu, dammayya maharAya, ninnannu samadhAnapaDisalu Agadu. nAnu
 sOte eMdanu./

Questions:

1. AiÀiÁgÀÄ D,ÁÜfÀPÉÌ vÀqÀ^ÁV §AzÀgÀÄ?
 /yAru AsthAnakke taDavAgi baMdaru?/
2. ©ÄgÀ§®èfÀÄ vÀqÀ^ÁV §gÀ®Ä PÁgÀt KfÀÄ?
 /bIraballanu taDavAgi baralu kAraNa Enu?/
3. ©ÄgÀ§®èfÀÄ MrØzÀ ÿÀjÁPÉë KfÀÄ?
 /bIraballanu oDDida parIkShe Enu?/
4. ©ÄgÀ§®èfÀÄ vÀfÀUÉ KfÀÄ ^ÉÄPÉAzÀÄ PÉÄ½zÀfÀÄ?
 /bIraballanu tanage Enu bEkeMdu kELidanu?/
5. CPÀâgÀfÀÄ ,ÉÆ®®Ä PÁgÀt^ÉfÀÄ?
 /akbaranu sOlalu kAraNavEnu?/

Passage 3: PÀfÀßqÀ ^sÁµÉ

/kannaDa bhAShe/

^sÁµÉ MAzÀÄ ,AA^òÀfÀ ^AiÁzsÀâÄÄ. CzÀÄ ^AiÁvÀÄ ^ÄvÀÄÜ
 §gÀ°À gÀÆÿAzÀ°è C©ü^ÀpÀÛUÉÆ¼ÄÄivÀÛzÉ. ^AiÁwÀÄ ,ÁAPÉÄwPÀ
 gÀÆÿ^ÉÄ §gÀ°À. ^sÁµÉUÉ gÀÆÿÀ DPÁgÀ ^sËwPÀ CxÀ^Á gÁZÀðPÀ
 UÄÄtUÄ¼ÉÄfÀÆ E®è. CzÀÄ ÿÁæzÉÄ^PÀ^ÁV ,Àðß^ÉÄ±ÀÀfÀÄß
 CxÉÊð,ÄÄ^À °ÉÆAzÁtÁPÉ PÉ®,À^ÀfÀÄß ÿÁæwðçüPÀ^ÁV ð^Àð»,ÄÄvÀÛzÉ.
 ^AiÁfÀ^ÀðVgÀÄ^À aAw,ÄÄ^À ÿÀj^sÁ«ÄÄ^À ,ÀzÁ ZÉËvÀfÀâzÁAiÀÄPÀ^ÁV
 ÿÀæwQæ-Ä,ÄÄ^À ^sËçPPÀ ±ÀQÜAiÉÄÄ EzÀPÉÌ »Éß-É. CzÀgÀ
 ,ÁzsÀävÉAiÄÄ ÿÀju^ÀÄ^ÉÄ ,AA^òÀfÀ. ^sÁµÉAiÄÄ ,ÄÄ,AAWÀnvÀ
 gÀÆÿAzÀ zsÀé±ÀjÁgÀçAzÀ CxÀð,ÄÄáj,ÄÄvÀÛzÉ. ^sÁµÉ §®è^ÁjUÉ ^sÁ^ÀfÉ
 ÿÀgÀ,ÀgÀ ,ÀA®UÀßUÉÆ¼ÄÄ^ÀÄzÀÄ. ^sÁ^ÀfÉUÄ¼É®è^ÀfÀÆß
 ^sÁµÉAiÄÄ vÉPÉÌUÉ vÀgÀ®Ä ,ÁzsÀâ®è^ÁzÀgÀÆ ^ÄÄÆ® D±ÀAiÄÄPÉÌ
 zsÀPÉÌ ^ÁgÀzÀAvÉ §¼Ä½zÁUÀ ^AiÁvÀæ GzÉYÄ±À ,ÁçüvÀ^ÁUÄÄvÀÛzÉ.
 ^sÁµÁÿÀæAiÉÆÄUÄzÀ°è CzÀgÀ DA vÀjPÀ ,AA§AzsÀ^ÀfÀÄß
 CjAiÄÄ^ÀÄzÀÄ CUÄvÀÄ. «zsÀ ^sÁµÉUÄ¼ÄÄ °À®ÄÄ ,Á^AiÁfÀÄ
 UÄÄuAA±ÀUÄ¼ÄfÀÄß °ÉÆAçzÁYgÀÆ, J®è^ÀÇ MAzÉÄ ^ÄÄÆ®çAzÀ
 gÀÆÿÄÄUÉÆAqAAvÀ^ÀUÄ¼Ä®è. EzÀjAzÀ-ÉÄ ÿÀæwAiÉÆAzÀÄ
 ^sÁµÉAiÄÄÆ vÀfÀß ^ÄÄÆ®,ÀégÀÆÿAzÀ eÁAiÄÄ^AiÁfÀ^ÀfÀÄß
 ,À^ÄÄyð,ÄÄvÀÛ-ÉÄ «PÀ,ÀUÉÆ¼ÄÄivÀÛzÉ, ,À^ÄÄÈzÀP^ÁUÄÄvÀÛzÉ.
 CzÀÄ ,Á»vÀâ gÀZÀfÉUÄÆ EA§Ä PÉÆqÄÄvÀÛzÉ. PÀfÀßqÀ ^sÁµÉ ^ÄÄvÀÄÜ

„Á»vÀâPÉÌ „ÀÀÀiÁgÀÄ JgÀqÀÄ „Á«gÀ ÀµÀðUÀ¼À „ÀÄçüÃWÀð
 Ew°Á,À«zÉ. CzÀÄ EvÀgÀ „sÁµÉ -„Á»vÀâ, „ÀA,ÀÌöÈw-ÄAzÀ
 ¥Àæ„sÁ«vÀAzÀgÀÆ zÉÃ¹AiÀÄ£ÀÄß ©nÖ®è. „ÀévÀAvÀæªÁV „É¼ÉzÀÄ
 §AçzÉ. CzÀgÀ „ÀA,ÀÌöÈwPÀªÀ°AvÀéªÀ£ÀÄß CjAiÀÄªªÀÄzÀÄ MAzÀÄ
 §°ÀªªÀÄÄRªªÀzÀ GzÉÝÃ±À.

/bhAShe oMdu saMvahana mAdhyama. adu mAtu mattu baraha rupadalli
 abhivyaktigoLLuttade. mAtina sAMkEtika rUpavE baraha. bhAShege rUpa, AkAra,
 bhoutika athavA rAcanika guNagaLEnU illa. adu prAdEshikavAgi sannivEshavannu
 arthaisuva hoMdANike kelasavannu prAtinidhikavAgi nirvahisuttade. mAnavanigiruva
 ciMtisuva paribhAvisuva sadAcaitanyadAyakavAgi pratikriyisuva bhoudhika shaktiyE
 idakke hinnele. adara sAdhyateya pariNAMavE saMvahana. bhASheya susaMghaTita
 rUpada dhvanisharIradiMda artha sphurisuttade. bhAShe ballavarige paraspara bhAvane
 saMlagnagoLLuvudu. bhAvanegaLellavannU bhASheya tekkege taralu sAdhyavillavAdarU
 mUla Ashayakke dhakke bAradaMte baLasidAga mAtira uddEsha sAdhitavAguttade.
 bhAShA prayOgadalli adara AMtarika saMbaMdhavannu ariyuvudu mukhya. kannDa
 bhAShe mattu sAhityakke sumAru eraDu sAvira varShagaLa itihAsavide.adu itara bhAShe-
 sAhitya, saMskRutiyiMda prabhAvitavAdarU dEsiyannu biTTilla. svataMtravAgi beLedu
 baMdide. adara sAMskRutika mahatvavannu ariyuvudu oMdu bahumukhyavAda uddEsha./

Statements:

1. „sÁµÉ ÀiÁvÀÄªÀvÀÄÛ §gÀ°À gÀÆ¥ÀzÀ°è
 C©üªªPÀÛUÉÆ¼ÄÄîvÀÛzÉ.
 /bhAShe adu mAtu mattu baraha rupadalli abhivyaktigoLLuttade./
- 2.ªÀiÁw£À,ÁAPÉÃwPÀ gÀÆ¥ÀªÉÃ §gÀ°À.
 /mAtina sAMkEtika rUpavE baraha./
3. „sÁµÁ¥ÀæAiÉÆÃUzÀ°è CzÀgÀ DAvÀjPÀ „ÀA§AzSªªÀ£ÀÄß
 CjAiÀÄªªÀÄzÀÄ CUÀvÀâ
 /bhAShA prayOgadalli adara AMtarika saMbaMdhavannu ariyuvudu mukhya./
4. CzÀÄ „Á»vÀâ gÀZÀ£ÉUÀÆ EA§Ä PÉÆqÀÄvÀÛzÉ.
 /adu sAhitya racanegU iMbu koDuttade./

Questions:

1. „sÁµÉ AiÀiÁªªzÀPÉÌ „ÁzsÀ£ÀªÁVzÉ?
 /bhAShe yAvudakke sAdhanavAgide?/
2. „sÁµÉ AiÀiÁªª PÉ®,ªª£ÀÄßªªÀð»ªªvÀÛzÉ?
 /bhAShe yAva kelasavannu nirvahisuttade?
- 3.ªÀiÁ£ÀªªUÉ AiÀiÁªª ±ÀQÛ EzÉ?
 /mAnavanige yAva shakti ide?
4. „sÁµÉAiÀÄ ¥ÀæAiÀÄvÀßzÀ°è AiÀiÁªªzÀ£ÀÄß CjAiÀÄªªªªzÀÄ
 CUÀvÀâ?
 /bhASheya prayatnadalli yAvudannu ariyuvudu agatya?
5. PÀ£ÀßqÀ „sÁµÉªªvÀÄÛ „Á»vÀâPÉÌ JµÀÄÖªªµÀðUÀ¼À Ew°Á,À«zÉ?
 /kannaDa bhAShe mattu sAhityakke eShTu varShagaLa itihAsavide?

Passage 3: £ÀUÀÄ

jigupseyAgi, jagattE bEDavAgi timma himAlayakke hOgi tapassu mADida. dEvaru pratyakShanAgi " timma, ninna bhaktige meccidenu: bEkAda varavannu kELu"- eMda. kaNnu tereyade timma "ayyO maharAya idu nianage tiLiyade? vara bEkAgiruvudu nanagalla nanna magaLige" eMdu nakkubiTTa. bIciyavara caturOktigaLalli idoMdu. suprasiddha nATakakAra sheriDin briTiSh pArlimeMTina sadasyanAgidda. omme pArlimeMTinalli bhAShaNa mADuttiddAga AvEshada bharadalli Ata "I sabhAgRuhadalliruva sabhAsadaralli ardhadaShTu janaru kattedaLiddAre" eMda. sabheyalli kOlAhalavedditu. sheriDan ADida padagaLannu hiMtegedukoLLabEkeMdu sabhikaru AgrahapaDisidaru. iMtahapadagaLannADuvudu yOgyavallaveMdu sabhApatigaLu nirNaya koTTaru. Aga sheriDin shAMta svaradalli "nAnu sabhikara kShame kELuttEne, I sabhAgRuhadalliya ardhadaShTu janaru kattedaLalla. ADiddannu hiMdakke tegedukoMDe" eMda./

Statements:

1. PÉÃªÀ® ÀÄR, PÉÃªÀ® zÄÄBR AiÄÄªÀ ¥ÁætÂ fÃªÀ£AzÀ°èAiÄÄÆ EzÉ.
/kEvala sukha, kEvala duHkha yava prANi jIvanadalliyU ide./
2. ÀÄRªÉª¹zÁUÀ ÀAvÉÆÄµÀªÇ, zÄÄBRªÉª¹zÁUÀ C¼ÄÄªÇ
§gÄÄªÄzÄÄ.
/sukhavenisidAga saMtOShavU, duHkhavenisidAga aLuvU baruvudu./
3. À€UÀðzÉÆ¼ÀV£ÀªÄ£ÀªÀgÀÆ EvÀgÀ ¥ÁætÂUÀ¼ÀÆ
£ÀUÀÄvÁÛgÉ.
/svargadoLagina manavarU itara prANigaLU naguttAre./
4. zÉªªgÄÄ ¥ÀævÀpÀè£ÁV " wªÄÄª, ¢£Äß "sÀQÛUÉªÉÄaÑzÉ£ÄÄ:
"ÉÄPÁzªªgÀªÀ£ÄÄß PÉÃ¼ÄÄ"- JAzÀ.
/dEvaru pratyakShanAgi " timma, ninna bhaktige meccidenu: bEkAda varavannu kELu"- eMda./
5. ±ÉjqÀ£i DrzÀ ¥AzÀUÀ¼À£ÄÄß »AvÉUÉzÀÄPÉÆ¼ÄÄªÉÄPÉAzÄÄ
À©üPÁgÄÄ DUÄª°À¥Är¹zÁgÄÄ.
/sheriDan ADida padagaLannu hiMtegedukoLLabEkeMdu sabhikaru AgrahapaDisidaru./

Questions:

1. ¥Àæ¥ÀAZÀ AiÄiÁªÄzÀgÀ DUÀgÀ?
/prapaMca yAvudara Agara?/
- 2.ªÄ£ÀªÄÄ AiÄiÁªÄzÀPÉiªÄÄÆ®?
/manavu yAvudakke mUla?/
3. ¥ÁvÁ¼ÄÉÆÄPÀzÀ°è AiÄiÁgÄÄ £ÀUÀÄvÁÛgÉ?
/pAtALalOkadalli yAru naguttAre?/
4. wªÄÄª£ÄÄ zÉªªjUÉ K£ÄÄªÉÄ½zÀ?
/timmanu dEvarige Enu hELida?/
5. ÀÄ¥Àæ¹zÀP £ÁIPÁPÁgÀ ±Éjr£i J°è ÀzÀ, Àå£ÁVzÀÝ?
/suprasiddha nATakakAra sheriDin elli sadasyanAgidda?/

WRITING

LEVEL I: FUNCTIONAL WRITING

This level is divided into following sections:

- A. Strengthening activities
- B. Functional writing skills
- C. Writing readiness tasks

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75% of total score

A. Strengthening activities

Following activities are expected to improve muscle strength important for writing:

- a. Hand strengthening activities
- b. Finger strengthening activities
- c. Wrist stability activities
- d. Finger-dexterity activities
- e. Teaching pencil grasp

Stimulus hierarchy:

- Combination of auditory and visual (A+V)

- Auditory (A)

Response hierarchy: Gesture (G)

a. Hand strengthening activities

Help the person with aphasia build hand strength through tasks that involve gripping an object between the palm and fingers.

Materials: Water, tub and sponge.

Task 1: Fill the tub with water and ask the person with aphasia to squeeze the sponge into water. Refill and squeeze out. Repeat this activity several times until he can squeeze out the water efficiently.

Task 2: Ask the person with aphasia to press the soft ball by keeping it on the palm and pressing it by using all the five fingers.

Task 3: Give few sheets and ask the person with aphasia to punch on the marked spot using punching machine.

b. Finger strengthening activities

After developing greater hand control, practice finger-strengthening activities.

Materials required: Paper, cloth pins, cup, cotton balls, and beads.

Task 1: Ask the person with aphasia to tear the paper into strips with their fingers, and then scrunch the paper pieces into balls using one hand.

Task 2: Ask the person with aphasia to pinch the clothespins and arrange them around the lip of the cup.

Task 3: Ask the person with aphasia to pick up the beads/cotton balls one by one and put it in the cup.

c. Wrist stability activities

Materials required: Board, marker, colours/crayons, drawing paper, and clipboard.

Task 1: Ask the person with aphasia to stand in front of the board and draw a line/circle using the marker. Make sure that the board is above the eye level of person with aphasia.

Task 2: Draw a circle on a white paper and pin to a vertical surface or mount on a clipboard. Ask the person with aphasia to paint the circle without crossing the boundary using the paint brush/crayon on the sheet.

Task 3: Ask the person with aphasia to draw parallel lines next to the line drawn by the clinician on the board using the marker.

d. Finger-dexterity activities

Finger dexterity is the ability to manipulate items with small, controlled movements of a few fingers.

Materials required: Coins, and thermacol balls.

Task 1: Ask the person with aphasia to pick up the coins one by one and line up a row of several coins and quickly turn them over.

Task 2: Ask the person with aphasia to take thermacol balls and roll between the thumb and index finger.

Task 3: Have small stick notes. Ask the person with aphasia to pick the pieces one by one and stick it on the clipboard.

Scoring: The responses for above mentioned activities should be scored based on the completeness, smoothness and quickness of the hand/finger/wrist movements.

e. **Teach the pencil grasp**

Materials required: Marker, crayon, wide pencil, and average sized pencil.

Level 1: Ask the person with aphasia to wrap the fingers on the crayon/marker and hold it in their hand. Clinician will assist manually to hold the marker by supporting the fingers of the person with aphasia.

Level 2: Ask the person with aphasia to wrap the fingers on the crayon/marker and hold it in their hand as demonstrated by the clinician and scribble over the plane sheet.

Level 3: If person with aphasia demonstrate the correct tripod grip using crayons and markers, introduce a wide pencil, and then to average sized pencil/pen.

B. **Functional writing skills**

Stimulus hierarchy:

- Combination of auditory, graphic and gestural (A+G+G)
- Combination of auditory and graphic (A+ G)
- Auditory (A)

Response hierarchy:

- Combination of Gestural and graphic (G+G)
- Graphic (G)

a. **Writing/signing his/her name**

Level 1: Write the name of person with aphasia on a card using a marker boldly while having his attention. Ask the person with aphasia to trace the letter shapes with his finger.

Level 2: Keep the name card on the table and ask the person with aphasia to trace the letters.

Level 3: Give the dotted representation of his name card. Ask the person with aphasia to join the dotted lines and copy it on a blank sheet.

Level 4: Ask the person with aphasia to write his name/sign from the memory.

Level 5: Write a big box and ask the person with aphasia to write his name/sign inside the box without crossing the lines.

Level 6: Decrease the box size to regular letter size.

Level 7: Draw two lines and ask the person with aphasia to write his name/sign between the lines.

Level 8: Ask the person with aphasia to write his name/sign on a blank sheet.

For some persons with aphasia, all of the above mentioned levels need not be followed. Clinician is free to skip some levels based on the individual performance level.

Scoring: The responses are to be scored based on the letter legibility, letter alignment and spacing within the word.

b. Writing name & address on postal card

Level 1: Ask the person with aphasia to write his address within the box of postal letter, by copying it from the model.

Level 2: Ask the person with aphasia to write his address within the lines of postal letter, by recalling it from the memory.

Scoring: The responses are to be scored based on the letter legibility, letter alignment and spacing within the word.

c. Filling bank forms

Level 1: Ask the person with aphasia to fill in the blank places of withdrawal/deposit slip by copying the details given to him at respective places.

Level 2: Ask the person with aphasia to fill the details in the respective blank places of withdrawal/deposit slip based on the instructions given to him.

Scoring: The responses are to be scored based on the letter legibility, letter alignment and spacing within the word.

C. Writing readiness tasks

This section contains writing readiness tasks, and is subdivided into following sub-sections.

- a. Tracing
- b. Joining the dots
- c. Copying lines
- d. Copying letters
- e. Copying syllables

a. Tracing

Level 1: Clinician will first trace the line and ask the person with aphasia to trace. Clinician will gesture for additional cueing.

Level 2: Clinician will first trace the line and ask the person with aphasia to trace without providing gestural cue.

Level 3: Ask the person with aphasia to trace the line. No cues are provided.

For all the levels use stimuli set 1 and 2.

Stimuli: Set 1: 25 straight and curved lines

Set 2: 28 letters.

Note: stimuli given at the end of writing level-II.

b. Joining the dots

Task: Ask the person with aphasia to join the dots.

Stimuli: 18 dotted letters (appendix 2).

c. Copying lines

Level 1: Ask the person with aphasia to write the letter inside the box by looking at the model letter kept on the table.

Level 2: Decrease the box size and ask the person with aphasia to copy within the box without crossing the lines.

Stimuli: 33 letter parts(appendix 2).

d. Copy the letters

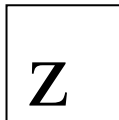
Level 1: Ask the person with aphasia to write the letter inside the box by looking at the model letter kept on the table.

e.g.:



Level 2: Decrease the box size and ask the person with aphasia to copy within the box without crossing the lines.

e.g.:



Stimuli: Letters in reading level I

e. Copying syllables

Level 1: Ask the person with aphasia to write the letter inside the box by looking at the model letter kept on the table.

Level 2: Decrease the box size and ask the person with aphasia to copy within the box without crossing the lines.

WRITING: LEVEL II

This level contains word level writing tasks, and is subdivided into following sections.

- | | |
|--------------------|----------------------|
| a. Copying words | d. word verification |
| b. dictation | e. word fluency |
| c. word completion | |

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75%

Stimulus hierarchy:

- combination of auditory, graphic and gestural (A+G+G)
- Combination of auditory and graphic (A+ G)
- Auditory (A)

Response hierarchy:

- Combination of Gestural and graphic (G+G)
- Graphic (G)

Scoring: Score the responses of person with aphasia based on the accuracy, completeness and smoothness in following the activities.

Stimulus hierarchy:

- combination of auditory, graphic and visual (A+G+V)
- Combination of auditory and visual (A+ V)
- Auditory (A)

Response hierarchy:

- Graphic (G)

Scoring: The response to be scored based on the letter legibility, letter alignment and spacing within the word.

a. Copying words

Level 1: Give the word card/stimuli with the blank letter. Ask the person with aphasia to fill in the missing letter from the given choices.

Level 2: Ask the person with aphasia to complete the word by writing the missing letter.

Stimuli: Use the stimuli from word identification of reading level II. However, clinician is free to increase the number of activities in this sub-section.

Scoring: The response to be scored based on the letter legibility, letter alignment and spacing within the word.

b. Dictation

Level 1: Give the picture card/stimuli and say the word. Ask the person with aphasia to write the name said by clinician.

Level 2: Ask the person with aphasia to write down the word dictated by the clinician.

Stimuli: Use the stimuli from reading level II. However, clinician is free to increase the number of activities in this sub-section.

Scoring: The response to be scored based on the letter legibility, letter alignment and spacing within the word.

c. Word completion

Level 1: Give the word card/stimuli with the blank letter. Ask the person with aphasia to fill in the missing letter from the given choices.

Level 2: Ask the person with aphasia to complete the word by writing the missing letter.

Stimuli: Use the stimuli from word completion of reading level II. However, clinician is free to increase the number of activities in this sub-section.

d. Word verification

Level 1: Give the picture card/stimuli with the word card/stimuli and ask the person with aphasia if the word shown is correct or incorrect.

Level 2: If the word is incorrect, ask the person with aphasia to write the correct form of the word.

Stimuli: Use the stimuli from-jumble/ rearrange task of reading level II. However, clinician is free to increase the number of activities in this sub-section.

e. Word fluency

Phonemic fluency task:

Level 1: Ask the person with aphasia to say as many words as possible starting from the letter named by the clinician.

Level 2: Ask the person with aphasia to write as many words as possible starting from the letter named by the clinician.

Lexical fluency task:

Level 1: Ask the person with aphasia to say as many words as possible belonging to the lexical category named by the clinician.

Level 2: Ask the person with aphasia to write as many words as possible belonging to the lexical category named by the clinician.

WRITING: LEVEL III

This level is divided into following sections:

Section 1: Sentence level

- | | |
|--------------------------|--------------------------|
| A. Sentence copying | D. Sentence sequencing |
| B. Sentence completion | E. Sentence construction |
| C. Sentence verification | |

Section 2: Higher writing skills

- A. Punctuation
- B. Question construction
- C. Picture description
- D. Narration/ creative writing

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75%

Section 1: Sentence level

A. Sentence copying

Level 1: Give the picture card and read the sentence aloud. Ask the person with aphasia to write the sentence by copying from the given card.

Level 2: Give the sentence card and read it aloud. Ask the person with aphasia to copy the sentence.

Level 3: Ask the person with aphasia to write the sentence as stated by the clinician.

Stimuli: Use the sentences, picture cards/stimuli from -section A sentence copying (level I) of reading level III.

B. Sentence completion

Level 1: Give the picture card and the sentence card with the missing word. Ask the person with aphasia to fill in the word from the given choices.

Level 2: Give the sentence card with the missing word and the choices. Ask the person with aphasia to fill in the appropriate word and write it.

Stimuli: Use the sentences, picture cards/stimuli from -section A sentence completion (level I) of reading level III.

C. Sentence verification

Level 1: Clinician reads the sentences and asks the person with aphasia to indicate whether the sentence is right/wrong.

Level 2: Give the sentence card and ask the person with aphasia to read. If, wrong ask him/her to write the correct form of the sentence.

Stimuli: Use the sentences, picture cards/stimuli from -section A sentence verification of reading level III.

D. Sentence sequencing

Task: Give the sequential picture cards and ask the person with aphasia to write in sentence.

Stimuli: Use the sentences, picture cards/stimuli from -section A sentence sequencing of reading level III.

E. Sentence construction

Level 1: Give the picture card and tell the person with aphasia what is it about. Ask the person with aphasia to construct a sentence and write it down.

Note: Pictures are not provided for this activity.

Level 2: Ask the person with aphasia to write a sentence about the given topic.

Section 2: Higher writing skills

A. Punctuation

Task: Give the sentence card. Ask the person with aphasia to mark the punctuations appropriately in the sentence.

Stimuli:

- | | | |
|----|--|------------------------------------|
| 1 | CzÀÄ gÀ,ÉÛ | adu raste |
| 2 | EzÀÄ K£ÀÄ | idu Enu |
| 3 | VqÀzÀ°è KꝛzÉ | giDadalli Enide |
| 4 | DPÁ±À ꝛÃ° EzÉ | AkAsha nlli ide |
| 5 | ªÁí JAxÁªÄÄ¼É | vhA eMthA maLe |
| 6 | bÉÃ §,ÄÄì ¹UÀ°@è | CE bassu sigalilla |
| 7 | CAiÉÆãÃ CªÀ£ÄÄ eÁj
©zÀÝ£ÄÄ | ayyO avanu jAri biddanu |
| 8 | CªÀ£ÄÄ CªÀ½UÉ ¥ÄÄ,ÀÛPA
PÉÆqÀÄwÛzÁÝ£É | avanu avaLige pustaka koDuttiddAne |
| 9 | EzÀÄ nÃ.«. UÀrAiÀiÁgÀ
ªÄÄvÄÄÛ ¥sÁã£ÄÄ | idu TI.vi. gaDiyAra mattu phyAnu |
| 10 | C°è ±ÀlÄð ¥ÁãAlÄ ZÀ¥Äà°
EªÉ | alli sharTu pyAMTu chappali ive |

Note: Pictures are not provided for this activity.

B. Question construction

Level 1: Keep the sentence card and ask the person with aphasia to pick the right question card from the given choices.

Level 3: Ask the person with aphasia to make a question for the given sentence.

Stimuli:

1	EzÄÄ "ÁªÄÄl.	idu bAvuTa.	EzÄÄ KfÄÄ?	idu Enu?
2	EzÄÄ PÄfÄßqÄPÄ.	idu kannaDaka.	EzÄÄ KfÄÄ?	idu Enu?
3	ªÉÄÄffÄªÉÄÄ-É ¥sÁâfÄÄ EzÉ.	mEjina mEle phyAnu ide	ªÉÄÄffÄªÉÄÄ-É KzÉ?	mEjina mEle Enide?
4	OµÀçü QIQªÉÄÄ-É EzÉ.	auShadhi kiTaki mEle ide.	OµÀçü J°èzÉ?	auShadhi ellide?
5	CªÄfÄ PÁgÄÄ PÉA¥ÄÄ §tÚzÄÄÝ.	avana kAru keMpu baNNaddu.	CªÄfÄ PÁgÄÄ AiÄiªÄÄ §tÚzÄÄÝ?	avana kAru yAva baNNaddu?
6	¥ÄÄ, ÄÛPÄzÄ M¼ÄUÉ ¥ÉÄÄß EzÉ.	pustakada oLage pennu ide.	¥ÄÄ, ÄÛPÄzÄ M¼ÄUÉ KfÄÄ EzÉ?	pustakada oLage Enu ide?
7	CªÄfÄÄªÄÄgÄ PÄrAiÄÄÄwÛzÄÝfÉ.	avanu mara kaDiyuttiddAne.	CªÄfÄÄ KfÄÄ ªÄiÄqÄÄwÛzÄÝfÉ?	avanu Enu mADuttiddAne?
8	CªÄgÄÄ UÄÄA¥ÁV PÄÄ½wzÄÝgÉ.	avaru guMpAgi kuLitiddAre.	CªÄgÄÄªÉÄUÉ PÄÄ½wzÄÝgÉ?	avaru hEge kuLitiddAre?
9	ªÁV®ªÄwÛgÄ UÄAqÄ, ÄÄ zAwzÄÝgÉ.	bAgila hattira gaMDasu niMtiddAre.	ªÁV®ªÄwÛgÄ AiÄiÄgÄÄ zAwzÄÝgÉ?	bAgila hattira yAru niMtiddAre?
10	CªÄfÄÄ eÉÄÄgÄÄ ªÄÄ¼É-ÄAzÁV bÄwæ »rçzÄÝfÉ.	avanu jOru maLeyiMdAgi Catri hiDididdAne.	CªÄfÄÄ KPÉ bÄwæ »rçzÄÝfÉ?	avanu Eke Catri hiDididdAne?

Note: Pictures are not provided for this activity.

C. Picture description

Task: Give the picture cards/stimuli to the person with aphasia and ask him to write about the picture card by observing the details of the picture.

Stimuli: Use the stimuli from reading level II and reading level III.

D. Narration/creative writing

Task: Clinician will give a topic to write about to the person with aphasia. Topic will be selected based on the interest of person with aphasia

ARITHMETIC

LEVEL I: (FUNCTIONAL CALCULATION)

Following are the sections:

- | | |
|---|-----------------------------------|
| A. Identification of numbers | D. Concept of zero |
| B. Identification of geometrical shapes | E. Concept of counting |
| C. Identification of mathematical signs | F. Concept of time |
| | G. Concept of currency |
| | H. Concept of measurements |

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75% of total score

Strategies to use: Appropriate strategies can be used (refer pages 17-18). These should be used to strengthen the responses.

- Pictures for this level are shown in Appendix 6

Stimulus mode hierarchy:

- Combination of auditory, visual and graphic (A+V+G)
- Combination of auditory and graphic (A+G)
- Graphic (A)

Response mode hierarchy

- Pointing (P)
- Verbal and Graphic (V+G)

A. Identification of numbers

Task (a)

Level 1: Give the number card/stimulus while saying the number aloud. Ask the person with aphasia to point to the respective picture which contains the objects in same number.

Level 2: Give the number card/stimulus and ask the person with aphasia to point to the card which has objects in same number.

Level 3: Give the number and ask the person with aphasia to name it aloud.

Stimuli: Number card/stimulus from 1 to 20.

Note: Pictures are provided for this activity.

Task (b)

Level 1: Give the number card/stimulus along with the number card/stimulus in words. Say the word loudly and ask the person with aphasia to point to the same number out of four choices of number card/stimulus on the table.

Level 2: Give the number card/stimulus. Ask the person with aphasia to point to the word card/stimuli of the same number.

Level 3: Tell a number. Ask the person with aphasia to write the number and say it aloud.

Stimuli:

1	MAzÄÄ	oMdu	11	°À£ÉÆBAzÄÄ	hannoMdu
2	JgÀqÄÄ	eraDu	12	°À£ÉBgÀqÄÄ	hanneraDu
3	ªÄÄÆgÄÄ	mUru	13	°ÀçªÄÄÆgÄÄ	hadimUru
4	£Á®ÄÌ	nAlku	14	°Àç£Á®ÄÌ	hadinAlku
5	LzÄÄ	Aidu	15	°Àç£ÉÊzÄÄ	Hadinaidu
6	DgÄÄ	Aru	16	°Àç£ÁgÄÄ	hadinAru
7	K¼ÄÄ	ELu	17	°Àç£ÉÊ¼ÄÄ	hadinELu
8	JAIÄ	eMTu	18	°Àç£ÉAIÄ	hadineMTu
9	MA¨sÀvÄÄÛ	oMbhattu	19	°ÀvÉÆÛA¨sÀvÄÄÛ	hattoMbhattu
10	°ÀvÄÄÛ	Hattu	20	E¥ÄàvÄÄÛ	Ippattu

Note: Pictures are not provided for this activity.

Task (c)

Level 1: Give the number card/stimulus along with the number card/stimulus in words. Say the word loudly and ask the person with aphasia to point to the same number out of four choices of number card/stimulus on the table.

Level 2: Give the number card/stimulus. Ask the person with aphasia to point to the word card/stimuli of the same number.

Level 3: Tell a number. Ask the person with aphasia to write the number and say it aloud.

Stimuli:

1.	100	£ÄÆgÄÄ nUru
2.	120	£ÄÆj¥ÄàvÄÄÛ nUrippattu
3.	250	E£ÄÆBgÉÊªÄvÄÄÛ innUraivattu

4. 280 E£ÀÆβgÉAˆˆsÀvÀÄÛ
innUreMbhattu
5. 315 ^aÀÄÄ£ÀÆβgÀ °Àç£ÉÊzÀÄ
munUra hadinaidu
6. 397 ^aÀÄÄ£ÀÆβgÀ vÉÆAˆˆsÀvÉÛÄ¼ÄÄ
munUra toMbhattELu
7. 441 £Á£ÀÆgÀ £À®^aÀvÉÆÛAzÀÄ
nAnUra nalavattoMdu
8. 488 £Á£ÀÆgÀ JAˆˆsÀvÉÛAIÄ
nAnUra eMbhatterMTu
9. 661 DgÀÄ£ÀÆgÀ CgÀ^aÀvÉÆÛAzÀÄ
ArunUra aravattoMdu
10. 999 MAˆˆsÉÊ£ÀÆgÀ vÉÆAˆˆsÀvÀÄÛ
oMbhainUra toMbhattu
11. 1015 MAzÀÄ ,Á«gÀzÀ °Àç£ÉÊzÀÄ
oMdu sAvirada hadinaidu
12. 2022 JgÀqÀÄ ,Á«gÀzÀ E¥ÀàvÉÛgÀqÀÄ
eraDu sAvirada ippatteraDu
13. 4203 £Á®ÄÌ ,Á«gÀzÀ E£ÀÆβgÀ ^aÄÄÆgÀÄ
nAlku sAvirada innUra mUru
14. 8304 JAIÄ ,Á«gÀzÀ ^aÄÄ£ÀÆβgÀ £Á®ÄÌ
eMTu sAvirada munUra nAlku
15. 10,112 °ÀvÀÄÛ ,Á«gÀzÀ £ÀÆgÀ °À£ÉβgÀqÀÄ
hattu sAvirada nUra hanneradu
16. 25,710 E¥ÀàvÉÛöÊzÀÄ ,Á«gÀzÀ K¼ÄÄ£ÀÆgÀ °ÀvÀÄÛ
ippattaidu sAvirada ELunUra hattu
17. 28,518 E¥ÀàvÉÛAIÄ ,Á«gÀzÀ L£ÀÆgÀ °Àç£ÉAIÄ
ippatteMTu sAvirada ainUra hadineMTu
18. 50,341 L^aÀvÀÄÛ ,Á«gÀzÀ ^aÄÄ£ÀÆβgÀ
£À®^aÀvÉÆÛAzÀÄ
aivattu sAvirada munUra nalavattoMdu
19. 1,15,105 MAzÀÄ ®PÀë °Àç£ÉÊzÀÄ ,Á«gÀzÀ £ÀÆgÀLzÀÄ
oMdu lakSha hadinaidu sAvirada nUrAaidu

20. 8,71,916

JAIÄ ®PÄë JÿÄàvÉÆÛAzÄÄ ,Á«gÄzÄ
MA¨sÉÊ£ÄÆgÄ °Àç£ÁgÄÄ

eMTu lakSha eppattoMdu sAvirada oMbhainUra hadinAru

Note: Pictures are not provided for this activity.

B. Identification of geometrical shapes

Level 1: Keep four shapes on the table. Ask the person with aphasia to point to the shape matching with the one in clinician's hand. Clinician should name the shape as well.

Level 2: Ask the person with aphasia to name the shape card which is pointed by the clinician.

Level 3: Ask the person with aphasia to draw the shape which is named by the clinician.

Stimuli:

- | | | | |
|---|--|--|-----------------|
| 1. $^a\text{ÄÈv}\hat{\text{U}}$ | vRutta | 6. $\text{Z}\ddot{\text{E}}\text{P}\grave{\text{A}}$ | couka |
| 2. $\text{Cz}\text{s}\grave{\text{A}}\grave{\text{d}}$ | ardha caMdra | 7. $\text{£}\grave{\text{A}}\text{P}\grave{\text{A}}\ddot{\text{e}}\text{v}\grave{\text{A}}\text{æ}$ | nakShatra |
| | $\text{Z}\grave{\text{A}}\text{A}\text{z}\grave{\text{A}}\text{æ}$ | | |
| 3. $\text{w}\text{æ}\text{P}\acute{\text{E}}\text{Æ}\tilde{\text{£}}\grave{\text{A}}$ | trikOna | 8. $\text{Z}\grave{\text{A}}\ddot{\text{P}}\acute{\text{E}}\grave{\text{I}}$ | / cukke / biMdu |
| | | $\text{©}\text{Az}\grave{\text{A}}\ddot{\text{A}}$ | |
| 4. $\text{DAi}\grave{\text{A}}\ddot{\text{v}}\grave{\text{A}}$ | Ayata | 9. $\text{U}\acute{\text{E}}\text{g}\acute{\text{E}} / \text{g}\acute{\text{E}}\tilde{\text{A}}\text{S}\acute{\text{E}}$ | gere / rEkhe |
| 5. $\text{¨}\acute{\text{A}}\text{t}$ | bANa | | |

Note: Pictures are provided for this activity.

C. Identification of mathematical signs

Level 1: Keep four four cards/stimuli depicting mathematical signs on the table. Ask the person with aphasia to point to the sign matching with the one in clinician's hand. Clinician should name the sign as well.

Level 2: Ask the person with aphasia to name the sign as clinician points to the card depicting the mathematical sign.

Level 3: Ask the person with aphasia to write the sign and name its use, which is named by the clinician.

Stimuli:

1	PÀÆr,ÄÄ	kUDisu	+
2	PÀ¼É	kale	-
3	UÄÄtÄ,ÄÄ	guNisu	×
4	ˆsÁV,ÄÄ	bhAgisu	/
5	aPÄÏzÄÄ	cikkadu	<
6	zÉÆqÄØzÄÄ	doDDadu	>
7	,Ä ^a ÄÄ	sama	=
8	±ÉÄPÄqÁ	shEkaDA	%

Note: Pictures are not provided for this activity.

D. Concept of zero

Level 1: Give numbers and read them aloud. Ask the person with aphasia to apply the mathematical operation and mark the correct answer out of choices given.

Level 2: Give the written numbers and ask the person with aphasia to write the answer. No choices are given in this level.

Level 3: Ask the person with aphasia to write the answer and say it aloud.

Stimuli:

1. $0+0=$ _____ (10, 0, 2)
2. $0+1=$ _____ (1, 0, 10)
3. $5+0=$ _____ (6, 5, 50)
4. $10+0=$ _____ (0, 11, 10)
5. $5-0=$ _____ (5, 6, 0)
6. $0-0=$ _____ (0, 2, 00)
7. $12-0=$ _____ (0, 12, 11)

- 8. $0 \times 0 =$ _____ (0, 10, 00)
- 9. $1 \times 0 =$ _____ (0, 1, 10)
- 10. $0 \times 4 =$ _____ (40, 4, 00)
- 11. $10 \times 0 =$ _____ (10, 0, 100)
- 12. $1/0 =$ _____ (10, 1, 0.0)
- 13. $6/0 =$ _____ (3, 6, 60)
- 14. $11/0 =$ _____ (10, 11, 110)
- 15. $30/0 =$ _____ (300, 30, 00)

Note: Pictures are not provided for this activity. However, clinician can use pictures if necessary.

E. Concept of counting

Counting task: Use the number and picture cards/stimuli of task (a) under (B) Identification of numbers.

F. Concept of time

a. Forenoon/afternoon

Level 1: Ask the person with aphasia to indicate yes/no for the following questions.

Level 2: If no, ask the person with aphasia to answer correctly for the following questions.

Stimuli:

1. $\text{ĩ}^{\text{a}} \text{Å} \text{Å} \text{É} \frac{1}{4} \text{À} \text{U} \text{É} \text{Ï} \text{°} \text{À} \text{®} \text{Ä} \text{è} \text{Ä} \text{Ó} \text{w} \text{Û} \text{Ã} \text{g} \text{Á}?$
nIvu beLagge hallujuttIrA?
2. $\text{ç} \text{£} \text{À} \text{¥} \text{À} \text{w} \text{æ} \text{PÉ} \text{g} \text{Á} \text{w} \text{æ} \text{Nz} \text{À} \text{Ä} \text{v} \text{Á} \text{Û} \text{g} \text{Á}?$
dinatrike rAtri OduttArA?
3. $\text{ĩ}^{\text{a}} \text{Å} \text{Å} \text{,} \text{Å} \text{AeÉ} \text{nÃ} \text{P} \text{Ä} \text{Ä} \text{r} \text{Ai} \text{Ä} \text{Ä} \text{w} \text{Û} \text{Ã} \text{g} \text{Á}?$
nIvu saMje TI kuDiyuttIrA?
4. $\text{ĩ}^{\text{a}} \text{Å} \text{Å} \text{É} \frac{1}{4} \text{À} \text{U} \text{É} \text{Ï} \text{zÉ} \text{x} \text{°} \text{À} \text{i} \text{Á} \text{q} \text{Ä} \text{w} \text{Û} \text{Ã} \text{g} \text{Á}?$
nIvu beLagge nidre mADuttIrA?

- 5 *Ä*E*Ä*Ä*Ä* , *Ä*A*É* °Ä*Ä*Ä*Ö*vÄ*Û*£Ä?
sUrya saMje huTTuttAnA?
- 6 *Ä*ÄzÄ°Ä*ß* ZÄAçgÄ PÄtÄvÄ*Û*£Ä?
madyAhna caMdira kANuttAnA?
- 7 gÄwæ PÄvÄ*Û*- ÄUÄÄvÄ*Û*zÄ?
rAtri kattalAguttadA?
- 8 °ÄUÄ®Ä DPÄ±ÄzÄ°è £ÄPÄävÄæ PÄtÄvÄ*Û*Ä?
hagalu AkAshadalli nakShatra kANuttavA?
- 9 *Ä*EÄiÄÄ*ð* °ÄÄIÄ*Ö*Ä *Ä*ÄÄÄZÉ
PÄvÄ*Û*gÄÄvÄ*Û*zÄ?
sUrya huTTuva muMce kattaliruttadA?
- 10 ðÄ*å* ÄÄiÄÄÄ«°ÄgÄPÉÌÄÄQAUï UÉ
*Ä*ÄzsÄågÄwæ °ÉÄÄUÄÄwÄÄgÄ?
nIvu vAyuvihArakke/vAkiMg ge madhyarAtri hOguttIrA?

Note: Pictures are not provided for this activity.

b. Clock times

Level 1: Show the clock drawing and give four time options. Ask the person with aphasia to point to the correct time.

Level 2: Give the clock diagram and ask the person with aphasia to draw the needles for the time requested by the clinician.

Stimuli: Clock drawings for,

- | | | |
|---------------|------------|----------------|
| 1. 6 A.M. | 4. 5 P. M. | 7. 1 P. M. |
| 2. 9 A. M. | 5. 7 P. M. | 8. 10.10 P. M. |
| 3. 4.45 P. M. | | |

Note 1: Pictures are included for this activity.

Note 2: Clinician can extend this activity to train the person with aphasia to see the clock timings which are important for the individual like, bus time, doctor's appointment time, therapy session timings, medication timing and so on.

G. Concept of currency

Level 1: Ask the person with aphasia to point to the picture of currency which is named by the clinician.

Level 2: Ask the person with aphasia to name the picture of currency which is pointed by the clinician.

Stimuli:

- | | | |
|----|-------------------------------------|---------------------------|
| 1 | L ^a ÀvÀÄÛ ¥ÉÊ,É £Átå | aivattu paise nANya |
| 2 | MAzÀÄ gÀÄ¥Á-Ä £Átå | oMdu rupAyi nANya |
| 3 | JgÀqÀÄ gÀÄ¥Á-Ä £Átå | eraDu rupAyi nANya |
| 4 | LzÀÄ gÀÄ¥Á-Ä £Átå & | aidu rupAyi nANya & nOTu |
| | £ÉÆÄIÄ | |
| 5 | °ÀvÀÄÛ gÀÄ¥Á-Ä £Átå & | hattu rupAyi nANya & nOTu |
| | £ÉÆÄIÄ | |
| 6 | E¥ÀàvÀÄÛ gÀÄ¥Á-Ä £ÉÆÄIÄ | ippattu rupAyi nOTu |
| 7 | L ^a ÀvÀÄÛ gÀÄ¥Á-Ä £ÉÆÄIÄ | aivattu rupAyi nOTu |
| 8 | £ÀÆgÀÄ gÀÄ¥Á-Ä £ÉÆÄIÄ | nUru rupAyi nOTu |
| 9 | L£ÀÆgÀÄ gÀÄ¥Á-Ä £ÉÆÄIÄ | ainUru rupAyi nOTu |
| 10 | „Á«gÀ gÀÄ¥Á-Ä £ÉÆÄIÄ | sAvira rupAyi nOTu |

Note: Pictures are provided for this activity.

H. Concept of measurements

Level 1: Ask the person with aphasia to indicate yes/no for the following questions.

Level 2: If no, ask the person with aphasia to answer correctly for the following questions.

Stimuli:

1. CQÌAiÀÄ£ÀÄß PÉ. f. -ÉPÀÌzÀ°è vÀÆUÀÄvÁÛgÉ.
akkoyannu ke. ji. lekkadalli tUguttAre.

2. °Á@£ÀÄß ªÄÄÆmÉ - ÉPÀÌzÀ°è C¼ÉAiÀÄÄvÁÛgÉ.
hAlannu mUTe lekkadalli aLeyuttAre.
3. MAzÀÄ PÉ. f. LzÀÄ PÉ. f. VAvÀ PÀrªÉÄ.
oMdu ke. ji. aidu ke. ji. giMta kaDime.
4. °Á@£ÀÄß °Älj£À°è C¼ÉAiÀÄÄvÁÛgÉ.
hAlannu lITarinalli aLeyuttAre.
5. JuÉÚAiÀÄ£ÀÄß °Älj£À°è C¼ÉAiÀÄÄvÁÛgÉ.
eNNeyannu lITarinalli aLeyuttAre.
6. JvÀÛgÀª£ÀÄß PÉ. f AiÀÄ°è C¼ÉAiÀÄÄvÁÛgÉ.
ettaravannu ke. ji yalli aLeyuttAre.
7. CzSð °ÄlgíªÉÆ, ÀgÀÄ ¥ÁâPÉmí £À°è 'UÄÄvÀÛzÉ.
ardha lITar mosaru pyAkeT nalli siguttade.
8. UÁã, ÿ 1° AqÀgí vÀÆPÀ PÉ. f. - ÉPÀÌzÀ°è EgÀÄvÀÛzÉ.
gyAs siliMDar tUka ke. ji. lekkadalli iruttade.
9. °ÉAU¼ÀÆgÀÄªÉÄÊ, ÀÆjªAzÀ 140 Q. «ÄÄ
zÀÆgÀzÀ°èzÉ.
beMgaLUru maisUriniMda 140 ki.mI dUradallide.
10. ªÄªª 10, ÉA. «ÄÄ. GzÀÝ EçÝÄgÀ.
nIvu 10 seM. mI. udda iddIra.
11. 100, ÉA. «ÄÄ. ÉÄjzÀgÉ MAzÀÄ «ÄÄlgí DUÄÄvÀÛzÉ.
100 seM. mI. sEridare oMdu mITar Aguttade.
12. Q-ÉÆÄ«ÄÄlgí «ÄÄlgí VAvÀ zÉÆqÀØ
ªÄiÁ¥£À/C¼ÄvÉ.
kilOmITar mITar giMta doDDa mApana/aLate.
13. D¼ªª£ÀÄß «ÄÄlgí/Q-ÉÆÄ«ÄÄlgí £À°è
C¼ÉAiÀÄÄvÁÛgÉ.
ALavannu mITar/kilOmITar nalli aLeyuttAre.
14. MAzÀÄ PÉ. f. °ÀwÛAiÀÄÄ MAzÀÄ PÉ. f. °ÉÄ¼ÉVAvÀ
°ÀUÄÄgÀ.
oMdu ke. ji. hattiyu oMdu ke. ji. bELegiMta hagura.
15. 500 «Ä° °Älgí VAvÀ 2 °Älgí °Äl°AiÀÄ°è °ÉZÄÄÑ ªÄgÀÄ
EgÀÄvÀÛzÉ.
500 mili lITar giMta 2 lITar bATaliyalli heccu nIru iruttade.

Note: Pictures are not provided for this activity.

LEVEL II: ADVANCED CALCULATIONS

This level is divided into following sections:

A. Addition

C. Multiplication

B. Subtraction

D. Division

Scoring

- 0 = No response/ incorrect response/ unintelligible response
- 1 = Partially correct and intelligible response
- 2 = Fully correct intelligible response

Progress criteria: 75%

Strategies to use: Appropriate strategies can be used (refer pages 17-18). These should be used to strengthen the responses. Clinician is free to use other strategies which are more specific to mathematical concepts.

Note: Pictures are not provided.

Stimulus hierarchy:

- Combination of auditory and graphic (A+G)
- Graphic (A)

Response hierarchy:

- Graphic (G)
- Combination of graphic and verbal (V)

A. Addition

This section contains following subsections:

- a. Single digit addition
- b. Double digit addition
- c. Multiple digit addition

All the above sub-sections follow three levels.

Level 1: Give numbers and read them aloud. Ask the person with aphasia to add those numbers and mark the correct answer out of choices given.

Level 2: Give the written numbers and ask the person with aphasia to add and write the number. No choices are given in this level.

Level 3: Ask the person with aphasia to write the answer and say it aloud.

Stimuli:

- a. Single digit addition

Set 1:

1. $1+1 = \underline{\quad}$ (2, 3, 1)
2. $1+2 = \underline{\quad}$ (3, 2, 1)
3. $2+2 = \underline{\quad}$ (5, 3, 4)
4. $2+3 = \underline{\quad}$ (5, 2, 6)
5. $3+1 = \underline{\quad}$ (3, 1, 4)
6. $4+4 = \underline{\quad}$ (7, 6, 8)
7. $7+2 = \underline{\quad}$ (8, 9, 7)

8. $6+2 = \underline{\quad}$ (7, 8, 4)
9. $4+5 = \underline{\quad}$ (9, 5, 1)
10. $5+5 = \underline{\quad}$ (10, 15, 5)

Set 2:

1. $7+3 = \underline{\quad}$ (13, 10, 12)
2. $9+2 = \underline{\quad}$ (14, 11, 7)
3. $6+6 = \underline{\quad}$ (16, 12, 18)
4. $7+8 = \underline{\quad}$ (15, 17, 15)
5. $4+9 = \underline{\quad}$ (13, 14, 11)
6. $7+7 = \underline{\quad}$ (15, 14, 16)
7. $6+8 = \underline{\quad}$ (18, 14, 16)
8. $8+8 = \underline{\quad}$ (17, 16, 18)
9. $9+9 = \underline{\quad}$ (19, 18, 20)
10. $9+10 = \underline{\quad}$ (20, 19, 9)

b. Double digit addition

Set 1:

1. $10+10 = \underline{\quad}$ (20, 0, 16)
2. $11+11 = \underline{\quad}$ (32, 22, 12)
3. $14+15 = \underline{\quad}$ (18, 19, 21)
4. $11+20 = \underline{\quad}$ (41, 31, 21)
5. $13+16 = \underline{\quad}$ (31, 29, 28)
6. $17+22 = \underline{\quad}$ (39, 71, 41)
7. $20+24 = \underline{\quad}$ (44, 54, 42)
8. $40+45 = \underline{\quad}$ (90, 85, 88)
9. $30+40 = \underline{\quad}$ (70, 60, 15)

10. $20+39 = \underline{\hspace{2cm}}$ (60, 59, 19)

Set 2:

1. $14+16 = \underline{\hspace{2cm}}$ (20, 30, 24)

2. $15+19 = \underline{\hspace{2cm}}$ (52, 34, 29)

3. $19+23 = \underline{\hspace{2cm}}$ (43, 42, 59)

4. $26+16 = \underline{\hspace{2cm}}$ (42, 28, 38)

5. $12+31 = \underline{\hspace{2cm}}$ (29, 38, 43)

6. $34+17 = \underline{\hspace{2cm}}$ (41, 51, 48)

7. $69+18 = \underline{\hspace{2cm}}$ (78, 87, 68)

8. $55+27 = \underline{\hspace{2cm}}$ (87, 82, 77)

9. $72+19 = \underline{\hspace{2cm}}$ (89, 91, 101)

10. $66+29 = \underline{\hspace{2cm}}$ (85, 95, 105)

Set 3:

1. $50+50 = \underline{\hspace{2cm}}$ (100, 104, 140)

2. $46+66 = \underline{\hspace{2cm}}$ (113, 121, 112)

3. $39+85 = \underline{\hspace{2cm}}$ (142, 124, 132)

4. $70+92 = \underline{\hspace{2cm}}$ (192, 162, 709)

5. $97+79 = \underline{\hspace{2cm}}$ (197, 792, 176)

6. $82+87 = \underline{\hspace{2cm}}$ (816, 169, 168)

7. $59+96 = \underline{\hspace{2cm}}$ (166, 155, 199)

8. $88+77 = \underline{\hspace{2cm}}$ (815, 165, 728)

9. $91+89 = \underline{\hspace{2cm}}$ (208, 180, 190)

10. $99+108 = \underline{\hspace{2cm}}$ (207, 199, 919)

c. Multiple digit addition

1. $999+19 = \underline{\hspace{2cm}}$ (1018, 1000, 1118)

2. $439+672 = \underline{\hspace{2cm}}$ (1111, 1001, 1100)

3. $588+755 = \underline{\hspace{2cm}}$ (1313, 1333, 1343)

4. $866+739 = \underline{\hspace{2cm}}$ (1605, 1506, 1806)

5. $1016+9 = \underline{\hspace{2cm}}$ (1005, 1125, 1025)

6. $1005+28=$ _____ (1033, 1088, 1003)
7. $1000+132=$ _____ (1213, 1132, 1032)
8. $2032+438=$ _____ (2470, 2740, 2027)
9. $3209+500=$ _____ (3709, 3700, 3079)
10. $12,000+6=$ _____ (1206, 12006, 12600)

B. Subtraction

This section contains following levels:

- a. Single digit subtraction
- b. Double digit subtraction
- c. Multiple digit subtraction

Level 1: Give numbers and read them aloud. Ask the person with aphasia to minus those numbers and mark the correct answer out of choices given.

Level 2: Give the written numbers and ask the person with aphasia to subtract and write the number. No choices are given in this level.

Level 3: Ask the person with aphasia to write the answer and say it aloud.

Stimuli:

- a. Single digit subtraction

Set 1:

1. $2-1=$ _____ (2, 1, 3)
2. $3-2=$ _____ (1, 5, 4)
3. $4-2=$ _____ (6, 2, 3)
4. $7-4=$ _____ (4, 3, 6)
5. $8-6=$ _____ (3, 2, 9)
6. $9-7=$ _____ (10, 2, 4)
7. $7-6=$ _____ (11, 1, 9)
8. $6-3=$ _____ (9, 3, 6)

9. $9-9=$ _____ (9, 0, 10)

10. $9-4=$ _____ (13, 5, 11)

Set 2:

1. $14-4=$ _____ (18, 10, 8)

2. $12-6=$ _____ (18, 16, 6)

3. $15-9=$ _____ (6, 19, 25)

4. $17-3=$ _____ (14, 4, 18)

5. $32-1=$ _____ (22, 31, 30)

6. $21-9=$ _____ (31, 12, 21)

7. $24-4=$ _____ (20, 18, 28)

8. $22-7=$ _____ (15, 17, 29)

9. $23-8=$ _____ (31, 27, 15)

10. $38-9=$ _____ (19, 29, 20)

b. Double digit subtraction

Set 1:

1. $24-12=$ _____ (20, 12, 8)

2. $48-16=$ _____ (27, 32, 16)

3. $56-23=$ _____ (63, 31, 33)

4. $77-55=$ _____ (22, 33, 11)

5. $89-69=$ _____ (29, 20, 10)

6. $72-61=$ _____ (12, 11, 27)

7. $99-33=$ _____ (33, 99, 66)

8. $65-32=$ _____ (33, 25, 37)

9. $82-21=$ _____ (38, 61, 16)

10. $67-12=$ _____ (17, 55, 50)

Set 2:

1. $74-39=$ _____ (35, 30, 45)

2. $81-23=$ _____ (25, 58, 38)

3. $90-45=$ _____ (46, 45, 50)

4. $46-37=$ _____ (9, 8, 11)

5. $56-29=$ _____ (25, 27, 31)
6. $61-57=$ _____ (14, 4, 6)
7. $25-18=$ _____ (12, 9, 7)
8. $51-19=$ _____ (22, 12, 32)
9. $32-17=$ _____ (12, 19, 15)
10. $87-68=$ _____ (20, 19, 29)

c. Multiple digit subtraction

1. $132-2=$ _____ (120, 134, 130)
2. $144-4=$ _____ (140, 141, 148)
3. $279-8=$ _____ (278, 271, 239)
4. $712-12=$ _____ (172, 700, 124)
5. $753-7=$ _____ (735, 746, 757)
6. $634-22=$ _____ (612, 622, 633)
7. $765-31=$ _____ (734, 743, 751)
8. $832-19=$ _____ (813, 831, 881)
9. $754-88=$ _____ (656, 648, 666)
10. $888-333=$ _____ (833, 555, 585)
11. $987-799=$ _____ (188, 900, 378)
12. $931-859=$ _____ (72, 35, 120)
13. $1023-3=$ _____ (1000, 1020, 123)
14. $2083-7=$ _____ (2076, 2088, 208)
15. $3456-23=$ _____ (3433, 3333, 3344)
16. $5584-262=$ _____ (5322, 5533, 5232)
17. $9878-8999=$ _____ (778, 798, 879)
18. $13567-44=$ _____ (12341, 12233, 13523)

19. $13567-199=$ _____ (12268, 12368, 13368)

20. $18089-17074=$ _____ (1015, 1005, 1808)

C. Multiplication

This section contains following levels:

- a. Single digit multiplication
- b. Double digit multiplication
- c. Multiple digit multiplication

Level 1: Give numbers and read them aloud. Ask the person with aphasia to multiply those numbers and mark the correct answer out of choices given.

Level 2: Give the written numbers and ask the person with aphasia to multiply and write the number. No choices are given in this level.

Level 3: Ask the person with aphasia to write the answer and say it aloud.

Stimuli:

a. Single digit multiplication

- 1. $2 \times 2 =$ _____ (3, 6, 4)
- 2. $2 \times 3 =$ _____ (2, 3, 6)
- 3. $4 \times 3 =$ _____ (8, 9, 12)
- 4. $4 \times 4 =$ _____ (14, 12, 16)
- 5. $6 \times 2 =$ _____ (16, 10, 12)
- 6. $8 \times 3 =$ _____ (21, 23, 24)
- 7. $6 \times 5 =$ _____ (15, 24, 30)
- 8. $7 \times 6 =$ _____ (42, 46, 24)
- 9. $8 \times 6 =$ _____ (48, 58, 68)
- 10. $9 \times 9 =$ _____ (91, 81, 99)

b. Double digit multiplication

Set 1:

1. $11 \times 2 = \underline{\hspace{2cm}}$ (11, 33, 22)
2. $14 \times 2 = \underline{\hspace{2cm}}$ (24, 32, 28)
3. $12 \times 3 = \underline{\hspace{2cm}}$ (24, 39, 36)
4. $20 \times 3 = \underline{\hspace{2cm}}$ (50, 60, 23)
5. $13 \times 5 = \underline{\hspace{2cm}}$ (66, 45, 65)
6. $16 \times 6 = \underline{\hspace{2cm}}$ (96, 80, 76)
7. $17 \times 5 = \underline{\hspace{2cm}}$ (78, 85, 76)
8. $19 \times 4 = \underline{\hspace{2cm}}$ (76, 94, 67)
9. $30 \times 3 = \underline{\hspace{2cm}}$ (90, 60, 330)
10. $41 \times 2 = \underline{\hspace{2cm}}$ (81, 82, 80)

Set 2:

1. $22 \times 5 = \underline{\hspace{2cm}}$ (101, 110, 111)
2. $25 \times 6 = \underline{\hspace{2cm}}$ (152, 150, 156)
3. $33 \times 4 = \underline{\hspace{2cm}}$ (132, 133, 134)
4. $28 \times 7 = \underline{\hspace{2cm}}$ (196, 286, 216)
5. $27 \times 8 = \underline{\hspace{2cm}}$ (216, 200, 206)
6. $29 \times 10 = \underline{\hspace{2cm}}$ (290, 299, 210)
7. $37 \times 6 = \underline{\hspace{2cm}}$ (222, 212, 223)
8. $38 \times 8 = \underline{\hspace{2cm}}$ (304, 300, 388)
9. $42 \times 3 = \underline{\hspace{2cm}}$ (126, 128, 123)
10. $46 \times 6 = \underline{\hspace{2cm}}$ (276, 265, 277)
11. $58 \times 4 = \underline{\hspace{2cm}}$ (222, 232, 233)
12. $66 \times 6 = \underline{\hspace{2cm}}$ (396, 339, 366)
13. $74 \times 3 = \underline{\hspace{2cm}}$ (223, 222, 243)
14. $88 \times 7 = \underline{\hspace{2cm}}$ (661, 616, 666)
15. $99 \times 9 = \underline{\hspace{2cm}}$ (881, 896, 891)

Set 3:

1. $11 \times 12 = \underline{\hspace{2cm}}$ (132, 122, 133)
2. $13 \times 12 = \underline{\hspace{2cm}}$ (156, 166, 155)
3. $13 \times 15 = \underline{\hspace{2cm}}$ (199, 195, 185)
4. $14 \times 16 = \underline{\hspace{2cm}}$ (223, 214, 224)
5. $20 \times 14 = \underline{\hspace{2cm}}$ (280, 288, 214)

6. $21 \times 19 = \underline{\hspace{2cm}}$ (333, 399, 393)
7. $23 \times 13 = \underline{\hspace{2cm}}$ (299, 219, 290)
8. $24 \times 43 = \underline{\hspace{2cm}}$ (1032, 1033, 1022)
9. $25 \times 25 = \underline{\hspace{2cm}}$ (655, 526, 625)
10. $30 \times 30 = \underline{\hspace{2cm}}$ (333, 306, 900)

c. Multiple digit multiplication

1. $250 \times 2 = \underline{\hspace{2cm}}$ (500, 255, 505)
2. $700 \times 3 = \underline{\hspace{2cm}}$ (2200, 2001, 2100)
3. $123 \times 9 = \underline{\hspace{2cm}}$ (1107, 1017, 1117)
4. $200 \times 12 = \underline{\hspace{2cm}}$ (2400, 2404, 1202)
5. $230 \times 13 = \underline{\hspace{2cm}}$ (2990, 2909, 2999)
6. $315 \times 25 = \underline{\hspace{2cm}}$ (7767, 7875, 2314)
7. $4600 \times 2 = \underline{\hspace{2cm}}$ (9200, 2808, 2900)
8. $2303 \times 3 = \underline{\hspace{2cm}}$ (6909, 6999, 6099)
9. $360 \times 30 = \underline{\hspace{2cm}}$ (10800, 19800, 12309)
10. $112 \times 146 = \underline{\hspace{2cm}}$ (16622, 16352, 10239)

D. Division

This section contains following levels:

- a. Single digit division
- b. Double digit division

Level 1: Give numbers and read them aloud. Ask the person with aphasia divide those numbers and mark the correct answer out of choices given.

Level 2: Give the written numbers and ask the person with aphasia to divide and write the number. No choices are given in this level.

Level 3: Ask the person with aphasia to write the answer and say it aloud.

Stimuli:

a. Single digit division

Set 1:

1. $4/2=$ _____ (4, 1, 2)
2. $9/3=$ _____ (3, 6, 9)
3. $12/4=$ _____ (3, 10, 8)
4. $15/5=$ _____ (5, 3, 10)
5. $18/6=$ _____ (10, 8, 3)
6. $24/6=$ _____ (4, 6, 20)
7. $30/6=$ _____ (5, 6, 3)
8. $35/7=$ _____ (7, 5, 12)
9. $42/7=$ _____ (6, 7, 4)
10. $48/8=$ _____ (8, 14, 6)
11. $56/8=$ _____ (8, 7, 9)
12. $64/8=$ _____ (8, 6, 12)
13. $72/9=$ _____ (9, 8, 7)
14. $90/9=$ _____ (9, 10, 11)
15. $100/10=$ _____ (10, 9, 100)
16. $500/5=$ _____ (100, 50, 12)
17. $1000/5=$ _____ (100, 200, 105)
18. $2200/2=$ _____ (1100, 1011, 1000)

b. Double digit division

Set 1:

1. $144/12=$ _____ (14, 112, 12)
2. $168/12=$ _____ (16, 14, 18)
3. $182/13=$ _____ (18, 12, 14)
4. $210/14=$ _____ (15, 12, 21)
5. $238/14=$ _____ (23, 17, 14)
6. $266/14=$ _____ (26, 14, 19)
7. $315/15=$ _____ (22, 21, 32)

8. $368/16=$ _____ (23, 36, 16)
9. $408/17=$ _____ (24, 20, 40)
10. $513/19=$ _____ (27, 19, 51)
11. $580/20=$ _____ (29, 28, 50)
12. $726/22=$ _____ (33, 26, 62)
13. $816/24=$ _____ (34, 33, 28)
14. $875/25=$ _____ (33, 37, 35)
15. $999/27=$ _____ (29, 37, 39)

Set 2:

1. $1200/40=$ _____ (40, 30, 33)
2. $1312/41=$ _____ (34, 32, 31)
3. $1428/42=$ _____ (34, 33, 28)
4. $1512/42=$ _____ (36, 33, 30)
5. $1628/44=$ _____ (38, 28, 37)
6. $1755/45=$ _____ (39, 40, 38)
7. $1974/47=$ _____ (42, 44, 40)
8. $2200/50=$ _____ (43, 40, 44)
9. $2538/54=$ _____ (47, 44, 48)
10. $2800/56=$ _____ (50, 51, 49)

LEVEL III

This level contains activities for generalizing the concepts learnt in reading, writing and arithmetic to practical daily life situations. Few of the practical situations are suggested here. However, these practical situations can be tailor made to each individual with aphasia considering his environment, present abilities and communication needs. Clinician is expected to simulate the situations and carry out role play activities for generalization of the skills learnt by the persons with aphasia. Use appropriate strategies and fade off the cues as much as possible to make the person with aphasia more independent to function in these situations.

e.g., situation: travelling in bus. C: P:

C: J°èUÉ °ÉÆÃUÀ`ÉÃPÀÄ?
Ellige hOgabEku?

P: °ÉÄÊ, ÆjUÉ nPÉmï PÉÆr.
MaisUrige TikeT koDi.

C: 75 gÀÄ¥Á-Ä PÉÆr.
75 rupAyi koDi.

P: (gives 100 rupee note)

C: (Asks the person with aphasia, how much money he has to get back)

P:25 gÄÄ¥Á¬Ä PÉÆr.
25 rupAyi koDi.

Other situations in which such role play activities can be carried out are:

- 1) Hospital setting
- 2) Family gathering
- 3) Restaurants
- 4) Vegetable market
- 5) Work place
- 6) Travelling
- 7) Paying bills
- 8) Bank transaction

RESULTS AND DISCUSSION

The present study aimed at validating the Manual for Treatment of Reading, Writing and Arithmetic for Persons with Adult Aphasia in Kannada (MTR3A2-K). The manual was field tested on ten individuals with different types of aphasia (group A) and ten neuro-typical individuals with normal reading, writing and arithmetic skills (group B). The manual was administered on group B without involving them in the treatment plan where as the persons with aphasia in group A were given treatment in reading, writing and arithmetic domains using this manual for 15 sessions, each session lasting for a duration of an hour. The responses obtained from all the 20 participants during the sessions were recorded using treatment recording sheets. The scores of each participant on each activity of various levels and domains were compiled and converted to percentages. The data collected from ten participants with aphasia and ten normal individuals was subjected to quantitative analysis using SPSS (18.0 version) software. For the purpose of comprehensive analysis, the group A was further categorized as persons with fluent and non-fluent type of aphasia to see, if any difference existed in treatment outcome among these two types. The following statistical analyses were used.

Descriptive statistics: Mean and standard deviation were computed for the various domains in the baseline, mid and post therapy sessions (i.e. 1st, 7th and 15th session) for all the persons with aphasia and baseline sessions of neurotypical adults.

Mann-Whitney U test: This test was done across the groups to compare the performance of participants within each domain. Pair-wise comparison was done between group A and B, and also between the fluent and non-fluent types of aphasia within group A.

Friedman test: This test was done to analyse the differences in performance among 1st, 7th and 15th sessions for each level of all three domains in group A.

Wilcoxon-signed rank test: The data was also subjected to Wilcoxon signed rank test to observe, which pairs of sessions showed a statistically significant difference at different levels of each domain.

Based on the statistical analysis, the findings of the present study have been presented under the following headings:

- I. Quantitative analysis of performance by neurotypical participants (N=10) across all the domains.
- II. Quantitative analysis of performance by all the participants (N=20; neurotypical adults-10 and individuals with aphasia-10) across all the domains.
- III. Quantitative analysis of performance by participants with fluent and non-fluent type of aphasia in group A (N=10; fluent-5 and non-fluent-5) across all the domains.
- IV. Quantitative analysis of performance by all persons with aphasia (N=10) in group A across all the domains.
- V. Quantitative analysis of performance by all persons with aphasia (N=10) in group A across various levels in the three domains.

Note: Goals selected for all ten persons with aphasia varied relative to his communicative deficits, as they represented three different types of aphasia. Subsequently, the scores that were calculated and analyzed are based on each individual's performance, only on those goals selected for him during therapy.

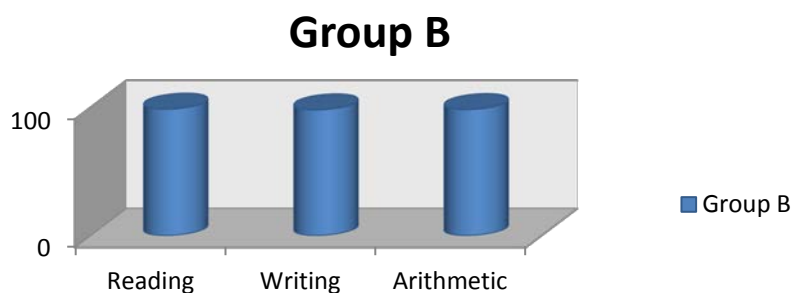
I. Quantitative analysis of performance by neurotypical participants (N=10) across all the domains.

The developed manual was administered on neurotypical participants in order to obtain a baseline, and to determine the appropriateness of the activities. The total scores were summed up and converted to percentage scores in order to bring uniformity across the scores in all three domains. The mean (M) and standard deviation (SD) of percentage scores were calculated for ten neuro-typical individuals. Table 2 and Figure 3 indicate the mean and SD of percentage scores for individuals in all three domains.

Table 2

Mean and standard deviation values of the three domains in group B.

Domains	Group B (N=10)	
	Mean %	SD of %
Reading	98.89	1.10
Writing	98.34	1.44
Arithmetic	98.58	1.291



*Figure 3.*Mean values of all three domains in group B.

Table 2 and Figure 3 indicate that the performance of the neurotypical adults was nearing the maximum score in all three domains, i.e. reading, writing and arithmetic. This clearly indicates that the activities in the manual were appropriate for neurotypical adults. Thus, this manual was considered as applicable for the intervention of reading, writing and arithmetic deficits in persons with aphasia. Hence, in order to validate this manual, it was also administered on persons with aphasia.

II. Quantitative analysis of performance by all the participants (Neurotypical-10 and Individuals with aphasia-10; N-20) across all the domains.

The mean (M) and standard deviation (SD) of percentage scores for 1st, 7th and 15th therapy sessions of group A and baseline of group B were calculated. Table 3 and Figure

4, 5 and 6, indicate the mean and SD of percentage scores for group A and B in all three domains.

Table 3

Mean and standard deviation values of all three domains in group A and group B.

Domains	Group A						Group B	
	1 st session		7 th session		15 th session		No therapy*	
	M	SD	M	SD	M	SD	M	SD
Reading	46.7	25.53	57.6	24.1	69.0	23.36	98.89	1.10
Writing	32.7	21.3	41.32	19.48	51.59	21.10	98.34	1.44
Arithmetic	34.8	26.9	40.7	26.6	48.54	38.50	98.58	1.291

*- No therapy indicates that the neurotypical adults were not given therapy.

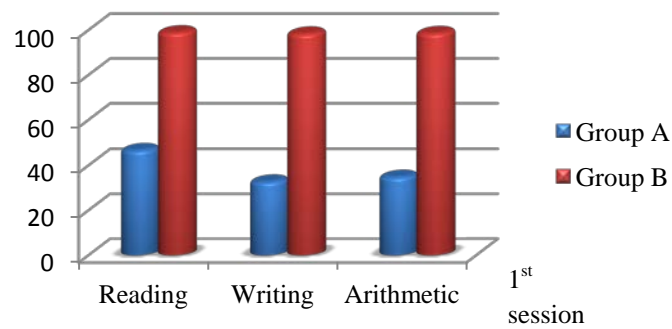


Figure 4. Mean % values of all three domains in baseline of group A and group B.

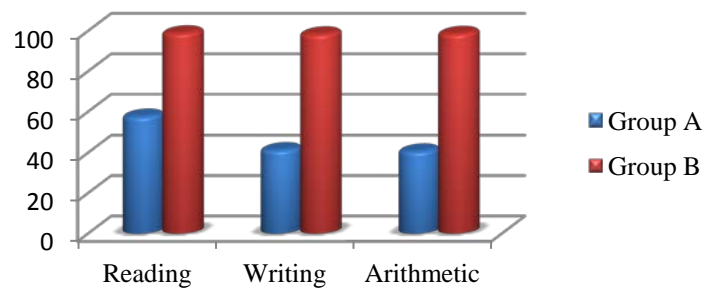


Figure 5. Mean % values of all three domains in 7th session of group A and baseline of group B.

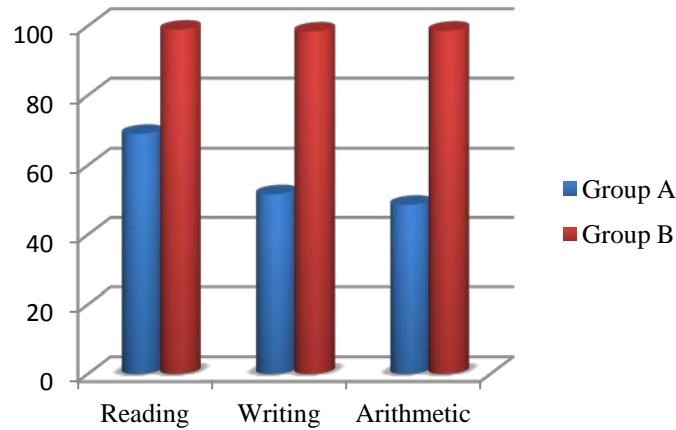


Figure 6. Mean % values of all three domains in 15th session of group A and baseline of group B.

It is evident from Figure 4, 5 and 6, that the response of persons with aphasia was lower compared to group B of neuro-typical individuals in all three domains. Also, it can be observed that the performance of group A has improved from 1st to 15th session.

To determine if there is any statistically significant difference between group A (1st, 7th and 15th session) and group B (baseline), pair-wise comparison was done using Mann Whitney U test. The results of this test indicated a statistically significant difference between group A and group B in reading domain ($/z/=3.794$, $p<.001$) at baseline, ($/z/=3.718$, $p<.001$) at 7th session, and ($/z/=3.339$, $p<.001$) at 15th session. Also, there was a statistically significant difference between group A and B in writing domain ($/z/=3.797$, $p<.001$) at baseline, ($/z/=3.797$, $p<.001$) at 7th session, and ($/z/=3.797$, $p<.001$) at 15th session. Also in arithmetic domain, there was a statistically significant difference between the two groups ($/z/=3.787$, $p<.001$) at baseline, ($/z/=3.787$, $p<.001$) at 7th session, and ($/z/=3.787$, $p<.001$) at 15th session, respectively.

Based on the performance of the neuro-typical adults and persons with aphasia, it is evident that this manual differentiates between the two groups. The results of this manual indicate that the performance of persons with aphasia is affected in reading, writing and

arithmetic domains. Studies conducted by Benson and Ardila(1996), Goodglass (1993),Semenza et al. (2006) support the present finding in stating that the persons with aphasia have reading, writing and arithmetic deficits due to persisylvian damage.

Thus from Table 3 and Figure 4, 5 and 6, it can be stated that the performance of group A has improved across 1st, 7th and 15th sessions. However, the scores have not approximated the performance of group B. This shows that the activities illustrated in the manual does bring a change in the reading, writing and arithmetic skills of persons with aphasia.

The results of the study receives support from Beeson, Volk and Rising (2003), who have provided evidence for treatment in writing for 8 individuals with chronic aphasia by following Copy and Recall Treatment (CART) for 10-12 weeks. Orjada and Beeson (2005) also provide evidence for the present finding by using Oral Reading Treatment (ORT) and Copy and Recall Treatment (CART) for anindividual with chronic aphasia for 10 weeks. They also noted an improvement in reading and spelling abilities with increase in grammatical complexity of spoken language. Thus, the results of this study show that, the systematic re-training using controlled and intensive stimuli helps in improving the reading, writing and arithmetic skills in persons with aphasia.

Further, to investigate if there was any difference in the performance of the two types of aphasia (fluent and non-fluent) on administration of the developed manual, the following analysis was carried out.

III. Quantitative analysis of performance by participants with fluent and non-fluent types of aphasia in group A (N=10; fluent-5 and non-fluent-5) across all the domains.

Percentage mean and SD values were computed for all the raw scores of 1st, 7th and 15th sessions for individuals with fluent and non-fluent type of aphasia. Table 4 and Figure 7, 8 and 9 illustrate the mean and SD values in all three domains across baseline, mid and post therapy sessions for fluent and non-fluent types of aphasia.

Table 4

Mean and standard deviation values of all three domains across baseline, mid and post therapy influent and non-fluent aphasia type.

Domains	Fluent Type (N=5)						Non-fluent Type (N=5)					
	1 st session		7 th session		15 th session		1 st session		7 th session		15 th session	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Reading	52.2	29.2	61.9	24.0	72.8	21.9	41.28	23.1	53.23	26.1	65.14	26.5
Writing	33.64	15.4	44.42	8.8	57.22	11.7	31.7	28	38.2	27.4	45.9	28
Arithmetic	40.2	31.4	45.6	31.1	53.03	30.6	29.62	24.1	35.84	23.9	44.06	22.3

It is evident from the mean scores that the individuals with fluent and non-fluent types of aphasia performed equally with no obvious difference. The same has been depicted in Figure 7, 8 and 9.

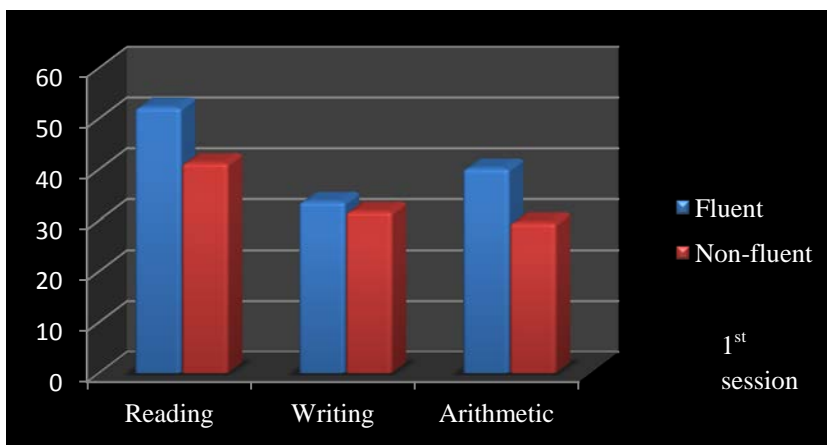


Figure 7. Mean values of three domains at baseline in fluent and non-fluent types of aphasia.

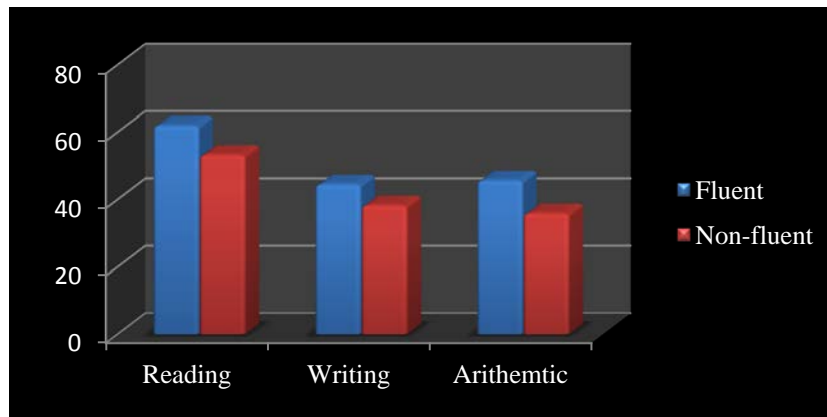


Figure 8. Mean values of three domains at 7th session in fluent and non-fluent types of aphasia.

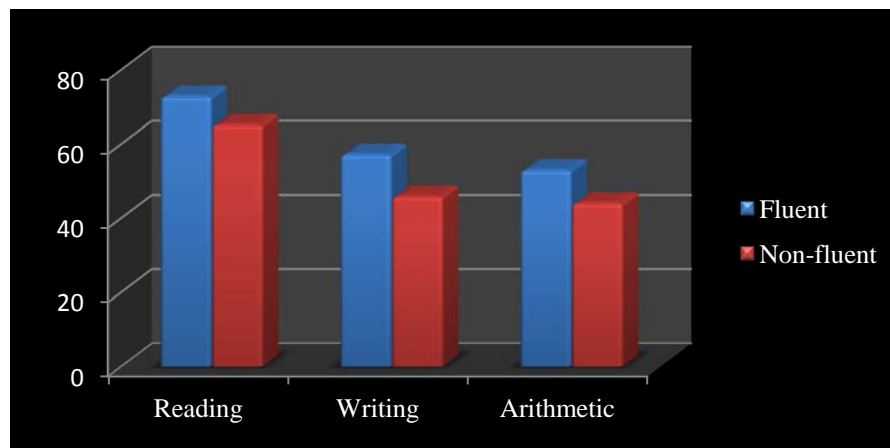


Figure 9. Mean values of three domains at 15th session in fluent and non-fluent types of aphasia.

Thus, to determine if there was any statistically significant difference in the performance of the fluent and non-fluent aphasia groups, Mann Whitney U test was conducted. A pair-wise comparison was made between the scores of 1st, 7th and 15th sessions across all the domains in both the groups. There was no statistically significant difference between the two groups in reading domain ($Z = .313$, $p > .754$), in writing domain ($Z = .731$, $p > .465$), and in arithmetic domain ($Z = .731$, $p > .465$) at baseline, in reading domain ($Z = .313$, $p > .754$), in writing domain ($Z = 1.1499$, $p > .251$), and in arithmetic domain ($Z = .313$, $p > .754$) at 7th session, in reading domain ($Z = .522$, $p > .602$), in writing domain ($Z = 1.149$, $p > .251$), and in arithmetic domain ($Z = .104$, $p > .917$) at 15th session. Thus, there

was no statistically significant difference between the fluent and non-fluent types of aphasia in all three domains across 1st, 7th and 15th sessions.

A major factor in obtaining no significant difference in performance between fluent and non-fluent aphasia groups could be that, the sample size was limited to five in each type of aphasia groups; also the higher scores of few participants could have masked the lower scores of the other participants, as a group. There were also individual variations in mean percentage scores which were not reflected during statistical analysis. Although there was no statistically significant difference, the mean scores indicate that the performance of fluent aphasia group was better than non-fluent aphasia group at baseline, mid and post therapy sessions. This also receives support from the principle behind the treatment for wernicke's aphasia (TWA: Estabrooks & Albert, 1991) which states that the academic skills of persons with fluent aphasia are better than that of non-fluent aphasia. The vocation of persons with aphasia in the fluent aphasia group (Teacher, Accountant and Engineer) could be a significant factor contributing to their better performance in reading, writing and arithmetic tasks.

The reason for poor performance by the non-fluent aphasia group could be the motoric deficits, poor verbal output which is essential for reading, writing and arithmetic skills. Moreover, due to the lesion in frontal and or prefrontal cortex in non-fluent aphasias, cognitive skills which are necessary for reading, writing and arithmetic skills might be affected.

As the performance of PWA could vary for reading, writing and arithmetic domains, it is important to investigate the performance in each of these domains individually. Also, since there was no significant difference between the performance of fluent and non-fluent types, the scores have not been analyzed with respect to types in the further analyses. This is discussed under the following analysis.

IV. Quantitative analysis of performance by persons with aphasia (N=10) across all the domains.

The performance of ten persons with aphasia at three levels of each domain were added up to calculate the total scores and converted into percentages in baseline, mid and post therapy sessions. Further the data was subjected to non-parametric tests to compare across 1st, 7th and 15th sessions.

1. Comparison of performance of persons with aphasia (N=10) in reading domain for the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).
2. Comparison of performance of persons with aphasia (N=10) in writing domain for the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).
3. Comparison of performance of persons with aphasia (N=10) in arithmetic domain for the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

1. Comparison of performance of persons with aphasia (N=10) in reading domain for the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

In reading domain, the mean (M) and standard deviation (SD) of percentage scores were calculated for baseline, mid and post therapy sessions. Table 5 and Figure 10 illustrate the mean and SD values for persons with fluent and non fluent aphasia for reading domain.

Table 5

Mean and standard deviation values of reading domain across baseline, mid and post therapy sessions.

Percentage scores	Reading		
	Baseline session	Mid therapy session	Post therapy session
Mean %(N=10)	46.74	57.60	69.0
SDof %	25.53	24.0	23.36

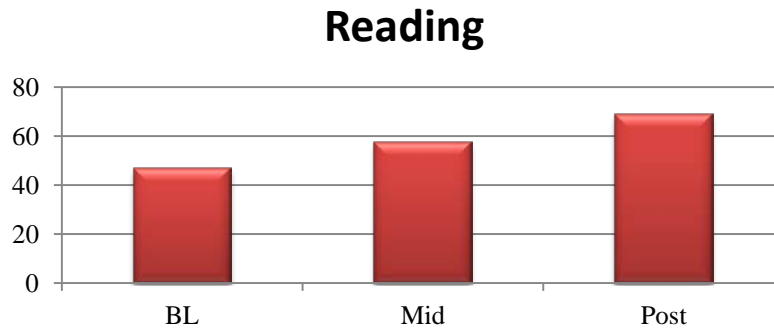


Figure 10. Responses of the persons with aphasia in reading domain across baseline, mid and post therapy sessions.

From Table 4, it can be observed that the persons with aphasia (PWA), scored an overall mean of 46.74 (SD=25.53), 57.60 (SD=24.0) and 69.0 (SD=23.36) for baseline, mid therapy and post therapy sessions, respectively. As depicted in Figure 10, the percentage scores of all persons with aphasia (PWA) improved from 1st to 15th session.

Friedman’s test was carried out to determine if there was any statistically significant difference in the baseline, mid and post therapy sessions, since the mean scores differed. The results of the test showed a statistically significant difference across baseline, mid and post therapy sessions $\{\chi^2(2) = 20, p < 0.001\}$. The data was further subjected to Wilcoxon signed rank test to determine which pairs of sessions showed a statistically significant difference. Results of this test indicated a statistically significant difference between baseline and mid ($|z| = 2.803, p < 0.01$); mid and post ($|z| = 2.805, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.805, p < 0.01$). Therefore, it can be inferred that all the participants showed a significant improvement in percentage scores across the therapy sessions.

2. Comparison of performance of persons with aphasia (N=10) in writing domain for the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

In writing domain, the mean (M) and standard deviation (SD) of percentage scores were calculated for baseline, mid and post therapy sessions. Table 6 and Figure 11 illustrate the mean and SD values for persons with aphasia in the writing domain.

Table 6

Mean and standard deviation values of writing domain across baseline, mid and post therapy sessions.

Percentage scores	Writing		
	Baseline session	Mid therapy session	Post therapy session
Mean (N=10)	32.70	41.32	51.59
Std. Deviation	21.34	19.48	21.10

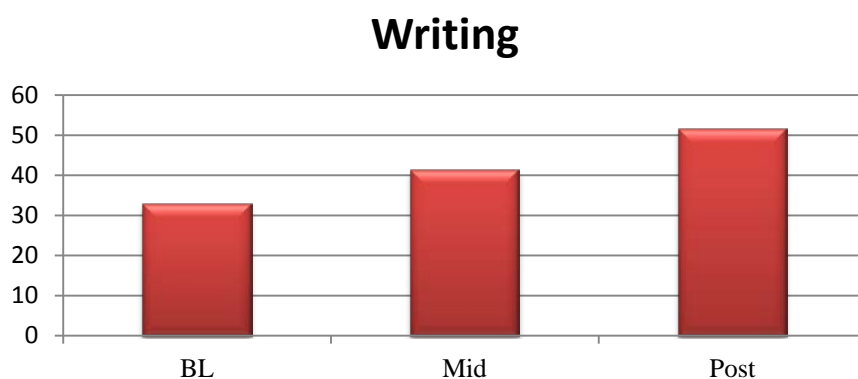


Figure 11. Responses of the persons with aphasia in writing domain across baseline, mid and post therapy sessions.

From Table 5, it can be seen that the persons with aphasia (PWA), scored an overall mean of 32.70 (SD=21.34), 41.32 (SD=19.48) and 51.59 (SD=21.10) for baseline, mid therapy and post therapy sessions, respectively. As depicted in Figure 11, all persons with aphasia (PWA) were found to improve in writing skill across therapy sessions.

To determine if there was any statistically significant difference across the baseline, mid and post therapy sessions, Friedman’s test was carried out. The results of this test indicated a statistically significant difference across baseline, mid and post therapy sessions $\{\chi^2(2) = 20, p < 0.001\}$. Further, Wilcoxon signed rank test was carried out to determine which pairs of sessions showed a statistically significant difference. There was a statistically significant difference between baseline and mid ($|z| = 2.803, p < 0.01$); mid and post ($|z| = 2.803, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.803, p < 0.01$). A significant improvement in writing was evident in all the participants across the therapy sessions.

3. Comparison of performance of persons with aphasia (N=10) in arithmetic domain for the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

In arithmetic domain, the mean (M) and standard deviation (SD) of percentage scores were calculated for baseline, mid and post therapy sessions. Table 6 and Figure 12 illustrate the mean and SD values for persons with aphasia in arithmetic domain.

Table 7

Mean and standard deviation values of arithmetic domain across baseline, mid and post therapy sessions.

Percentage scores	Arithmetic		
	Baseline session	Mid therapy session	Post therapy session
Mean (N=10)	34.82	40.75	48.54
Std. Deviation	26.99	26.66	25.69

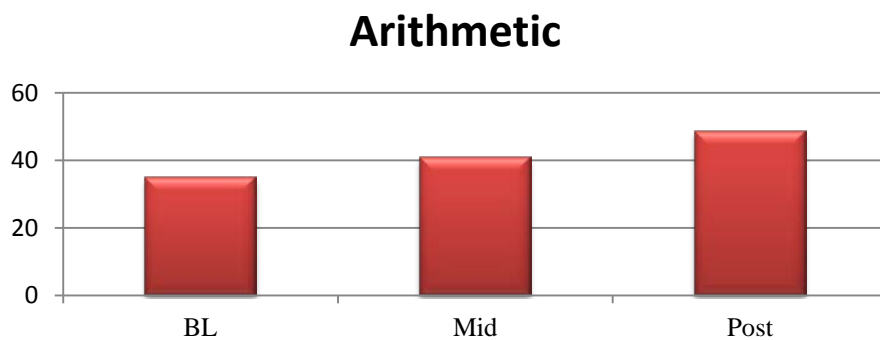


Figure 12. Responses of the persons with aphasia in arithmetic domain across baseline, mid and post therapy sessions.

From Table 6, it can be observed that the persons with aphasia (PWA), scored an overall mean of 34.82 (SD=26.99), 40.75 (SD=26.66) and 48.54 (SD=25.69) for baseline, mid therapy and post therapy sessions respectively. As depicted in Figure 12, all persons with aphasia (PWA) were found to improve in arithmetic skill across therapy sessions.

Friedman’s test was carried out to determine if there was any statistically significant difference across the baseline, mid and post therapy sessions. The results of this test indicated a statistically significant difference across baseline, mid and post therapy session $\{\chi^2(2) =$

20, $p < 0.001$ }. The data was further subjected to Wilcoxon signed rank test to determine which pairs of sessions showed a statistically significant difference. Results of this test indicated a statistically significant difference between baseline and mid ($|z| = 2.803$, $p < 0.01$); mid and post ($|z| = 2.803$, $p < 0.01$) and baseline and post therapy sessions ($|z| = 2.803$, $p < 0.01$). Therefore, all the participants showed a significant improvement in arithmetic domain across the therapy sessions.

Thus, from the quantitative analysis across reading, writing and arithmetic domains, it is clear that the performance of all the persons with aphasia improved across 1st, 7th and 15th sessions. This suggests the clinical implication of the manual for persons with aphasia. The present finding receives support from a study by Beeson et al. (2002) who reported that a systematic, controlled, and time-based treatment will facilitate regaining of the lost literacy skills in persons with aphasia.

Within each domain, it is important to note if there was any improvement at all three levels across 1st, 7th and 15th session. To investigate this, the following analysis was carried out.

V. Quantitative analysis of performance by all persons with aphasia (N=10) in group A across various levels in each domain.

The performance of persons with aphasia in each level of all three domains was analysed.

1. Comparison of performance of persons with aphasia (N=10) in reading level I, II and III across the baseline, mid and post therapy sessions. (1st, 7th and 15th sessions).
2. Comparison of performance of persons with aphasia (N=10) in writing level I, II and III across the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

- Comparison of performance of persons with aphasia (N=10) in arithmetic level I, II and III across the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

1. Comparison of performance of persons with aphasia (N=10) in reading level I, II and III across the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

The mean (M) and standard deviation (SD) of percentage scores were calculated for baseline, mid and post therapy sessions in reading level I, II and III. Table 7 and Figure 13 illustrate the mean and SD values for persons with aphasia in reading domain at all three levels.

Table 8

Mean and standard deviation values of reading at level I, II and III across baseline, mid and post therapy sessions.

Reading		1 st session	7 th session	15 th session
Level 1	M	81.14	86.11	95.68
	SD	24.08	14.79	4.53
Level 2	M	38.66	46.24	59.46
	SD	30.33	25.0	28.6
Level 3	M	24.74	31.99	47.20
	SD	26.84	30.70	34.82

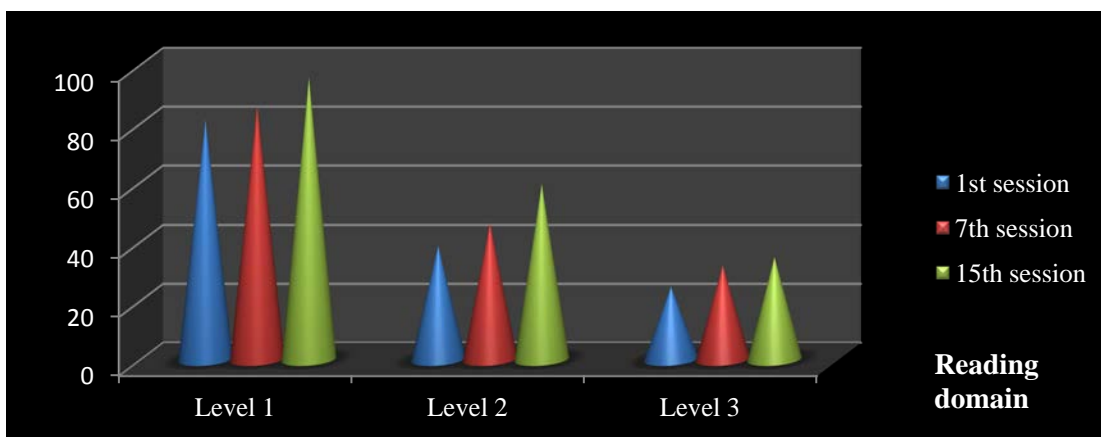


Figure 13. Responses of persons with aphasia in reading at level I, II and III across baseline, mid and post therapy sessions.

From Table 7 and Figure 13, it can be observed that the persons with aphasia scored an overall mean of 81.14 (SD=24.08), 86.11 (SD=14.79), 95.68 (SD=4.53) at baseline, mid

and post-therapy sessions for level I, 38.66 (SD=30.33), 46.24 (SD=25.0) and 59.46 (SD=28.6) for baseline, mid therapy and post therapy sessions for level II, 24.74 (SD=26.84), 31.99 (SD=30.70) and 47.20 (SD=34.82) for baseline, mid therapy and post therapy sessions for level III, respectively.

Table 7 and Figure 13 clearly indicate a difference in the mean scores across 1st, 7th and 15th sessions, across all three levels of reading. Friedman test was done to determine if there was any statistically significant difference. The results of the test indicate that there was a statistically significant difference across the sessions at level I $\{\chi^2(2) = 8, p < 0.05\}$, level II $\{\chi^2(2) = 18, p < 0.001\}$, and level III $\{\chi^2(2) = 17.17, p < 0.001\}$. Further, Wilcoxon signed rank test was carried out to determine which pairs of session showed a statistically significant difference across three sessions and three levels of reading. The results of this test indicated that, at level 1, there was a statistically significant difference between baseline and mid ($|z| = 2.201, p < 0.05$); and no significant difference between mid and post ($|z| = 1.826, p > 0.05$) and baseline and post therapy sessions ($|z| = 1.826, p > 0.05$). There was a statistically significant difference between baseline and mid ($|z| = 2.668, p < 0.01$); mid and post ($|z| = 2.666, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.666, p < 0.01$) at level II, and baseline and mid ($|z| = 2.366, p < 0.01$); mid and post ($|z| = 2.666, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.666, p < 0.01$) at level III. Therefore, all the participants showed a significant improvement in reading at level I, II and III across the therapy sessions.

The performance of the persons with aphasia was better at level I than at II and III. The possible reason for this finding is the type of tasks involved at level I. It was a functional level which included orientation to reading material, following directions, recognition of signs and alphabet, following directions, motoric activities like using scissors, staplers etc. These tasks were relatively simpler than those involved at level II and III, thus fetching a

higher score. The activities included at level II were reading at syllable, word and phrase level, phonemic awareness tasks, grammatical tasks, tasks targeting on word knowledge and oral reading. Level III included oral reading, reading comprehension at sentence and discourse level. Thus, the tasks of level II and III were relatively complex, requiring better reading skills in the persons. Cherney, Merbitz and Grip (1986) support the current finding by stating that retraining persons with aphasia using passage reading tasks help in improving the reading comprehension.

The reason for obtaining no statistically significant difference between 7th and 15th sessions of level I could be that the scores of level I were high from baseline leading to a ceiling effect by the 15th session.

In conclusion, the goal of this domain varied from just helping the person with aphasia to orient him/her to reading material/reading procedure itself to comprehend what is in the written text. The sections at the base provided greater benefits to those persons with aphasia who had more difficulty in paying attention and less motivation in reading the print, and with visual-perceptual deficits. At the advanced levels of reading comprehension, persons with aphasia needed more sessions for treatment to improve reading comprehensions as they had poor listening comprehension.

2. Comparison of performance of persons with aphasia (N=10) in writing level I, II and III across the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

In writing level I, II and III, the mean (M) and standard deviation (SD) of percentage scores were calculated for baseline, mid and post therapy sessions. Table 10 and Figure 14 illustrate the mean and SD values for persons with aphasia for writing domain at three levels.

Table 9

Mean and standard deviation values of writing level I across baseline, mid and post therapy sessions.

Writing		1 st session	7 th session	15 th session
Level 1	M	46.41	54.08	61.85
	SD	22.5	35.33	26.59
Level 2	M	23.14	34.65	44.51
	SD	21.52	20.29	23.1
Level 3	M	15.94	23.08	30.72
	SD	18.6	20.5	24.38

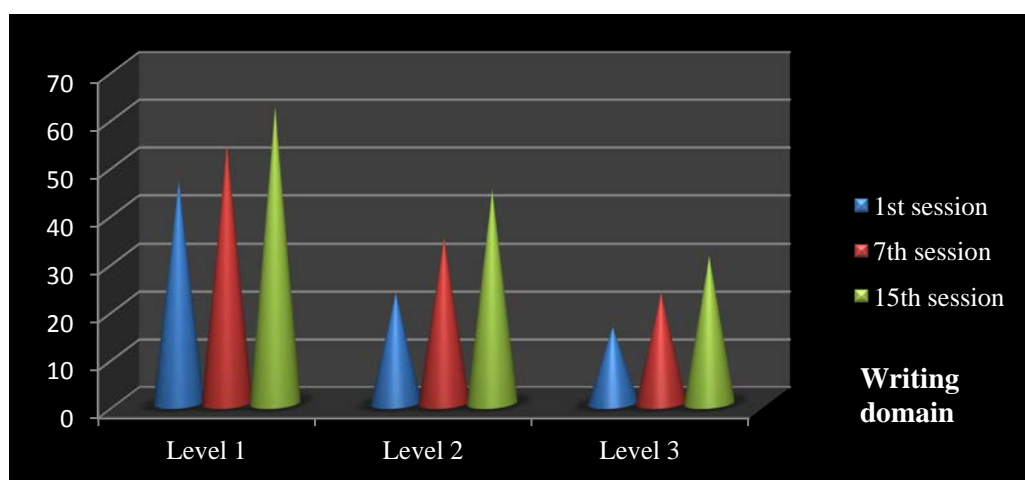


Figure 14. Responses of persons with aphasia in writing level I across baseline, mid and post therapy sessions.

From Table 10 and Figure 14, it can be observed that the persons with aphasia scored an overall mean of 54.08 (SD=35.33), 46.41 (SD=22.5), 61.85 (SD=26.59) at baseline, mid and post-therapy sessions for level I, 23.14 (SD=21.52), 34.65 (SD=20.29) and 44.51 (SD=23.1) for baseline, mid therapy and post therapy sessions for level II, 15.94 (SD=18.6), 23.08 (SD=20.5) and 30.72 (SD=24.38) for baseline, mid therapy and post therapy sessions for level III in writing, respectively.

The mean scores of writing, illustrated in Table 10 and Figure 14 indicate a difference across the 1st, 7th and 15th session at all three levels. Consequently, Friedman test was done to determine if there was any statistically significant difference. The results of the test indicate that there was a statistically significant difference across the sessions at level I $\{\chi^2(2) = 17,$

$p < 0.001$ }, level II $\{\chi^2(2) = 18, p < 0.001\}$, and level III $\{\chi^2(2) = 17.54, p < 0.001\}$. To determine which pairs of sessions showed a statistically significant difference at three levels of writing, Wilcoxon signed rank test was carried out. The results of this test indicated a statistically significant difference between baseline and mid ($|z| = 2.666, p < 0.01$); mid and post ($|z| = 2.666, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.666, p < 0.01$) at level I, and a statistically significant difference between baseline and mid ($|z| = 2.666, p < 0.01$); mid and post ($|z| = 2.666, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.666, p < 0.01$) at level II, and a statistically significant difference between baseline and mid ($|z| = 2.521, p < 0.01$); mid and post ($|z| = 2.666, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.666, p < 0.01$) at level III, as well. Thus, it can be stated that, all the participants showed a significant improvement in writing at level I, II and III across the therapy sessions.

It can also be observed from the results that the mean scores reduce with increasing level of the domain. The level I included muscle strengthening exercises (exercises of stability and mobility of wrist, fingers, shoulder and hand), pre-writing skills and functional writing activities. These activities are relatively simple and hence the scores obtained are comparatively higher. The tasks in level II focused on writing in syllable, word and phrase level. This level comprised of word stimuli with and without pictures, with increasing order of complexity of word length from short to long, non-geminates to geminates, and non-clustered words to clustered words. The activities under level III mainly focused on writing legibility along with advanced levels of writing creatively and spontaneously about a topic without any assistance. Hence, the performance in writing reduced with increasing level. Nevertheless, the performance of all the participants improved over 15 sessions, suggesting that regular training does help in improving the writing skills using the MTR3A2. A study by Beeson, Volk and Rising (2003), provides support for the current finding. They re-trained

spellings for words of various lengths, regular and irregular spellings, which in turn improved graphemic representations for trained words using CART technique.

3. Comparison of performance of persons with aphasia (N=10) in arithmetic level I, II and III across the baseline, mid and post therapy sessions (1st, 7th and 15th sessions).

In arithmetic domain, the mean (M) and standard deviation (SD) of percentage scores were calculated for baseline, mid and post therapy sessions. Table 10 and Figure 15 illustrate the mean and SD values of percentage scores for persons with aphasia for arithmetic domain at level I, II and III.

Table 10

Mean and standard deviation values of arithmetic level I, II and III across baseline, mid and post therapy sessions.

Arithmetic		1 st session	7 th session	15 th session
Level 1	M	66.6	68.45	73.38
	SD	28.8	23.2	18.3
Level 2	M	18.82	24.3	30.82
	SD	26.6	27.7	29.21
Level 3	M	21.37	26.28	33.29
	SD	35.2	38.08	39.4

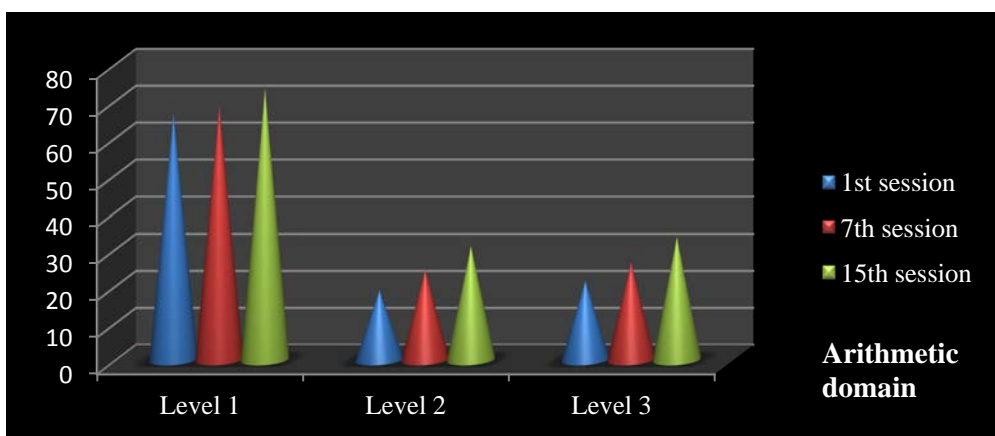


Figure 15. Responses of persons with aphasia in arithmetic level I, II and III across baseline, mid and post therapy sessions.

From Table 11, it can be observed that the persons with aphasia (PWA), scored an overall mean of 66.6 (SD=28.8), 68.45 (SD=23.2) and 73.38 (SD=18.3) at level I, 18.82

(SD=26.6), 24.3 (27.7) and 30.82 (29.21) at level II, and 21.37 (SD=35.2), 26.28 (38.08) and 33.29 (SD=39.4) at level III for baseline, mid therapy and post therapy sessions of arithmetic domain, respectively.

The mean scores of arithmetic domain, illustrated in Table 11 and Figure 15 indicate a difference across the 1st, 7th and 15th session at all three levels. Consequently, Friedman test was done to determine if there was any statistically significant difference. The results of the test indicate that there was no statistically significant difference across the sessions at level I $\{\chi^2(2) = 12, p > 0.001\}$, and a statistically significant difference across the sessions at level II $\{\chi^2(2) = 18, p < 0.001\}$, and level III $\{\chi^2(2) = 17.17, p < 0.001\}$. To determine which pairs of sessions showed a statistically significant difference at two levels of arithmetic, Wilcoxon signed rank test was carried out. The results of this test indicated a statistically significant difference between baseline and mid ($|z| = 2.666, p < 0.01$); mid and post ($|z| = 2.666, p < 0.01$) and baseline and post therapy sessions ($|z| = 2.668, p < 0.01$) at level II, and a statistically significant difference mid and post ($|z| = 2.668, p < 0.01$) and baseline and post ($|z| = 2.668, p < 0.01$) at level III, as well. However, at level III, there was no statistically significant difference between baseline and mid sessions ($|z| = 2.366, p > 0.01$). Thus, it can be stated that, there was no statistically significant difference across the sessions at level I, and also 1st and 7th sessions of level III. However, it can be stated that, all the participants showed a significant improvement in arithmetic domain at level I, II and III across the therapy sessions.

From the results obtained, it is clearly seen that the performance in arithmetic domain is high in the level I than II and III. The level I of this domain consisted of training the concept of number, shapes, mathematical signs; concept of zero and counting; concept of measurement, day/night, time and currency, and inculcating the basic mathematics in the daily life. Better performance at this level can be owed to the relatively less complex task of

this level. The level II of this domain included all the advanced calculations of four mathematical operations namely addition, subtraction, multiplication and division. The level III of this domain was different from rest of the levels in its composition. It required integration of the previously learnt concepts and using it practically to solve the simulated daily life situations. Owing to the complexity of the tasks included in level II and III, the mean scores are low for these levels. However, a significant improvement in performance across 15 sessions for all three levels in arithmetic domain indicates that the manual can be successfully used to improve the lost arithmetic skills in persons with aphasia.

Thus, from the results of the present study, it can be stated that the performance of the persons with aphasia significantly improved from 1st to 15th session using the Manual for Treatment of Reading, Writing and Arithmetic for Persons with Adult Aphasia in Kannada (MTR3A2-K). This indicates that the activities illustrated under various domains in the manual, facilitates reading, writing and arithmetic skills in persons with aphasia.

CHAPTER VI

SUMMARY AND CONCLUSION

The aim of the present study was to validate the Manual for Treatment of Reading, Writing and Arithmetic for Persons with Adult Aphasia in Kannada (MTR3A2-K). MTR3A2-K was developed by the authors (Kruthi & Goswami, 2011) by adhering to the guidelines for aphasia therapy. The manual contained three domains namely reading, writing and arithmetic, each domain further divided into three levels namely level I, level II and level III. Each level consisted of various sections and sub-sections with activities listed under each sub-section along with word and picture stimuli arranged in hierarchical order of increasing complexity. For each sub-section stimulus hierarchy, response hierarchy, scoring pattern and progress criteria were provided. The manual also had special guidelines with respect to reading and writing separately for carrying out the activities.

However, certain modifications in the activities and scoring procedures were done. Two additional modifications, a writing booklet and a kit for strengthening activities were included. And also an additional treatment recording sheet for scoring activities in writing domain was designed with respect to the type of activities. The treatment recording sheets for all three domains along with an overall treatment recording sheet are illustrated in Appendix 2. The work booklet is enclosed in Appendix 1.

Subsequently, the finalized manual was field tested on ten persons with aphasia post-stroke in the age range of 24-75 years (group A) and ten neuro-typical individuals in the age range of 21-30 years (group B), with all the participants being native speakers of Kannada. The participants in group B had normal reading and writing skills. The participants in group A were given therapy in reading, writing and arithmetic using MTR3A2-K for 15 therapy sessions, each session lasting an hour. The manual provided various activities under reading,

writing and arithmetic domains that are relevant to remediating the respective deficits in persons with aphasia. Systematic assembly of activities, stimulus and scoring pattern facilitated documentation of the participants' responses. All the participants' performance on this manual was assessed on the first therapy session and this was referred to as baseline. Based on the baseline performance, goals for the therapy were selected for each person with aphasia and therapy was given adhering to the progression criteria provided in the manual. The performance in each therapy session was objectively scored on the treatment recording sheets and the total scores were calculated along with percentages. During the course of therapy, each person with aphasia was assessed thrice, at the beginning of therapy (baseline), on the 7th session of therapy (mid) and on the 15th session of therapy (post therapy).

The scores of ten persons with aphasia and ten neuro-typical individuals were subjected to statistical analysis. A comparison was made between the performances of persons with aphasia (group A) and neuro-typical individuals (group B) to see the treatment effects. The data was analysed quantitatively across various domains and various levels across sessions. The results indicated an overall improvement in reading, writing and arithmetic domains in all the ten persons with aphasia (PWA) from baseline to post-therapy sessions. Hence, the treatment was effective for all the participants with aphasia in group A. The results revealed that the field testing of MTR3A2-K was indeed useful in facilitating better performance in persons with aphasia in the reading, writing and arithmetic domains, that lead to improved independence and interaction with significant others.

The manual is self explanatory. It is comprehensive in the arrangement of the activities and stimuli. Activities can be custom made by tailoring the activities with respect to PWA's occupation and social background. The scoring pattern is also flexible. The manual also gives scope for flexibility with respect to the criteria of progression for different types of aphasia. The quantification of the participants' performance can also be used to provide

feedback and to monitor the therapy for drawing future goals. The manual also makes a provision to step from therapy at clinical setting to other settings by incorporating transfer and generalization skills. The manual also gives some directives which help in enhancing the communication effectiveness between persons with aphasia and care takers outside the clinical settings.

6.1 Implications

MTR3A2-K is an exclusive work in addressing the treatment in reading, writing and arithmetic in post-stroke persons with aphasia having concomitant acquired dyslexia. This manual works as a valuable clinical tool that can be used by speech language pathologists, student clinicians as well as care-givers in the rehabilitation of reading, writing and arithmetic deficits in persons with aphasia. It can be stated that the activities will be effective and handy for the professionals working in the area of aphasia management. As this manual is easy to administer, practitioners may use it while addressing the problems in reading writing skills in persons with aphasia either in isolation or along with other traditional methods for teaching these skills described in the previous literature. The manual, in all its aspects, follows a scientific approach and highlights the importance of evidence based practice.

REFERENCES

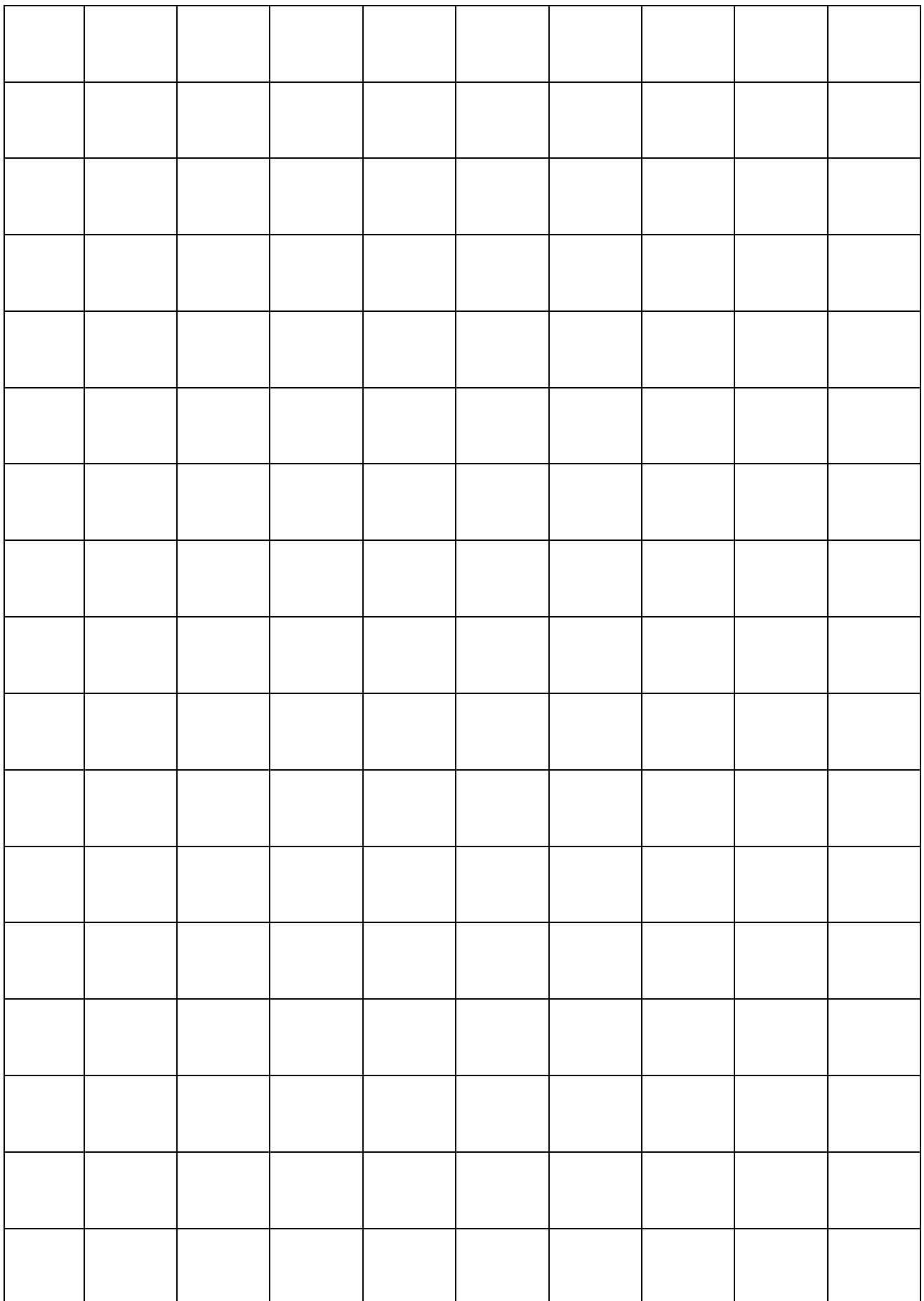
- Ball, A. L., de Reisthel, M., Breeding, V. E., & Mendoza, D. E. (2011). Modified ACT and CART in severe aphasia. *Aphasiology*, *25*(6-7), 836-848.
- Beeson, P. M. (1998). Treatment for letter-by-letter reading: A case study. In N. Helm Estabrooks & A. L. Holland (Eds.), *Approaches to the treatment of aphasia* (pp. 153–177). San Diego, CA: Singular.
- Beeson, P. M. (1999). Treating acquired writing impairment: Strengthening graphemic representations. *Aphasiology*, *13*, 367–386.
- Beeson, P. M., & Henry M. L. (2008). Comprehension and production of written words. In R. Chapey (Ed.), *Language intervention strategies in aphasia and related neurogenic communication disorders* (5th ed., pp. 654-688). Baltimore, MD: Lippincott Williams & Wilkins.
- Beeson, P., M., & Hillis, A. E. (2001). Comprehension and Production of Written Words. In R. Chapey (Ed.), *Language intervention strategies in adult aphasia* (pp. 572–59). Baltimore: Williams and Wilkin.
- Beeson, P. M., Hirsch, F. M., & Rewega, M. A. (2002). Successful word-writing treatment: Experimental analyses of four cases. *Aphasiology*, *16*, 473-491.
- Beeson, P. M., Rapcsak, S., Plante, E., Chargualaf, J., Chung, A., Johnson, S., & Trouard, T. (2003). The neural substrates of writing: A functional magnetic resonance imaging study. *Aphasiology*, *17*(6), 647–665.
- Beeson, P. M., Rewega, M., Vail, S., & Rapcsak, S. (2000). Problem solving approach to apraxia treatment: Interactive use of lexical and sublexical spelling routes. *Aphasiology*, *14*, 551-565.
- Behrmann, M. (1987). The rites of righting writing: Homophoneremediation in acquired dysgraphia. *Cognitive Neuropsychology*, *4*, 365-384.
- Benson, D. F. & Ardila (1996). *Aphasia: a clinical perspective*. New York: Oxford University Press, 1996.
- Bogousslavsky, J. (1988). Extrasylvian (Transcortical) Aphasic Syndromes. *Aphasia: a clinical perspective*. (pp. 142-165). New York: Oxford University Press, 1996.
- Bosso, A. (2003). *Aphasia and its therapy*. New York: Oxford University Press.
- Brookshire, R. (2003). *An introduction to neurogenic communication disorders* (6th ed.). St. Louis: Mosby Year Book.
- Bub, D. & Kertesz, A. 1982, Deep agraphia. *Brain and Language*, *17*, 146-165.
- Caramazza, A. (1997). Brain and Language. In M. S. Gazzaniga (Ed.), *Conversations in the Cognitive Neurosciences* (pp. 131–151). London: Bradford Books.
- Catts, H. W., & Kamhi, A. G. (2005). Language and reading: Convergences and divergences. In H. W. Catts & A. G. Kamhi (Eds.), *Language and reading disabilities* (pp. 1-25). Boston: Pearson.

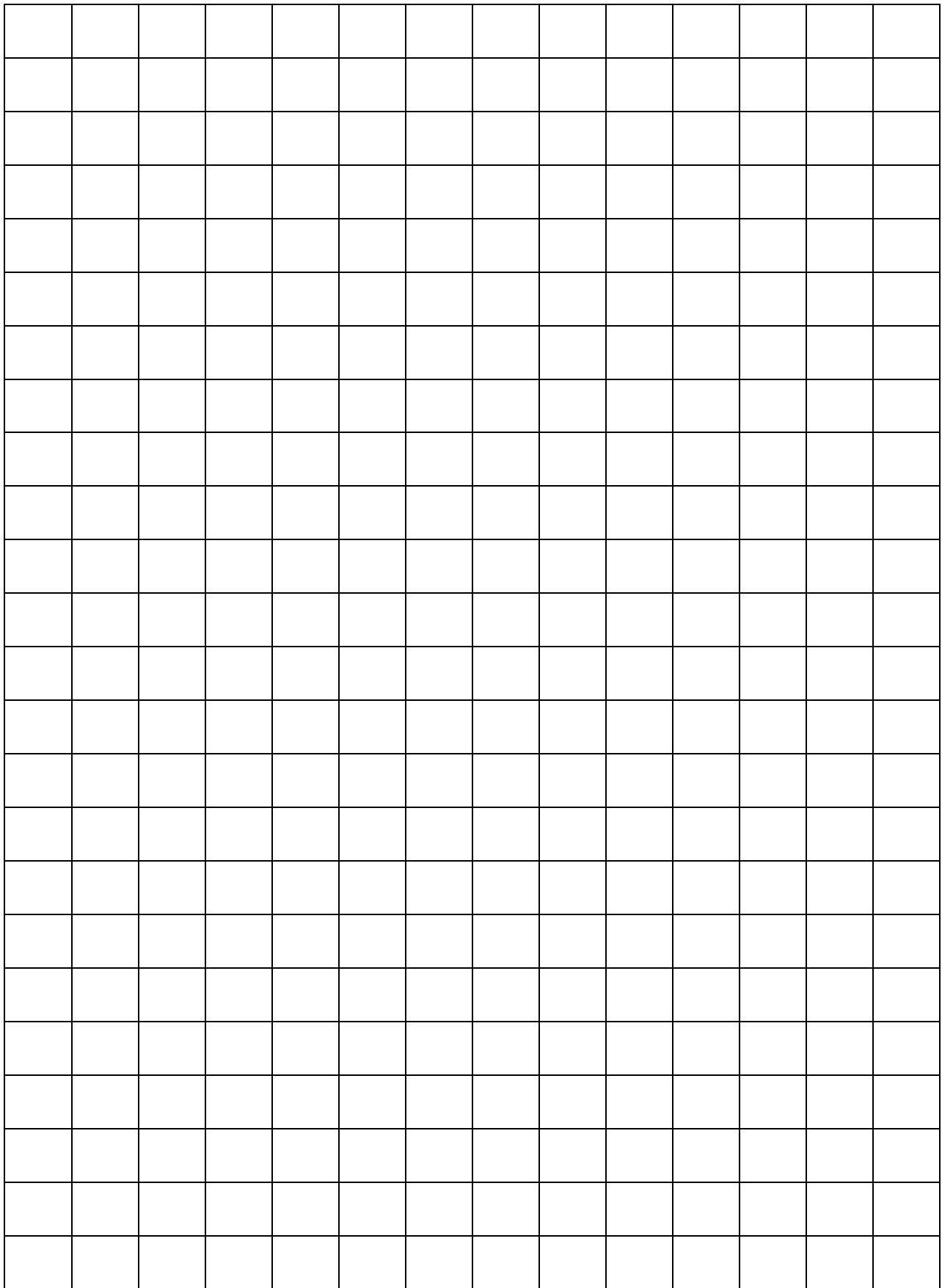
- Chaitra, S. & Goswami, S.P. (2010). *Manual for Adult Fluent Aphasia Therapy in Kannada (MAFAT-K). Articles based on Dissertation done at AIISH), Part-B Speech Language Pathology, Vol VII: 2008-2009, 62-66, All India Institute of Speech and Hearing, Mysore, India.*
- Chapey, R. (Ed.). (2001). *Language intervention strategies in adult aphasia and related neurogenic disorders.* (4thed.). Baltimore, MD: Lippincott Williams & Wilkins.
- Cherney, L., Merbitz, C. & Grip, J. (1986). Efficacy of oral reading in aphasia treatment outcome. *Rehabilitation Literature*, 112-119.
- Code, C. & Muller, D. (1995). *The treatment of aphasia: from theory to practice.* (pp. 187-222). Whurr Publishers Ltd. England.
- Coltheart, M. (2000). Deep Dyslexia is Right-Hemisphere Reading. *Brain and Language*, 71, 299–399.
- Coltheart, M., Patterson, K., & Marshall, J. C. (Eds.) (1980). *Deep dyslexia.* London: Routledge & Kegan Paul.
- Darley, F. L. & Aronson, A. E. & Brown, J. R. (1975). what is Aphasia. *Aphasia: a clinical perspective.* (pp. 1-9). New York: Oxford University Press, 1996.
- Davis, G. A. (2000). *Aphasiology –disorders and clinical practice.* (2nded.). Pearson Education.
- De Partz, M. P. (1986) Reeducation of a deep dyslexia patient: Rationale of the methods and results. *Cognitive Neuropsychology*. 3, 149-177.
- Deshpande, R., & Goswami, S.P (2008). *Manual for Adult Non-Fluent Aphasia Therapy in Hindi (MANAT-H). Articles based on Dissertation done at AIISH), Part-II Speech Language Pathology, Vol II: 2003-2004, 189-193, All India Institute of Speech and Hearing, Mysore, India.*
- Francis, D., Riddoch, M. J. & Humphreys, G. W. (2001). Cognitive Rehabilitation of Word Meaning Deafness. *Aphasiology* 15 (8): 749-766.
- Goodglass, H., & Kaplan, E (1983). *The assessment of aphasia and related disorders.* (2nded.). Philadelphia: Lea & Febiger.
- Goswami, S. P. & George, A. (2006). *ISHA monograph, Adult Aphasia: Language Intervention.* A Publication of the Indian Speech and Hearing Association.
- Goswami, S. P., Shanbal, Navitha, & Samasthitha. (2010). *Field Testing of Manual for Adult Non-fluent Aphasia Therapy in Kannada(MANAT-K).* Independent project at AIISH. University of Mysore, Mysore, India.
- Goswami, S. P., Shanbal, Chaitra & Ranjini, M. (2011). *Field Testing of Manual for Adult Fluent Aphasia Therapy in Kannada (MAFAT-K).* Independent project at AIISH. University of Mysore, Mysore, India.
- Hegde, M. N. (2006). *A course book on aphasia and other neurogenic language disorders.* (3rded.). Singular Publishing Company.

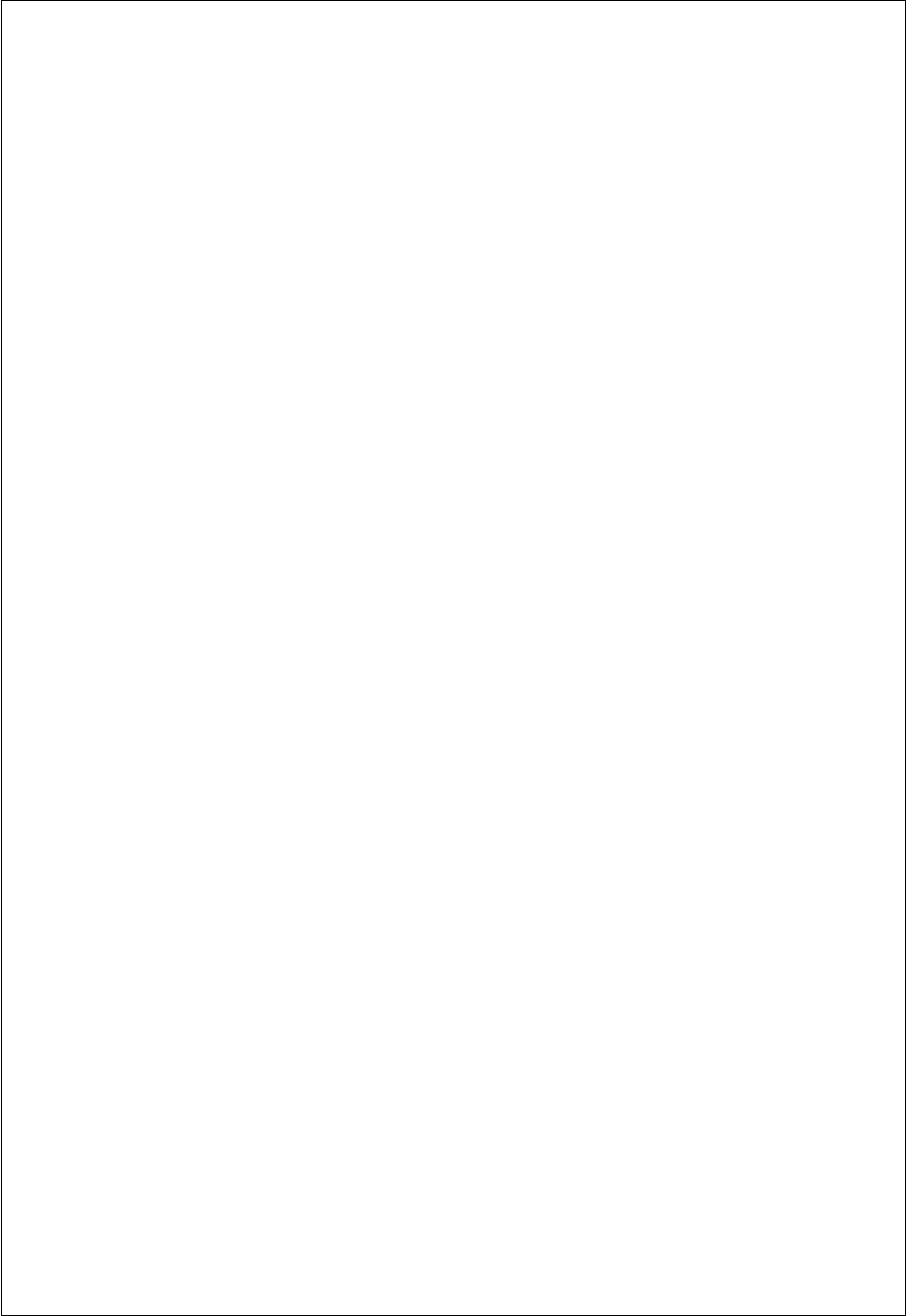
- Helm-Estabrooks, N., & Albert, M.L. (2004). *Manual of aphasia therapy*. Austin: Pro-Ed.
- Hillis, A. E. (1988). Alexia. *Aphasia: a clinical perspective*. (pp. 180-211). New York: Oxford University Press, 1996.
- Hillis, A. E., & Caramazza, A. (1992). The reading process and its disorders. In D. I. Margolin (Ed.). *Cognitive neuropsychology in clinical practice* (pp.229-261). New York: Oxford University Press.
- Hillis, A. E., & Caramazza, A. (1994). Theories of lexical processing and rehabilitation of lexical deficits. In M. J. Riddoch & G. W. Humphreys (Eds.), *Cognitive neuropsychology and cognitive rehabilitation*. Hillsdale, NJ: Lawrence Erlbaum.
- Howe, T., Worrall, L., & Hickson, L. (2004). What is an aphasia-friendly environment? A review. *Aphasiology*, 18 (11), 1015-1037.
- Kamhi, A, & Catts H (1986) *Toward an understanding of development language and reading disorders*. *Journal of Speech and Hearing Disorders*, 51. 337-347.
- Karant, P. (2003). *Cross-linguistic study of acquired reading disorders: Implications for Reading Models. Disorders, Acquisition and Teaching*. New York. Plenum Publishers.
- Kearns, K. (1990). Broca's Aphasia. In L.L.LaPointe (Ed). *Aphasia and related Neurogenic Language Disorders*. New York: Theime Medical Publishers.
- Kiran, S. & Thompson, C, K. & Hashimoto, N. (2001). Training Grapheme to Phoneme conversion in patients with oral reading and naming deficits: A model based approach. *Aphasiology*. 15. 855-876.
- Kruthi, H. R., & Goswami, S. P. (2011). *Manual for Treatment of Reading, Writing and Arithmetic for persons with Adult Aphasia in Kannada (MTR3A2-K)*. Unpublished Master's Dissertation. University of Mysore, Mysore, India.
- LaPointe, L. L. (1990). *Aphasia and Related Neurogenic Language Disorders*. New York: Theime Publishers, Inc.
- Levine, D. N., Calvanio, R., & Popovics, A. (1982). Language in the absence of inner speech. *Neuropsychologia*, 20(4), 391-409.
- Luzzatti, C., Colombo, C., Frustaci, M., & Vitolo, F. (2000). Rehabilitation of spelling along the sub-word-level routine. *Neuropsychological Rehabilitation*, 10, 249-278.
- Lyon, J. (1992). Communication use and participation in life for adults with aphasia in natural settings: The scope of the problem. *American Journal of Speech-Language Pathology*, 1, 7-14.
- Maher, L. M., Clayton, M. C., Barrett, A, M., Schober-peterson, D., & Rothi, L. J. (1998). Rehabilitation of a case of pure alexia: Exploiting residual abilities. *Journal of the International Neuropsychological Society*, 4(6), 636-647.
- Moyer, S. B. (1979). Rehabilitation of alexia: A case study. *Cortex*, 15, 139-144.

- Murdoch, B. E. (1990). *Acquired speech and language disorders: a neuroanatomical and functional neurological approach*. Chapman and Hall
- Orjada, S. A., & Beeson, P. M. (2005). Concurrent treatment for reading and spelling in aphasia. *Aphasiology*, *19*, 341-351.
- Patterson, K. E. (1982). The relation between reading and phonological coding: Further neuropsychological observations. In: A.W. Ellis (Ed.), *Normality and pathology in cognitive functions* (pp. 77–111). San Diego, CA: Academic Press.
- Porrizzo, A., S. (1975). Evaluation and treatment of reading deficits in aphasic patients. Paper presentation at the fifth conference on clinical aphasiology, April 30th-May 2nd, 1975: Santa fe, New Mexico.
- Rapcsak, S. Z., & Beeson, P. M. (2002). Neuroanatomical Correlates of Spelling and Writing. In A. E. Hillis (Ed.), *The Handbook of Adult Language Disorders. Integrating Cognitive Neuropsychology, Neurology and Rehabilitation* (pp. 71–99). New York, N.Y.: Psychology Press.
- Robson, J, Pring, T, Marshall, J, Morrison, S & Chiat, S (1998). Written Communication in Undifferentiated Jargon Aphasia: A Therapy Study. *International Journal of Language and Communication Disorders*, *33*, 305-328.
- Semenza, C., Delazer, M., Bertella, L., Grana, A., Mori, I., Conti, F. M., Pignatti, R., Bartha, L., Domahs, F., Benke, T., & Mauro, A. (2006). Is math lateralised on the same side as language? Right hemisphere aphasia and mathematical abilities. *Neuroscience letters*, *406* (3), 285-288.
- Shallice, T. 1981b. Phonological agraphia and the lexical route in writing. *Brain*, *104*, 413-429.
- Shallice, T., Warrington, E. K., & McCarthy, R. (1983). Reading without semantics. *Quarterly Journal of Experimental Psychology A, Human Experimental Psychology*, *35*, 111-138.
- Venugopal, M.B., & Goswami, S.P (2008). *Manual for Adult Non-Fluent Aphasia Therapy in Kannada (MANAT-K). Articles based on Dissertation done at AIISH, Part-B Speech Language Pathology, Vol III: 2004-2005, 181-190, All India Institute of Speech and Hearing, Mysore, India.*
- Warrington, E. K., & Shallice, T. (1980). Word-form dyslexia. *Brain*, *103*, 99-112.
- Webb, W. G., & Love, R. J. (1983). Reading problems in chronic aphasia. *Journal of Speech and Hearing Disorders*, *48*, 164-171.
- Whitworth, A., Webster, J., & Howard, D. (2005). *A cognitive neuropsychological approach to assessment and treatment of aphasia. A clinician's guide*. East Sussex: Psychology Press.
- www.merriam-webster.com/dictionary/writing. Retrieved on April 16, 2013.
- www.merriam-webster.com/dictionary/arithmetric. Retrieved on April 16, 2013.

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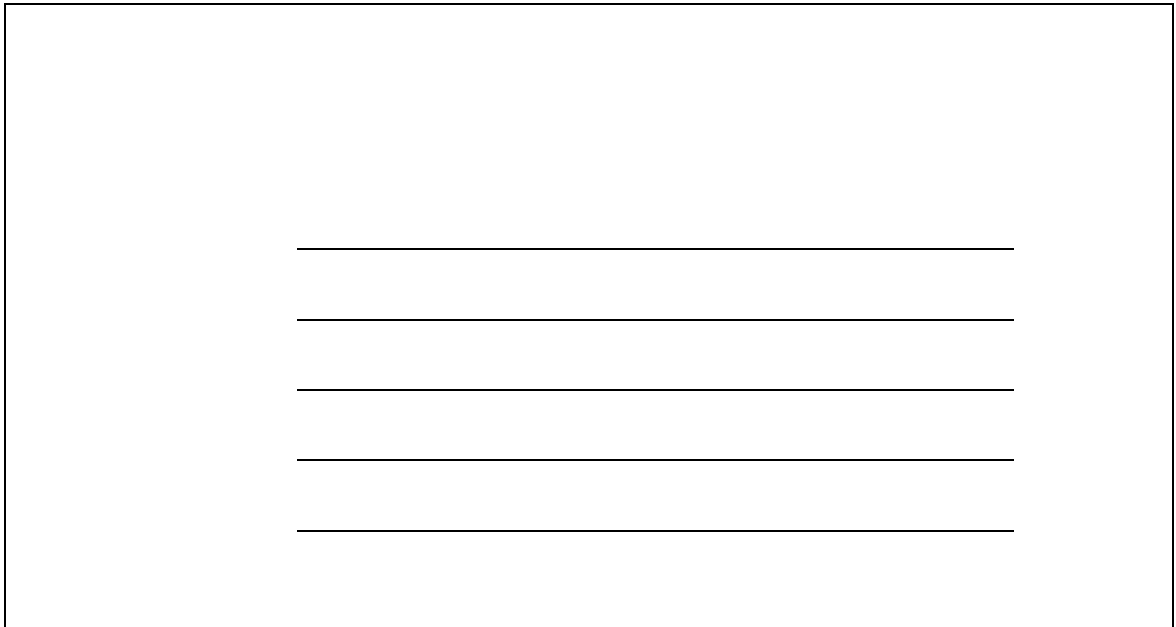




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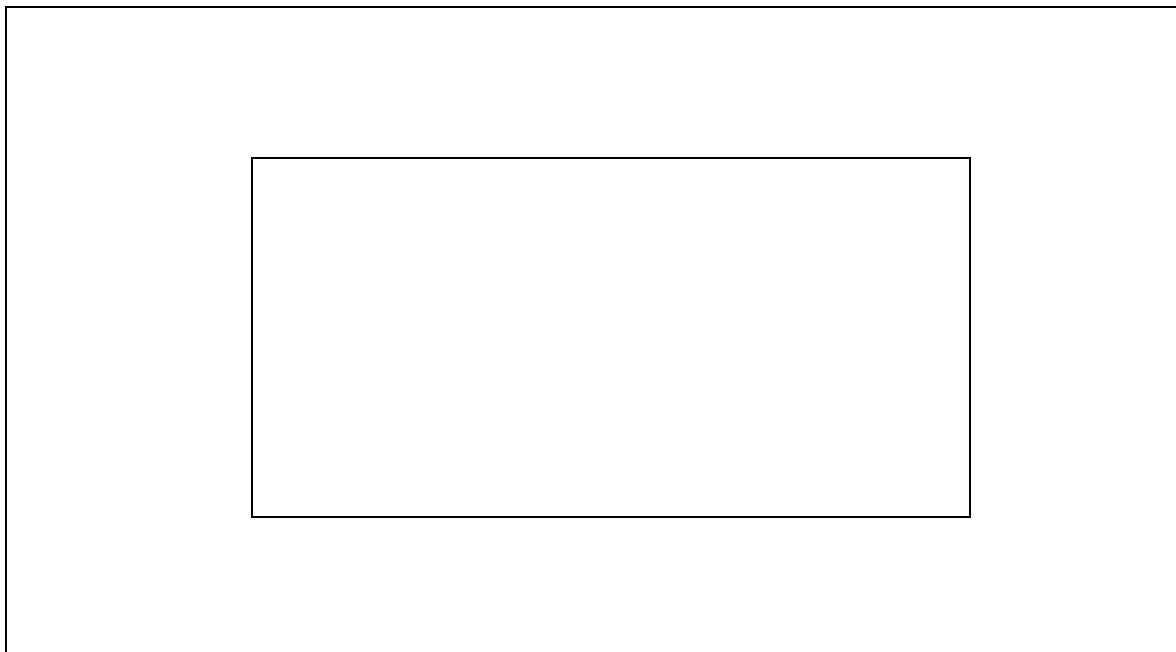
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----- Branch		Withdrawal Slip	
A/C No. _____		____/____/20__	
Pay Self Rupees _____		Rs. _____	
_____		A/c. Holder Sign _____	
		Name _____	

Bank of Baroda		SAVINGS BANK	
----- Branch		Withdrawal Slip	
A/C No. _____		____/____/20__	
Pay Self Rupees _____		Rs. _____	
_____		A/c. Holder Sign _____	
		Name _____	

Level 2

BANK OF BARODA				COMMON DEPOSIT SLIP FOR SB/CD/RD/CC/OD/TL/DL			
Deposited in Branch..... My Account with.....Branch				Date:			
FULL NAME.....				Type of Account.....			
Account No. _____							
CHEQUE DEPOSIT				CASH DEPOSIT			
Bank's name & Branch	Cheque no. & Date	Rs.	Ps.	Denomination	Pieces	Rs.	Ps.
				1000×			
				500×			
				100×			
				50×			
				10×			
				5×			
				Coins			
TOTAL				TOTAL			
Total amount (in words) Rupees.....							
Telephone/Mobile No.:.....				Signature of Depositor			
				Transaction Number (For Office Use)			

WORK BOOKLET

TREATMENT RECORDING SHEET

Activity	Stimulus number	Stimulus mode	Response mode	Target response	No. of trials										% correct response	Total percentage
					1	2	3	4	5	6	7	8	9	10		

Note: A= Auditory mode, V= Visual mode, G=Graphic Scoring= Total score/No. Of trials used 100

An exemplar depicting the use of treatment recording sheet with cueing hierarchy

Name of the person with aphasia: XX

Age/Gender:

Case no:

Date:

Provisional diagnosis:

Clinician:

Session No: 1

Activity	Stimulus number	Stimulus mode	Response mode	Target response	No. of trials										% correct response	Total percentage	
					1	2	3	4	5	6	7	8	9	10			
Reading LI (Following commands)	1	A+G	Gestural		2											100%	79.98%
	2	A+G	Gestural		2											100%	
	3	A+G	Gestural		1	1	2									66.6%	
	4	A+G	Gestural		0	1	1	2								50%	
	5	A+G	Gestural		1	2	2									83.3%	
Reading LII (Beginning sound)	1	A+G	Verbal		2											100%	90%
	2	A+G	Verbal		2											100%	
	3	A+G	Verbal		2											100%	
	4	A+G	Verbal		1	2										75%	
	5	A+G	Verbal		1	2										75%	
AirthmeticLI (Recognition of numbers)	1	A+G	Verbal		2											100%	88.32
	2	A+G	Verbal		1	1	2									66.6%	
	3	A+G	Verbal		1	2										75%	
	4	A+G	Verbal		2											100%	
	5	A+G	Verbal		2											100%	

If cueing hierarchy is not used mention the technique used separately. A= Auditory mode, V=Visual mode, G=Grapheme mode

Treatment recording sheet for strengthening activities

Activity	Stimulus number	Response	Trial 1				Trial 2				Total score	Total Percentage
			Strength	Smoothness/Rhythm	Completeness	Quickness	Strength	Smoothness/Rhythm	Completeness	Quickness		

Score: '0' - inadequate, '1' - partially adequate, '2' -adequate under all 4 parameters of each trial.

An exemplar depicting the use of treatment recording sheet for strengthening activities

Activity	Stimulus number	Response	Trial 1				Trial 2				Total score	Total Percentage
			Strength	Smoothness/ Rhythm	Completeness	Quickness	Strength	Smoothness/ Rhythm	Completeness	Quickness		
Hand strengthening	1	Sponge	1	1	1	1	1	2	1	1	56.25%	35%
	2	Soft ball	1	1	1	1	1	2	1	1	56.25%	
	3	Punching	0	0	1	0	0	1	1	0	18.75%	
	4	Stapling	0	0	1	0	0	1	1	0	18.75%	
	5	Therapy putty	0	1	1	0	0	1	1	0	25%	
Finger strengthening	1	Beads P	1	2	2	1	1	2	2	1	75%	46.25%
	2	Paper ball	1	2	2	1	1	2	2	1	75%	
	3	Bead threading	1	1	1	0	1	1	1	0	37.5%	
	4	Cloth pins	0	0	0	0	0	1	0	0	6.25%	
	5	Peg stand	1	1	1	0	1	1	1	0	37.5%	
Pencil grasp	1	Level1	1	1	1	1	1	2	1	1	56.25%	18.75%
	2	Level2	1	1	0	0	1	1	1	0	31.25%	
	3	Level3	0	0	0	0	0	0	1	0	6.25%	
	4	Level4	0	0	0	0	0	0	0	0	0%	
	5	Level5	0	0	0	0	0	0	0	0	0%	

Score: '0' - inadequate, '1' - partially adequate, '2' -adequate under all 4 parameters of each trial.

Treatment recording sheet for pre-writing (writing readiness) skills, functional writing and writing activities

Activity	Stimulus number	Response	Trial 1			Trial 2			Total score	Total Percentage
			Smoothness (Rhythm) / Legibility	Completeness/ Alignment	Quickness/ Spacing	Smoothness (Rhythm) / Legibility	Completeness/ Alignment	Quickness/ Spacing		

Score: '0' - inadequate, '1' - partially adequate, '2' -adequate under all 3 parameters of each trial in pre-writing (writing readiness) activities.
 Score: '0' - inappropriate, '1' - partially appropriate, '2'-appropriate under all 3 parameters of each trial in functional writing and writing activity.

An exemplar depicting the use of treatment recording sheet for pre-writing (writing readiness) skills, functional writing and writing activities

Activity	Stimulus number	Response	Trial 1			Trial 2			Total score	Total Percentage
			Smoothness (Rhythm) / Legibility	Completeness/ Alignment	Quickness/ Spacing	Smoothness (Rhythm) / Legibility	Completeness/ Alignment	Quickness/ Spacing		
Tracing	1	Level 2	1	1	1	1	1	1	37.5%	51.75%
	2	Level 2	1	1	2	1	1	2	40%	
	3	Level 2	1	1	2	1	2	2	56.25%	
	4	Level 2	1	2	2	1	2	2	62.5%	
	5	Level 2	1	2	2	1	2	2	62.5%	
Functional writing	1	Level 1	2	2	1	2	2	1	62.5%	37.15%
	2	Level 1	1	2	1	1	2	1	40%	
	3	Level 1	1	2	1	1	2	1	40%	
	4	Level 1	1	1	0	1	1	0	25%	
	5	Level 1	0	1	0	1	1	0	18.75%	
Dictation –letters	1	Level 1	1	1	1	1	1	1	37.5%	39%
	2	Level 1	1	1	2	1	1	2	40%	
	3	Level 1	1	1	2	1	1	2	40%	
	4	Level 2	1	2	1	1	2	1	40%	
	5	Level 2	1	1	1	1	1	1	37.5%	

Score: ‘0’- inadequate, ‘1’- partially adequate, ‘2’-adequate under all 3 parameters of each trial in pre-writing (writing readiness) activities.

Score: ‘0’- inappropriate, ‘1’- partially appropriate, ‘2’-appropriate under all 3 parameters of each trial in functional writing and writing activity.

An exemplar depicting the use of overall treatment recording sheet

Sl. no	Sections	Overall score
1.	<p style="text-align: center;"><u>READING</u></p> <p>Reading level I</p> <p><u>Orientation to reading material</u></p> <ul style="list-style-type: none"> • Eye gaze on printed word <ul style="list-style-type: none"> Level 1 100% Level 2 100% • Left to right progression <ul style="list-style-type: none"> Level 1 100% Level 2 100% • Touch the word <ul style="list-style-type: none"> Level 1 100% Level 2 100% • Paragraph glancing <ul style="list-style-type: none"> Level 1 100% Level 2 100% <p><u>Following commands</u></p> <ul style="list-style-type: none"> Level 1 100% Level 2 100% <p><u>Recognition of signs/logos</u></p> <ul style="list-style-type: none"> • Action verbs <ul style="list-style-type: none"> Level 1 100% Level 2 100% Level 3 100% • Daily logos <ul style="list-style-type: none"> Level 1 100% Level 2 100% Level 3 100% <p><u>Recognition of alphabets</u></p> <ul style="list-style-type: none"> • Letter matching <ul style="list-style-type: none"> I. Grapheme to grapheme match <ul style="list-style-type: none"> Level 1 100% Level 2 100% II. Grapheme to sound match <ul style="list-style-type: none"> Level 1 100% Level 2 100% 	

	<ul style="list-style-type: none"> • Letter identification <ul style="list-style-type: none"> Level 1 Level 2 • Letter puzzle <ul style="list-style-type: none"> Level 1 Level 2 	100% 100% 100% 100%
	Reading level II	
	<u>Monosyllables</u>	
	<ul style="list-style-type: none"> • Find the beginning sound <ul style="list-style-type: none"> Level 1 Level 2 • Find the ending sound <ul style="list-style-type: none"> Level 1 Level 2 • Rhyming words <ul style="list-style-type: none"> Level 1 Level 2 • Find the syllable in given word <ul style="list-style-type: none"> Level 1 Level 2 	100% 100% 100% 100% 100% 100%
	<u>Words</u>	
	<ul style="list-style-type: none"> • Word identification <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Word completion <ul style="list-style-type: none"> Level 1 Level 2 • Jumble/rearrange <ul style="list-style-type: none"> Level 1 Level 2 • Plurals <ul style="list-style-type: none"> Level 1 Level 2 • Tenses <ul style="list-style-type: none"> Level 1 	100% 100% 100% 100% 100% 100% 100% 100% 100%

	<p style="text-align: center;">Level 2</p> <ul style="list-style-type: none"> • Synonyms <ul style="list-style-type: none"> Level 1 Level 2 • Antonyms <ul style="list-style-type: none"> Level 1 Level 2 <p>Reading level III</p> <p><u>Sentence level</u></p> <ul style="list-style-type: none"> • Sentence completion <ul style="list-style-type: none"> Level 1 Level 2 • Sentence verification <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Sentence sequencing <ul style="list-style-type: none"> Level 1 Level 2 • Topographic/geographic orientation <p><u>Discourse level Reading comprehension</u></p> <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Level 4 	<p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p>
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Sl. no	Sections	Overall score
2.	<p style="text-align: center;"><u>WRITING</u></p> <p>Writing level I</p> <p><u>Strengthening activities</u></p> <ul style="list-style-type: none"> • Hand strengthening activities <ul style="list-style-type: none"> Task 1 	100%

	Task 2	100%
	Task 3	100%
	• Finger strengthening activities	
	Task 1	100%
	Task 2	100%
	Task 3	100%
	• Wrist stability activities	
	Task 1	100%
	Task 2	100%
	Task 3	100%
	• Finger-dexterity activities	
	Task 1	100%
	Task 2	100%
	Task 3	100%
	• Teach the pencil grasp	
	Level 1	100%
	Level 2	100%
	Level 3	100%
	<u>Functional writing skills</u>	
	• Writing/Signing his/ her name	
	Level 1	100%
	Level 2	100%
	Level 3	100%
	Level 4	100%
	Level 5	100%
	Level 6	100%
	Level 7	100%
	Level 8	100%
	• Writing name & address on postal card	
	Level 1	100%
	Level 2	100%
	• Filling bank forms	
	Level 1	100%
	Level 2	100%
	<u>Writing readiness tasks</u>	
	• Tracing	
	Level 1	100%
	Level 2	100%

	<ul style="list-style-type: none"> • Joining the dots <ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	<ul style="list-style-type: none"> • copying lines <ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	<ul style="list-style-type: none"> • Copying letters <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	<p>100%</p> <p>100%</p> <p>100%</p>
	<ul style="list-style-type: none"> • Copying syllables <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	<p>100%</p> <p>100%</p> <p>100%</p>
	<ul style="list-style-type: none"> • Copying words <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	<p>100%</p> <p>100%</p> <p>100%</p>
	Writing level II	
	<u>Dictation</u>	
	<ul style="list-style-type: none"> • Letters <ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	<ul style="list-style-type: none"> • Syllables <ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	<ul style="list-style-type: none"> • Words <ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	Word completion	
	<ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	Word verification	
	<ul style="list-style-type: none"> Level 1 Level 2 	<p>100%</p> <p>100%</p>
	Word fluency	
	<ul style="list-style-type: none"> • Lexical fluency task <ul style="list-style-type: none"> Level 1 	

	Level 2	100%
		100%
	• Phonemic fluency task	
	Level 1	
	Level 2	100%
		100%
	Writing level III	
	<u>Sentence level</u>	
	• Sentence copying	
	Level 1	
	Level 2	100%
		100%
	• Sentence completion	
	Level 1	
	Level 2	100%
		100%
	• Sentence verification	
	Level 1	
	Level 2	100%
		100%
	• Sentence sequencing	
	Level 1	
	Level 2	100%
		100%
	• Sentence construction	
	Level 1	
	Level 2	100%
		100%
	<u>Higher writing skills</u>	
	• Punctuation	
	Level 1	
	Level 2	100%
		100%
	• Question construction	
	Level 1	
	Level 2	100%
		100%
	• Picture description	
	Level 1	
	Level 2	100%
		100%
	• Narration/creative writing	
	Level 1	
	Level 2	100%
		100%

Sl. no	Sections	Overall score
3.	<p style="text-align: center;"><u>ARITHMATIC</u></p> <p>Arithmetic level I (Functional calculation)</p> <ul style="list-style-type: none"> • Identification of numbers <ul style="list-style-type: none"> Task (a) <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Task (b) <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Task (c) <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Geometric shapes <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Identification of mathematical signs <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p>Mathematical concepts</p> <ul style="list-style-type: none"> • Concept of zero and counting <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Concept of time <ul style="list-style-type: none"> (a)Forenoon/Afternoon <ul style="list-style-type: none"> Level 1 Level 2 (b)Clock times <ul style="list-style-type: none"> Level 1 Level 2 • Concept of currency of different denomination <ul style="list-style-type: none"> Level 1 	<p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p> <p style="text-align: center;">100%</p>

	Level 2	100%
	<ul style="list-style-type: none"> • Concept of measurement <ul style="list-style-type: none"> Level 1 Level 2 	 100% 100%
	Arithmetic level II (Advanced calculations)	
	<u>Addition</u>	
	<ul style="list-style-type: none"> • Single digit addition <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<ul style="list-style-type: none"> • Double digit addition <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<ul style="list-style-type: none"> • Multiple digit addition <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<u>Subtraction</u>	
	<ul style="list-style-type: none"> • Single digit Subtraction <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<ul style="list-style-type: none"> • Double digit Subtraction <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<ul style="list-style-type: none"> • Multiple digit Subtraction <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<u>Multiplication</u>	
	<ul style="list-style-type: none"> • Single digit Multiplication <ul style="list-style-type: none"> Level 1 Level 2 Level 3 	 100% 100% 100%
	<ul style="list-style-type: none"> • Double digit Multiplication <ul style="list-style-type: none"> Level 1 	 100%

	Level 2	100%
	Level 3	100%
	<ul style="list-style-type: none"> • Multiple digit Multiplication 	
	Level 1	100%
	Level 2	100%
	Level 3	100%
	<u>Division</u>	
	<ul style="list-style-type: none"> • Single digit division 	
	Level 1	100%
	Level 2	100%
	Level 3	100%
	<ul style="list-style-type: none"> • Double digit division 	
	Level 1	100%
	Level 2	100%
	Level 3	100%
	<ul style="list-style-type: none"> • Multiple digit division 	
	Level 1	100%
	Level 2	100%
	Level 3	100%
	Arithmetic level III	
	<u>Transferring skills</u>	
		100%

Overall treatment recording sheet

Sl. no	Sections	Overall score
1.	<p style="text-align: center;"><u>READING</u></p> <p>Reading level I</p> <p><u>Orientation to reading material</u></p> <ul style="list-style-type: none"> • Eye gaze on printed word <ul style="list-style-type: none"> Level 1 Level 2 • Left to right progression <ul style="list-style-type: none"> Level 1 Level 2 • Touch the word <ul style="list-style-type: none"> Level 1 Level 2 • Paragraph glancing <ul style="list-style-type: none"> Level 1 Level 2 <p><u>Following commands</u></p> <ul style="list-style-type: none"> Level 1 Level 2 <p><u>Recognition of signs/logos</u></p> <ul style="list-style-type: none"> • Action verbs <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Daily logos <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p><u>Recognition of alphabets</u></p> <ul style="list-style-type: none"> • Letter matching III. Grapheme to grapheme match <ul style="list-style-type: none"> Level 1 Level 2 IV. Grapheme to sound match <ul style="list-style-type: none"> Level 1 Level 2 	

	<ul style="list-style-type: none"> • Letter identification <ul style="list-style-type: none"> Level 1 Level 2 • Letter puzzle <ul style="list-style-type: none"> Level 1 Level 2 Reading level II <u>Monosyllables</u> <ul style="list-style-type: none"> • Find the beginning sound <ul style="list-style-type: none"> Level 1 Level 2 • Find the ending sound <ul style="list-style-type: none"> Level 1 Level 2 • Rhyming words <ul style="list-style-type: none"> Level 1 Level 2 • Find the syllable in given word <ul style="list-style-type: none"> Level 1 Level 2 <u>Words</u> <ul style="list-style-type: none"> • Word identification <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Word completion <ul style="list-style-type: none"> Level 1 Level 2 • Jumble/rearrange <ul style="list-style-type: none"> Level 1 Level 2 • Plurals <ul style="list-style-type: none"> Level 1 Level 2 • Tenses <ul style="list-style-type: none"> Level 1 	
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	<p style="text-align: center;">Level 2</p> <ul style="list-style-type: none"> • Synonyms <ul style="list-style-type: none"> Level 1 Level 2 • Antonyms <ul style="list-style-type: none"> Level 1 Level 2 <p>Reading level III</p> <p><u>Sentence level</u></p> <ul style="list-style-type: none"> • Sentence completion <ul style="list-style-type: none"> Level 1 Level 2 • Sentence verification <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Sentence sequencing <ul style="list-style-type: none"> Level 1 Level 2 • Topographic/geographic orientation <p><u>Discourse level Reading comprehension</u></p> <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Level 4 	
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Sl. no	Sections	Overall score
2.	<p style="text-align: center;"><u>WRITING</u></p> <p>Writing level I</p> <p><u>Strengthening activities</u></p> <ul style="list-style-type: none"> • Hand strengthening activities <ul style="list-style-type: none"> Task 1 Task 2 Task 3 	

	<ul style="list-style-type: none"> • Finger strengthening activities <ul style="list-style-type: none"> Task 1 Task 2 Task 3 • Wrist stability activities <ul style="list-style-type: none"> Task 1 Task 2 Task 3 • Finger-dexterity activities <ul style="list-style-type: none"> Task 1 Task 2 Task 3 • Teach the pencil grasp <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p><u>Functional writing skills</u></p> <ul style="list-style-type: none"> • Writing/Signing his/ her name <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Level 4 Level 5 Level 6 Level 7 Level 8 • Writing name & address on postal card <ul style="list-style-type: none"> Level 1 Level 2 • Filling bank forms <ul style="list-style-type: none"> Level 1 Level 2 <p><u>Writing readiness tasks</u></p> <ul style="list-style-type: none"> • Tracing <ul style="list-style-type: none"> Level 1 Level 2 • Joining the dots 	
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	<p>Level 1 Level 2</p> <ul style="list-style-type: none"> • copying lines <ul style="list-style-type: none"> Level 1 Level 2 • Copying letters <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Copying syllables <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Copying words <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p>Writing level II</p> <p><u>Dictation</u></p> <ul style="list-style-type: none"> • Letters <ul style="list-style-type: none"> Level 1 Level 2 • Syllables <ul style="list-style-type: none"> Level 1 Level 2 • Words <ul style="list-style-type: none"> Level 1 Level 2 <p>Word completion</p> <ul style="list-style-type: none"> Level 1 Level 2 <p>Word verification</p> <ul style="list-style-type: none"> Level 1 Level 2 <p>Word fluency</p> <ul style="list-style-type: none"> • Lexical fluency task <ul style="list-style-type: none"> Level 1 Level 2 	
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	<ul style="list-style-type: none"> • Phonemic fluency task Level 1 Level 2 <p>Writing level III</p> <p><u>Sentence level</u></p> <ul style="list-style-type: none"> • Sentence copying Level 1 Level 2 • Sentence completion Level 1 Level 2 • Sentence verification Level 1 Level 2 • Sentence sequencing Level 1 Level 2 • Sentence construction Level 1 Level 2 <p><u>Higher writing skills</u></p> <ul style="list-style-type: none"> • Punctuation Level 1 Level 2 • Question construction Level 1 Level 2 • Picture description Level 1 Level 2 • Narration/creative writing Level 1 Level 2 	
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Sl. no	Sections	Overall score
3.	<p style="text-align: center;"><u>ARITHMATIC</u></p> <p>Arithmetic level I (Functional calculation)</p> <ul style="list-style-type: none"> • Identification of numbers <ul style="list-style-type: none"> Task (a) <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Task (b) <ul style="list-style-type: none"> Level 1 Level 2 Level 3 Task (c) <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Geometric shapes <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Identification of mathematical signs <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p>Mathematical concepts</p> <ul style="list-style-type: none"> • Concept of zero and counting <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Concept of time <ul style="list-style-type: none"> (a)Forenoon/Afternoon <ul style="list-style-type: none"> Level 1 Level 2 (b)Clock times <ul style="list-style-type: none"> Level 1 Level 2 • Concept of currency of different denomination <ul style="list-style-type: none"> Level 1 	

	<p style="text-align: center;">Level 2</p> <ul style="list-style-type: none"> • Concept of measurement <ul style="list-style-type: none"> Level 1 Level 2 <p>Arithmetic level II (Advanced calculations)</p> <p><u>Addition</u></p> <ul style="list-style-type: none"> • Single digit addition <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Double digit addition <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Multiple digit addition <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p><u>Subtraction</u></p> <ul style="list-style-type: none"> • Single digit Subtraction <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Double digit Subtraction <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Multiple digit Subtraction <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p><u>Multiplication</u></p> <ul style="list-style-type: none"> • Single digit Multiplication <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Double digit Multiplication <ul style="list-style-type: none"> Level 1 	
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	<p style="text-align: center;">Level 2 Level 3</p> <ul style="list-style-type: none"> • Multiple digit Multiplication <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p><u>Division</u></p> <ul style="list-style-type: none"> • Single digit division <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Double digit division <ul style="list-style-type: none"> Level 1 Level 2 Level 3 • Multiple digit division <ul style="list-style-type: none"> Level 1 Level 2 Level 3 <p>Arithmetic level III</p> <p><u>Transferring skills</u></p>	
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An exemplar depicting the use of grand score sheet

DOMAIN		1 st session (in percentage)	7 th session (in percentage)	15 th session (in percentage)
READING	LEVEL 1	50	75	100
	LEVEL 2	20	40	55
	LEVEL 3	0	15	20
	TOTAL	70	130	175
WRITING	LEVEL 1	30	60	74
	LEVEL 2	14	-	-
	LEVEL 3	0	-	-
	TOTAL			
ARITHMETIC	LEVEL 1	30	50	75
	LEVEL 2	0	-	-
	LEVEL 3	0	-	-
	TOTAL	30	50	75
GRAND TOTAL OF ALL THE THREE DOMAIN		144	240	324

GRAND SCORE SHEET

DOMAIN		1 st session (in percentage)	7 th session (in percentage)	15 th session (in percentage)
READING	LEVEL 1			
	LEVEL 2			
	LEVEL 3			
	TOTAL			
WRITING	LEVEL 1			
	LEVEL 2			
	LEVEL 3			
	TOTAL			
ARITHMETIC	LEVEL 1			
	LEVEL 2			
	LEVEL 3			
	TOTAL			
GRAND TOTAL OF ALL THE THREE DOMAIN				