LINGUISTIC PROFILES OF APHASIA SUBTYPES

Suchitra (N)
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Dedicated to

Amma Anna,

Bava Madhu,

Ramesh

&

Divya

CERTIFICATE:

This is to certify that this Dissertation entitled :

LINGUISTIC PROFILES OF APHASIA SUBTYPES",

is the bonefide work in part fulfillment for the Final Year M.Sc. (Speech and Hearing), of the Student with Reg. No. M. 9122.

MYSORE
MAY, 1993.

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This is to certify that this Dissertation entitled :

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has been prepared under my
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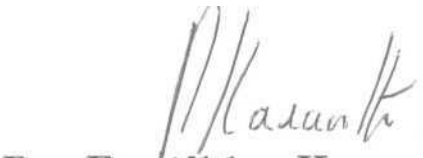

Dr. Pratibha Karanth,
Guide.

MYSORE
MAY, 1993.

DECLARATION

I hereby declare that this Dissertation entitled,

"LINGUISTIC PROFILES OF APHASIA SUBTYPES",

is the result of my own study under the guidance of Dr. Pratibha Karanth, Professor and HOD of Speech Pathology, All India Institute of Speech and Hearing, Mysore, has not been submitted earlier at any University for any other Diploma or Degree.

MYSORE **Reg. No. M 9122.**
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CONTENTS

INTRODUCTION

Language is every where. It permeates our thoughts, mediates our relations with others, and even creeps into our dreams. Most human knowledge and culture is stored and transmitted in language, which is so ubiquitous.

Language in its most common pervasive representative and central manifestation involves, aural-oral or non-oral communication. It thus consists of symbols of communication, arbitrary in their association to particular meanings and units are arbitrary in their particular shape for a particular language.

Language is an instrument of communication among the members of a speech community who are also members of the same culture and, is best suited to convey the meaning, current in that particular culture. Cultural meanings are roughly uniform for the members of the community and are thus readily conveyed and understood. Beyond these cultural meanings are also individual meanings not readily communicated through language. Individual meanings require explanations, metaphors, analogies and other indirect approaches if they are to be communicated through language. But some meanings and features of meaning become so frequent in their use in language or so attached to language, distinctions, that they can be divided in terms of a language without recourse to cultural references. Thus

linguistic meanings are independent of other connotations of language.

In general, linguistics may be defined as the description of language of the earth, and about the ways in which human beings use their languages to, communicate with each other (Elgin, 79). The application of linguistics has been varied and extensive. One such application is neurolinguistics.

Neurolinguistics consists of the study of language-brain relationships. It is a clinically related field of observation and theory construction, as of now.

Linguistic aphasiology is a recent natural outgrowth of neurolinguistics. The study of language brain relationships has utilised the techniques of establishing 'clinical pathological' correlation as database for theory construction. The study of linguistic aphasiology is of interest as a branch of abnormal human cognitive psychology which is worth understanding in detail for the practical purpose of rehabilitation. This will help in seeking the aspects of language code and its processing that might be disturbed after brain injury. This would be to account for the patterns of language in terms of what is lost.

Thus, the study of how brain damage can disrupt the use and system of language in adults has a four fold fascination.

1) It offers unique opportunities to find out more about the anatomo - physiological organisation of the human brain.
2) It gives scope for the distinguishing of psychologically separate components in mental operations, particularly in the mental operations of language.
3) It provides a testing ground & slope for linguistic theory.
4) Its findings have direct application in the rehabilitation of sufferers of aphasias.

This issue is important as the so called aphasic syndromes such as Broca's Wernicke's etc. are not clear-cut symptom complexes rolled into neat parcels. Different brain mechanisms underlie the processing of the different levels of language. These levels of language in the aphasics have been analysed in an effort to identify aphasia as a central disorder than trying to contrast the behaviour symptomatology in aphasia.

A common argument that has prevailed in the testing of aphasic patients is that the responses of these patients are inconsistent and consequently test result are unreliable. Some clinicians consider that test procedures are traumatic to the aphasic patient (Schuell, 65).

Despite the attempts to emphasize the essentially unitary nature of aphasia, there are terminologies which have become very convenient that are hard to shake off.

Weisenberg and McBride (1935) in the first study to use standardised tests with a relatively large number of aphasic patients, came to the conclusion, as Head had done ,that expressive aphasias are language disorders which involve far more than verbal formulation and expression. The development of more rigorous and standardised clinical investigations of aphasia following Weisenberg and McBride's precedent has led to a more sophisticated variant of the modality framework. This makes additional distinctions within the modality of speech in terms of the nature of the stimuli by which the speech is elicited. It distinguishes speech which consists of naming objects or pictures, speech, which is imitative of the examiners speech (repetition) and speech which is spontaneous i.e. is elicited in conversation or in the description of events (often the description of events which can be inferred from a picture). It thus offers additional dimensions to distinguish different classes of aphasia, but they are behavioural dimensions of the modalities rather than ones which might in themselves show up qualitative differences within a central disorder.

Within this modality framework different aphasics are assessed for a profile and there are equivocal evidences for the efficacy of using pictures to test the language of aphasics (Goodglass, Hyde & Blumstein, 1969, Saffran etal, 1980, Warrington & Shallice, 1984; Cherepski & Drummond 1987).

The aim of the present study is to further investigate these issues and to specifically address the question of:

a) Whether there is a difference of performance of linguistic abilities of aphasics within the two formal tests namely, the Linguistic Profile Test [LPT] (Karanth, 1980) and the picturized version of LPT, the Regional Rehabilitation Training Center, Ali Yavar Jung National Institute of Hearing Handicapped test battery known as Kannada Language Test [KLT] (i.e. whether the performance is modality bound or not) and

b) Whether there is a difference of performance on the two tests within the different aphaisa sub types.

REVIEW OF LITERATURE

The study of how brain damage can disrupt the use and system of language in adults (aphasiology) has a fourfold purpose. it offers unique opportunities to find out more about the anatomo - physiological organisation of the human brain. It gives scope for the distinguishing of psychologically separate components in mental operations, particularly in the mental operations of language; it provides a testing ground and inspiration for linguistic theory; & perhaps its findings have a direct application in the rehabilitation of suffers from aphasia.

If ever there was a study where several disciplines ought to meet, it is aphasiology. It includes within its sphere some rich complexity i.e. the physiology of the human brain, the psychology of the individual and linguistic science. Linguistic aphasiology is concerned with the psychology of language breakdown: it seeks to describe what aspects of language code and its processing are distributed after brain injury, and to account for the pattern of breakdown in terms of principles of language structure and processing. Research, in this area is becoming more extensive because Broca's aphasics are no more characterized only by mutism and the speech abnormalities in Vernicke's aphasia includes phonemic parpahasias, semantic parpahasias, unrecognisable segments termed neologisms and these

linguistic observations play a role in the system of classification and add to the knowledge of understanding of language breakdown.

Linguistics has achieved a revolution in aphasiology in two obtrusive ways: 1) Language is not a uniform mass. Language differs along other dimensions besides length and frequency of usage of words. The structure of language is hierarchical and from this structure, systems can be derived in terms of basic but abstract units (features, phonemes & morphemes). Different brain mechanisms underline the processing of different sentence types. 2) Language can be described in terms of different levels of organization. This opens the way for the analysis of aphasia as a central disorder, rather than a disorder of contrasting behaviour of modalities of language use. The three main levels are the system of sounds of speech (Phonology); the level of structural arrangement of sentences (Syntax); the level of the system of meaning (Semantics).

PHONOLOGY:

The sounds that make up words are organized in specific ways. Some features of the organization of the sounds of the words are universal to all human languages. Others are particular properties of individual languages. Phonology is the description of the system and patterns of these sounds that occur in a language. The description could be either

phonetic or phonemic. Phonetic descriptions are in terms of the elementary components of speech sounds without reference to meaning and the terms describe anticulatory or auditory, rather than acoustic events. A phonemic description applies the concept of a system of simultaneous combinations of phonetic features into phonemes. Phonemes are abstract representations of the sound segments relevant to the words of a language which are mapped in complex ways onto articulatory gestures and acoustic wave forms. A particular sound is a phoneme in a language if that sound can be contrasted with a another sound in a single position in a word and both the resulting forms are words of the language, bringing a change in meaning.

As phonemes are abstract representations, syllables are taken as the minimal units to study phonology. They play an important role in the sound system. It is at the syllable level and its structure that important constraints on the sequences of phonemes, which can be found in any language can be stated. In a word they are major factors determining the stress contours.

Disturbances in the production of sounds can be divided into those affecting the actual mechanism of articulation and those affecting the process of planning the sounds in a word.

Blumstein (1973a; 1973 b) studied particular types of

errors in the spontaneous speech of 5 Broca's 6 Conduction and 6 Wernicke's aphasics. She found that all the three groups of patients did not differ with respect to total phonemic inventory frequency with which each phoneme occurs in the inventory and the types of error that occurs with respect to phonemes. She concluded that the aphasic syndromes, affect the phonological aspect of linguistic code in the same way. Nespoulous etal (1984), however, did not support this view. They studied four Broca's and 4 Conduction aphasics and said that the type of substitution in a repetition task by Broca's aphasics was different from Conduction aphasics. The difference in the two studies would have been because the features of phonemic paraphasias considered would have been different. That is, Blumstein's study looked at more types of errors and Nespoulous considered a simple type of error in greater detail.

It is suggested that phonemic paraphasias arise at a stage of sentence planning at which the sound of content words - but not the function words - is being planned. The phonemic paraphasias made by non fluent aphasics arises in processes closely related to the actual execution of speech sounds while the phonemic paraphasias made by fluent aphasics is due to inability to plan the sounds of words correctly and are not constrained by articulatory features.

Garett (1982,1984) suggested that phonemic paraphasias

arise due to deficits in the stage of processing of phonological representation at which the link between word meaning and word sound is utilized. Caplan etal (1986a) say that disturbances of this sort can only account for errors made in naming pictures and other tasks which involve deriving phonological forms from semantic representations and cannot apply to any task in which there is a route from phonological representation of the input side directly to a phonological representation which is involved in speech planning. This means that there are two different types of disturbances of sound planning which can give rise to phonemic paraphasias. 1) Disturbance in accessing lexical phonological representations, 2) A disturbance in accessing superficial phonological representations. Milberg etai (1988) concluded that the impairments displayed by the aphasic patients may be due to the processing mechanisms contributing to lexical access. There may be a change in the threshold of sensitivity for activation of the lexicon. The fluent aphasics could be characterized by a decreased threshold of sensitivity of lexical access and thus they would show a lessened sensitivity to phonological distortion, subsequently accessing more words in the lexicon than normal. In contrast, the nonfluent aphasics could be characterized as having an increased threshold of sensitivity to lexical access and thus would show an increased sensitivity to phonological distortion,

subsequently accessing fewer words in the lexicon than normal.

Butterworth (1979) studied the neolgisms (word-like utterances that are not tune words in English) in the speech of a patient who made numerous phonemic paraphasias and concluded that these neologisms were produced by the patient when he could not find the phonological form of a word at all and resulted in a mechanism that randomly generated phonemes in sequences.

Cherepski etal, (1987) studied the linguistic features in nonfluent dysphasics using pictograms. Data revealed that pictograms yielded a relatively greater frequency of occurrence of phonemic paraphasias than neologistic paraphasias.

In conclusion, in aphasiological literature it is generally supposed that phonemic paraphasias are due to some impairment of the planning and /or execution of the phonological aspect of an utterance. Aphasia can, in addition, affect the internal phonological representation of a planned utterance and/or the monitoring system might prevent the adequate detection of phonological errors or impede an improvement when a correction is made. Similarly the target itself may be impaired: its initial representation might not be strong enough to permit correct outputting and comparision, or even if it is initially

adequate, it might decay over time. Moreover, both types of impairment may co-exist within the same patient. Other phonemic errors may arise at earlier stages of processing. Buckingham attributes this to the stage at which lexical or superficial phonological representations of individual words are inserted into developing phrasal structures.

SYNTAX:

Word formation and the construction of phrases and sentences are all based on the ability to combine vocabulary elements to yield larger structures. There are rules regulating combination of lexical items in the processes of word formation and phrase and sentence construction. Vocabulary elements in English and many other languages can be divided into content words, function words and affixes.

Content words - Consist of nouns, adjectives, verbs, adverbs and some prepositions.

Function words - Consist of articles, pronouns, auxiliaries, verbs, other prepositions possessive adjectives, etc.

Function words convey syntactic information and content words convey semantic information. Function words never bear main stress of a sentence when a sentence receives a normal intonation contour. Only content words can bear main stress. Function words cannot combine with other words and form compound words.

Affixes are not themselves words and are divided into derivational and inflectional affixes. Derivational affixes are those which are involved in word formation processes which are independent of the form of sentence, while inflectional affixes are dependent on sentence structure.

Agrammatism is related to the syndrome of Broca's aphasia in which there is omission of function words and affixes and there is retention of context words in spontaneous speech, often in writing and repetition. The speech of the agrammatic patient's is supposed to be characterized by the selective omission (or misselection) of inflectional affixes and free standing grammatical markers. Caramazza & Berndt, (1985); Kean, (1977), proposed that the class of elements affected in this syndrome was defined in terms of aspects of their sound pattern. They have difficulty with items which are not phonological words. Goodglass & Berko (1960) studied 21 agrammatic aphasic patients and found that they had less trouble producing the syllabic form of suffixes (eg: -es) than in producing the non syllabic form (eg: -s).

Goodglass (1973), Luria (1973), Tissot etal (1973), Miceli etal, (1983) have shown that patients with agrammatism can have different patterns of loss of vocabulary. Nespoulous etal, (1985 a) studied a patient with agrammatism and showed that he didn't have any problem

when the function words occured in isolation but it occured only when the words were presented in sentences or when they had produced sentences.

To know the reason of omitting function words, Goodglass etal, (1972) documented the syntactic construction produced by one agrammatic patient and found no syntactically well formed utterances in him. Caplan (1985) suggested that agrammatic patients do not construct phrasal modes in their utterances. However, it is not clear whether deficits of this general type reflect damage to a lexical or a syntactic component of the language production system. So a damage to a component of the lexical system which stores free standing grammatical markers and inflectional affixes could result in a pattern of speech classified as agrammatic; alternatively one could place the locus of damage in the processing device that specifies the syntactic frame of the sentence to be produced (Caramazza & Berndt, 1985).

Language processing is associated with the patterns demonstrated across varying aphasia types. For example, an expressive syntactic representational device which is dissociable from other levels of language programming has been postulated based upon :

1) The agrammatic language production of Broca's aphasia and
2) The seemingly preserved expressive syntax traditionally

attributed to Wernicke's aphasia. In agrammatism, the comprehension is characterized by a selective impairment of syntactic processing which corresponds to major components of linguistic theory. The dissociation of syntactic and semantic levels of sentence processing suggests that syntax is an independent component of grammar. Zurif eta!, (1972) suggested that agrammatics may have central disturbance in the processing of function word vocabulary which was more obvious in sentence production. The apparently preserved expressive syntax of Wernicke's aphasia (Butterworth, 1979, Goodglass & Caplan, 1972) has been characterized as restricted in the usage of complex syntactic constructions (Gleason, Goodglass, Obler, Green, Hyde & Weintraub, 1980). These results have suggested that Wernicke's aphasics demonstrate a central syntactic disruption resulting from posterior cortical damage which shares characteristics similar to the proposed impairment in Broca's aphasia.

Caramazza & Zurif, (1976); Heilman and Scholes, (1976); Schwartz etal, (1980b) and Berndt & Caramazza, (1980); indicate that the disturbance in agrammatics patient may not be limited to expression but may affect the ability to construct syntactic structure. Bradley etal, (1980) gave agrammatic patients and normal controls a number of lexical decision tasks testing recognition of function words (closed class words) and content words (open class). They concluded that the basic processes of recognising closed class words

was abnormal in agrammatic patient. They said that closed class words are recognised by a specialized routine which is not frequency sensitive whereas open class words are recognised by a routine which is frequency sensitive and this disturbance in lexical access underlies the inability of the agrammatics to use these elements in spontaneous speech and leads to the disturbances in syntactic expression and syntactic comprehension. Gordon and Caramazza (1982) from their study concluded that it is possible that agrammatics have a disturbance in word recognition affecting their ability to access the most frequent words of the language as quickly as normally and that because the most frequent words in the language are primarily closed class terms, this disturbance primarily affects these elements.

The ease with which aphasic patients are able to retrieve words leads to the factors that have to be taken into consideration. These factors can be characterized as either contextual or lexical/semantic in nature. Contextual factors relate to the circumstances of elicitation of target items. One such factor is the modality of presentation of stimuli i.e. whether items are presented through visual, auditory or tactile input channels (Goodglass & Stress, 1979).

Lexical/Semantic factors affecting word retrieval are those that are inherent in the target item itself. For eg:

frequency of usage of a word has been shown to be a powerful determinant (Howes, 1964; Rochford & Williams, 1965).

Saffran ctal, (1980b) studied 5 agrammatic patients describing simple pictures of actions and suggested that thematic roles are not mapped on to word order and that animacy determines the position of nouns around verbs. They concluded that agrammatic patients have either lost the basic linguistic notions of thematic roles or else cannot use even the basic word order of the language to express this sentential semantic features. The effect of pictorial context on sentence recognition memory in aphasic patients predicts that memory is retained more effectively in supportive situations which implies - visual information influences verbal memory in aphasic patients and Broca's & Wernicke's aphasics demonstrate different performance patterns when semantic analysis of sentences is critical (Albert, 1976; Cermak & Moreine, 1976; Cermak & Tarlow, 1978).

Hupet etal, (1986) tested 20 aphasics and 20 normal subjects for their understanding of implicit meanings of French adverbs. A multiple choice paradigm requiring to select from three figures the one which was best described by a sentence. Global quantitative comparison indicates that aphasics performance was inferior to that of the normal controls. No clear relationship was observed between

aphasia type and aphasic's performances although it was noted that all the conduction aphasics performed like normal and among Broca's aphasics, the one with the clearest agrammatic verbal output produced responses similar to those of normals.

It is not known whether there are common cognitive strategies underlying contextuaiization in both the pictorial and linguistic mode of presentation of a narrative. Bay (1962) claims that the linguistic disturbance is a consequence of a underlying cognitive impairment. According to him, the poor performance of aphasic patients in rendering verbally what they had seen in a cartoon story is caused either because they their inability to contextualize the pictorial information of their because they cannot comprehend specifically the humor which is expressed by these stories. Huber & Gleber, (1982) had aphasic, non-aphasic brain damaged patients and normal controls construct narratives from an unordered set of pictures and from an ordered set of corresponding sentences. Interaction between aphasic and non-aphasic behaviour was seen such that aphasic patients made relatively more errors on verbal versions and right hemisphere patients on the pictorial version.

Deloche and Seron (1981) tested the abilities of aphasic patients on sentence - picture matching of simple

declarative reversible sentences. Two factors were found to differentially affect Broca's and Wernicke's aphasics performance. 1) Sentence plausibility (viability of two given nouns in a sentence to act as agent and recipient according to normal subjects expectancies) and spatial arrangement. Sentence plausibility had a significant effect on the frequency of correct responses of Broca's aphasics but on those of Wernicke's. The latter were found to be more sensitive to a match or mismatch in the left-to right spatial arrangement of the grammatical subject and object in a sentence on one hand and the order of the corresponding personages in the picture on the other.

To understand speech the sentential and phrasal information from sentences that are heard have to be extracted. Unlike words, syntactic structures do not mean anything by themselves. By placing words in certain positions in syntactic structures, sentential features are added to the intrinsic lexical semantic features of those words. In certain aphasics, comprehension of some sentential semantic function is not determined or constrained by syntactic from in a normal manner.

Caplan etal, (1985) studied a large number of aphasics using a test requiring comprehension of a number of syntactic structures and indicated that syntactic structure influences sentence interpretation in aphasia. Sentences

with canonical order were consistently easier than those with deviations from canonical order.

Caramazza & Zurif (1976) investigated the sentence comprehension in aphasic patients. They tested Broca's Conduction and Wernicke's aphasics on sentence - picture matching task. They concluded that patients with Broca's aphasia cannot construct syntactic structures. The Broca's aphasics relied on the meanings of the individual content words and what they know about events in the real word to determine the meaning of the sentence.

They also claimed that aphasic patients use heuristics based upon basic word order to interpret sentences. Schwartz etal, (1980b) using similar task of sentence picture matching found similar results. Grodzinsky (1986) said that agrammatics have difficulty in comprehending some items as in production. Zurif etal, (1972), Berndt and Caramazza (1980), Bradley etal, (1980) and Caplan (1985) found that syntactic comprehension was abnormal in agrammatic patients because of their inability to use function words. Sherman and Schweickert (1989) studied syntactic and semantic contributions to sentence comprehension in agrammatics using sentence picture matching task and found that these subjects correctly interpreted most active and passive sentences. They failed to assign thematic roles and adjectives. These results showed that

aphasics use both semantic and syntactic information for sentence comprehension.

In conclusion it can be said that there are intra category variations in the aphasic's syntax production and the variation may not result from impairments to separate processing components. Moreover, the effects might not be equally apparent in all members of that class in a given task. The expression of the impairment would be affected by other symptoms a person has. In terms of sentence comprehension most of the studies have been done on agrammatics and the nature and severity of syntactic comprehension disorders found in them is no different from that found in the other aphasics. Also it can be concluded that in agrammatics, the syntactic comprehension deficits may or may not be caused by expressive agrammatism. This was supported by Schwartz etal, (1985) wherein they said that in the agrammatics the syntactic analyses of the test sentences were not impaired even in the conditions in which their performance breaks down. Moreover, their performance reflected in some way the division of labour between the syntactic component of the processor and those components that perform the bulk of the semantic processing which means that the agrammatics are able to perform syntactic analyses of the input sentences, despite the fact that they are agrammatic in comprehension. Apart from this, it can be said that there is no significant difference in

performance within aphasia subtypes whether the stimulus was given visually or auditorily.

SEMANTICS:

Semantics refers to the meaning of the individual word. The meanings of the individual words are determined by referents of each word and the meanings of phrases are determined by the combination of the meanings of the words in each phrase (Putnam, 1973). According to Aristotle each word stands for a concept which is clearly i.e there is a set of necessary and sufficient conditions for a concept to fall into a set designated by a word (Smith and Medin, 1981). Rosch etal, (1976) found that a hierarchical organisation of concepts is an important principle for the organisation of concepts and that the level of representation i.e. the 'basic object level' plays an important role and it is the one which is psychologically preferred in motor and perceptual tasks. Also they are acquired first in cognitive development and enter first in a child's vocabulary.

The vocabulary of Broca's aphasia, even though reduced by word finding difficulty, appears to be relatively well supplied with concrete or picturable nouns and verbs. Goodglass, Hyde and Blumstein (1969) found that Broca's and fluent (Wernicke's & Anomic aphasias) aphasics did differ in the proportion of picturable and non-picturable nouns used

but only in the highest frequency range. Fluent aphasics use many more non-picturable words that occur idiomatically but without much information value in their free flowing speech.

Goodglass, Klein, Carey & Jones (1966) examined the order of difficulty of object names, body parts, actions, colours, numbers and letters in a test in which the patient was asked to either name a visual stimulus or to choose the correct visual stimulus in response to the spoken name. Objects were most often the hardest category to name . In auditory comprehension this relationship was however, reversed eliminating the possibility of word frequency. The greatest discrepancies among semantic categories were observed in anomic patients who had much less difficulty naming numbers and letters than they did naming objects or body parts. Patients with Broca's speech pattern had little variability in naming. The authors concluded that the disparity in phonological information between letters and numbers places a greater information encoding load on the speaker for numbers but a greater load for decoding on the listener for letters.

Warrington and Shallice studied aphasic patients and found that they showed many patterns of relatively retained and impaired functional abilities in the area of storing semantic representations from written and auditory

modalities. They also studied the extent of dissociation between verbal and visual semantics in two cases and found that they behave differently in answering questions about words and pictures though it is not significantly different. Riddoch and Humphreys pointed out that both the patients were better overall on the picture than the word version but were impaired on both tests when compared to normals.

Varrington and Shallice (1984) documented several patients who had difficulties in comprehending both words and pictures of living things but much less difficulty comprehending words and pictures of common inanimate objects. The differences between inanimate objects and animals and living things may represent the differences between the salient features of these different categories. Inanimate objects are mainly distinguished by their functions. On the other hand foods and living items have similar functions and distinction among items within each of these categories depend more on each items physical characteristics than its function.

Brownwell (1978) found that though normal subjects were more likely to name typical objects with the basic level name, they were more likely to name atypical members of a category with a sub-ordinate level name. He found a similar effect in 5 Broca's and 5 Wernicke's aphasics. These subjects were more likely to produce the basic-level term

for a typical member of a category and a sub-ordinate term for a typical member of a category. These patients also made more errors on naming atypical items than typical items.

Cherepski & Drummond (1987) took nonfluent dysphasic utterances on picture description task which were compared to those elicited in a standard stative simple -picture description task. Results revealed that greater occurence of hesitations than circumlocutions, verbal paraphasias or revisions were seen.

Towne and Banick (1989) studied the effect of stimulus colour on naming performance in adult aphasics. The presence of colour in a visual stimulus increases visual redundancy and influences naming performance (Miller & Johnson -Laird, 1976). Duffy (1986) suggested that the clarity and redundancy of visual stimuli are capable of affecting linguistic processing. Bisach (1966) reported that coloured pictures resulted in significantly better naming than did black - line drawings or mutilated figures. The results of Towne & Banick study using colour and black and white picture naming task suggests that the presence of colour, in usual stimuli, does not have a facilitatory effect. Both were equally successful in eliciting correct naming responses.

In conclusion, it can be seen that semantic concepts

are organized hierarchically as well as in subordinate, basic and superordinate levels of representations. Moreover, there seems to be a preference for the basic level of representation, both in perceptual and language tasks.

Abnormalities in the semantic system or aphasics was mainly in the word meaning in providing definitions, in matching words and pictures, in naming objects and in a variety of other tasks that required word meaning. There were no difficulties in repetition, reading aloud and categorizing different views of an object as the same. Also, the dissociation between verbal and visual semantics is not very significant though there existed a significant difference between the aphasics & normals.

In brief the studies in this area have led to the conclusion that just as the co-occurence or association of symptoms need not be an indication of a common functional deficit, the dissociation of performance on different tasks does not necessarily indicate that different components are required to perform the various tasks, which means that the linguistic disturbances in aphasia may or may not be modality specific. Moreover, even if there is a difference of performance in different modalities, it is not very significant.

METHODOLOGY

AIM: To study the performance of linguistic abilities within the aphasic subtypes using the verbal and picturized version of a formal test.

SUBJECTS: Seven aphasics were taken for the present study. All the seven subjects were males. Out of them, four suffered from cerebrovascular accident and three had a head injury. On the basis of Western Aphasia Battery these aphasics were classified as Broca's, Wernicke's, Global and Anomic aphasics. Apart from this the subjects met the following criteria:

1) They had Kannada as their mother tongue
2) They were all right handed
3) Time following the stroke/head injury was not more than one year
4) They had not undergone any speech therapy.

Tools used for the present study:

1) Kannada version of Western Aphasia Battery
2) Kannada Version of Linguistic Profile Test
3) Kannada Language Test

WESTERN APHASIA BATTERY: This test was designed by Kertesz & Poole (1974) the oral language subtests are :

(i) Spontaneous speech

(ii) Auditory verbal comprehension

(iii) Repetition

(iv) Naming

Nouns are available for this test. This was used to assess the severity and type of aphasia . The summary of their scale scores provided the A.Q. (aphasia quotient). Each subject was given the Kannada version of WAB, prior to their inclusion in the study.

LINGUISTIC PROFILE TEST:

This test was designed by Karanth (1980). It was designed with the "objective of evaluating the linguistic competence of aphasics by obtaining and analyzing adequate lingusitic samples at the phonemic, syntactic and sementic levels both in reception and expression (Karanth, 1980).

The test has 3 major sections 1) Phonology 2) Syntax 3) Semantics.

1) Phonology: There are two subsections in the phonology section.

(i) Phonemic discrimination in which there are 24 items. The subjects were asked to point out two pictures out of a set of four on hearing the minimal pairs.

(ii) Phonetic expression in which there are 52 items. The subjects were asked to repeat the words after the tester.

Syntax: There are 10 subsections in the syntax section.

a) Morphophonemic structures

b) Plural forms

c) Tenses

d) PNG markers

e) Case markers

f) Transitives, Intransitives & Causatives

g) Sentence types

h) Conjunctions, Quotatives & Comparitives

j) Conditional Clauses

k) Participal constructions.

A total of 130 items were tested under all these subsections. The subjects were asked to judge whether the given sentences were gramatically correct or wrong. This is known as grammaticality judgment task which is a metalinguistic ability. "Metalinguistic ability" refers to one's ability to reflect upon one's language, appreciate and even talk about it. In making acceptability judgements, the individuals not only check for proper grammatical formulation of sentences but also semantic coherence of the same. Hence it means that making language judgements - retrieving and making use of one's language judgements retrieving and making use of one's intutions is relatively hard, when compared to talking and understanding. This is because, in giving a language judgement, one must take a

prior cogintive process (linguistic performance) as the object of a yet higher order cognitive process (reflection about language performance, or 'metalinguistic performance) which may have properties of its own" (Gleitman and Gleitman, 1979).

(iii) Semantics: There are two major sub-sections in this section. a) Semantic discrimination

b) Semantic expression.

In the first sub-section, discrimination of colours, furniture and body parts was tested. The subjects were asked to point the colour, object or body part named. A total of 15 items were tested.

In the second subsection expression ability was tested under the following tasks:

1) Naming
2) Lexical category
3) Synonymy
4) Antonymy
5) Homonymy
6) Polar questions
7) Semantic anomaly
8) Paradigmatic relations
9) Syntagmatic relations
10) Semantic contiguity
11) Semantic similarity

The instructions for each task was given differently based upon the type of expressive ability being tested.

KANNADA LANGUAGE TEST:

This was developed by AYJNIHH (Bombay) and RRTC (Madras) as a part of UNICEF Project "Development & Standardization of Language and Articulation tests in seven Indian Languages" This test is based on the LPT but uses pictures along with the sentence stimuli. The test has 2 sub-sections:

1) Semantics
2) Syntax

In the semantics section there are 12 subsections:

(i) Semantic discrimination
(ii) Naming
(iii) Lexical items
(iv) Synonymy
(v) Antonymy
(vi) Homonymy
(vii) Polar questions
(viii) Semantic anomaly
(ix) Paradigmatic relations
(x) Syntagmatic relations
(xi) Semantic contiguity
(xii) Semantic similarity

Out of these 12 sub-sections 4 { (i), (ii), (vi) & (ix)) are pictorial and the rest are in sentential form. The

instructions were given based on each task.

In the syntactic section, there are 11 sub-sections which correspond to the 11 subsection of LPT syntax section. Each section has 10 items; 5 items testing receptive abilities & 5 items testing expressive ability of the subject. For checking comprehension the subjects were expected to point to the correct picture out of a set of three to four related pictures in response to an auditorily presented sentence describing the target picture. The items evaluating expression required the subjects to describe the pictures which specifically test the usage of specific syntactic structures.

ADMINISTRATION & SCORING

The testing was done in a quiet room and the 3 tests were administered to all the aphasics.

Prior to the administration of LPT & KLT, VAB was administered and scoring was done as per the test format given in Appendix I.

The administration of 76 items of the phonology section of LPT entailed instructing the subject that he would hear a minimal pair in the phonemic discrimination task and he would have to point to the pictures presenting the pair out of a set of 4 pictures. In the phonetic expression sub section, the subjects were asked to repeat verbally after the tester.

In the 130 items of syntax section of LPT the subjects were instructed that they would hear a list of sentences/words; some of which were structurally well formed while some were not. Each subject was given examples of both correct and incorrect sentences. The subject was asked to listen carefully to the items that would be auditorily presented & indicate whether each item was correct or incorrect. The sentences or words were read out, one by one by the tester and the responses of the subjects, whether they indicated the stimulus as correct or incorrect, was recorded on a scoring sheet. The subjects had been told that there was no necessity for justifying their responses.

In the 85 items of semantics section of the LPT based upon the type of task involved, the instructions were given.

As the KLT consisted of comprehension & expression tasks the instructions given for the 115 items on comprehension task was to point to the appropriate picture from a set of related pictures, on hearing the target stimulus. The subjects responses were recorded on a scoring sheet.

In evaluating the expressive abilities of the subjects on 110 items, the subjects were asked to describe the pictures presented. When required, questions were asked about the descriptions. The subject's responses were

transcribed verbatim.

The entire testing lasted for a duration of two and a half to three hours which was carried out in 2 sessions,

ANALYSIS:

The subjects responses to all the items in the LPT & KLT, were scored for the accuracy of the response and the following were calculated:

a) The mean scores and the correlation between the total scores of LPT & KLT,
b) The mean scores and the correlation between the syntax and semantic section of both the tests separately.
c) The mean scores and correlation between the fluent and non fluent aphasics of both tests separately
d) The mean scores and correlation between the global and anomic aphasics on both tests separately
e) The mean scores and the correlation between the Broca's and Wernicke's aphasics.

The results have been presented and discussed in the following chapter.

RESULTS & DISCUSSION

The data collected from all the aphasics on the 3 tests are given as follows:

Initially the cases were classified based on the Western Aphasia Battery and Table-1 gives the demographic data along with scores obtained on the Western Aphasia Battery.

Table-2 and 3 gives the raw scores obtained on LPT and KLT respectively. As a whole, the mean score obtained on LPT was 78.36 and on KLT 98.43. In order to find out whether there is a correlation between the performance of aphasic subjects on the two tests, Karl Pearson's correlation coefficient was calculated.

1 a) The correlation coefficient (r) was found to be 0.99 which means that there is a high positive correlation. This shows that the performance in the verbal and visual modality did not differ, that is to say the performance of the aphasics as a group is not modality specific.

1 b).The correlation coefficient between the performance on the syntax section of LPT & the syntax section of KLT was found to be 0.79 & the correlation coefficient between the performance on semantics section of LPT & semantics section of KLT was 0.95. From this it can be seen that though there is a high positive correlation on both the tasks, the

	HISTORY						WESTERN APHASIA BATTERY SCORES						
CASE No.	AGE	SEX	DATE OF EPISODE	TESTED AFTER A PERIOD Of	HEAD INJURY OR STROKE	CT SCAN REPORT	SPONTANEOUS SPEECh INFORM. CONTENT	FLUENCY	AUDITORY VERBAL COMPREHENSION	REPETITION	NAMING	APHASIA QUOTIENT	DIAGNOSIS
I	25	M	29.1.92	8 months	Head Injury	N. A.	8/10	10/10	200/200	90/100	88/100	91.4	Anomic Aphasia
II	35	M	15.12.92	3 months	Head Injury	N. A.	8/10	9/10	197/290	90/100	84/100	88.5	Anomic Aphasia
III	32	M	29.11.92	l month	Head Injury	N. A.	6/10	5/10	117/200	79/100	20/100	53.5	Wernicke's Aphasia
IV	44	M	14.12.92	1.5months	Stroke	Temporo-parieto-occipital infarct.	0/10	7/10	22/200	14/100	0/100	19.0	Wernicke's Aphasia
V	40	M	30.9.92	2 months	Stroke	N.A.	0/10	0/10	44/200	0/100	0/100	4.4	Global Aphasia
VI	60	M	1.5.92	6 monthss	Stroke	N.A.	0/10	0/10	37/209	0/100	0/100	3.6	Global Aphasia
VII	35	M	2.9.91	1.3 yrs	Stroke	N.A.	0/10	1/10	144/200	0/100	0/100	16.4	Broca's Aphasia

TABLE-1: Showing th e demographic dataalong with scores obtained on the Western Aphasia Battery.

	SYNTAX												SEMANTICS												
No.	M.S.	PLURALS	TENSES	PNG MARK.	CASE MARK.	T, I&C	SENTENCE TYPES	PREDI-CATES	C, Q&C	C.C	P.C.	TOTAL (syntax)	S.D.	NAMING	L.C.	SYNO.	ANTO.	HOMO.	P.Q.	S.A.	P.R.	S.R.	S.C.	S.S.	TOTAL (semantics)	GRAND TOTAL
I	7.5	4.5	3.5	10	5	8	9	10	4	7	8	76.5	15	20	14	3	5	4.5	9	5	5	5	5	5	95.5	172
II	9.5	5	3	9.5	8	8	6	9	5	7	10	80.5	13	20	19	3	2	3.5	10	5	4	5	5	5	84.5	165
III	5	2	2.5	4	5	5	3	0	7	6	5	44.5	10	14	5	1	1	1	7	3	1	1	2	0	46	90.5
IV	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7	7
V	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	2	3
VI	4	1	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	2	0	0	0	0	0	6	11
VII	8.5	2.5	2.5	5.5	6	5	5	4	8	5	8	61	10	0	2	5	0	1	8	3	1	1	4	5	39	100
MAX. OBT. SCORES.	10	5	5	10	10	10	10	10	10	10	10	100	15	20	15	5	5	5	10	5	5	5	5	5	100	200

TABLE – 2 : Showing the raw scores obtained on LPT. [M.S. = Morphophonemic Structures; PNG.MARK. = Person Number Gender Marker; T, I&C = Transitives, Intransitives, & Causatives; C, Q&C = Comparatives, Quotatives & Conjunctions; C.C. = Conditional Clauses; P.C. = Participial Constructions; S.D. = Semantic Discrimination; L.C. = Lexical Category; SYNO.= Synonymy ; ANTO.= Antonymy; HOMO. = Homonymy; P.Q. = Polar Questions; S.A. = Semantic Anomaly; P.R.= Paradigmatic Relations; S.R. = Syntagmatic Relations; S.C. = Semantic Contiguity; S.S.= Semantic Similarity]

No.		SYNTAX												SEMANTICS												
		M.S.	PLURALS	TENSES	PNG MARK.	CASE MARK.	T, I&C	SENTENCE TYPES	C&Q	C	C.C	P.C.	TOTAL (syntax)	S.D.	NAMING	L.C.	SYNO.	ANTO.	HOMO.	P.Q.	S.A.	P.R.	S.R.	S.C.	S.S.	TOTAL (semantics)	GRAND TOTAL(R+E)
I	R	4	5	5	5	5	5	5	5	4	5	5	53	10	5	20	3	5	5	5	5	3.5	5	5	5	75.5	229.5
	E	5	5	3.5	5	5	5	5	4	5	5	5	52.5		5		4	5	4.5	5	4	5	5	5	5	47.5	
II	R	5	5	4.5	5	5	4	5	5	5	4	4	51.5	10	5	16	5	5	5	5	5	5	5	5	5	76	204
	E	2	5	1	4	5	5	2	1	5	4	4	38		5		2	4	2.5	3	5	5	3	2	5	36.5	
III	R	2	4	4	3	3	2	3	3	4	4	2	34	7	5	15	3	5	2	4	3	3.5	2	3	2	54.5	115
	E	0	1	1.5	1	0	2	2	1	2	1	1	12.5		3		2	3	0	1	1	2	1	2	0	15	
IV	R	0	2	0	0	0	4	0	0	0	0	0	6	3	2	0	0	0	0	0	0	0	0	0	0	5	11
	E	0	0	0	0	0	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0	0	0	0	
V	R	0	2	0	2	0	1	0	0	0	1	0	6	0	2	0	0	3	0	2	0	0	0	0	0	8	14
	E	0	0	0	0	0	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0	0	0	0	
VI	R	0	2	2	2	0	1	0	0	0	2	0	9	2	0	0	0	0	0	2	0	0	0	0	0	4	13
	E	0	0	0	0	0	0	0	0	0	0	0	0		0		0	0	0	0	0	0	0	0	0	0	
VII	R	3	5	3	5	4	4	3	5	4	4	4	44	10	4	2	5	1	2	5	4	4	5	4	5	51	103.5
	E	3	1.5	0	0	0	0	0	0	0	0	0	4.5		0		0	1	0	0	0	1	0	1	1	4	
MAX. OBT. SCORES. (R+E)		10	10	10	10	10	10	10	10	10	10	10	110	10	10	20	10	10	10	10	10	10	10	10	10	130	240

TABLE – 3: Showing the raw scores obtained on KLT. [M.S. = Morphophonemic Structures; PNG.MARK. = Person Number Gender Marker; T, I&C = Transitives, Intransitives, & Causatives; Q&C = Comparatives, Quotatives C = Conjunctions; C.C. = Conditional Clauses; P.C. = Participial Constructions; S.D. = Semantic Discrimination; L.C. = Lexical Category; SYNO.= Synonymy ; ANTO.= Antonymy; HOMO. = Homonymy; P.Q. = Polar Questions; S.A. = Semantic Anomaly; P.R.= Paradigmatic Relations; S.R. = Syntagmatic Relations; S.C. = Semantic Contiguity; S.S.= Semantic Similarity] [R = Receptive ability; E = Expressive].

correlation was better on semantics rather than syntax. This could be due to the difference in the nature of syntactic task across the two tests grammaticality judgement in LPT as against picture matching/picture description in KLT.

1 c). The correlation coefficient between the combined performance on the syntax section of the two tests and the combined performance of the semantics section of the two tests was 0.96 which shows that there is a high positive correlation between the two leading to the conclusion that as a group, aphasics are not affected more in syntax or semantics.

2 a). The correlation coefficient between the Fluent & the Non-Fluent aphasics on the syntax section of LPT was 0.36 & on the semantics section was also 0.36. This shows that a low positive correlation exists between the two.

2 b). The correlation coefficient between the fluent and non fluent aphasics on the syntax section of KLT was 0.26 & on the semantics section was 0.46. This is in agreement with the low positive correlation seen on LPT. It is obvious that the syntactic and the semantic abilities of Fluent and Non- Fluent aphasics differ considerably with the difference being greater on syntax than semantics.

3 a). The correlation coefficient between the performance of

Broca's aphasic and Wernicke's aphasic on the syntax section of LPT was 0.0 (as the Wernicke's aphasic failed the test) and on the syntax section of KLT was 0.12.

3 b). The correlation coefficient between the performance of Broca's aphasic and Wernicke's aphasic on the semantics section of LPT was 0.67 and on semantics section of KLT was 0.63 which indicates there is positive correlation on both the tests. Here again, the correlation on the semantics section was better than the correlation on the syntax section confirming the conclusion as in l(c) that the performance on syntactic tasks differentiate the major types of aphasia to a greater extent than the semantic tasks. This observation is not entirely in line with the earlier theories of Broca's aphasia as a primarily syntactic disorder and Wermicke' saphasia as a primarily semantic disorder.

4 a). Correlation coefficient between the global and anomic aphasics on the syntax section of LPT was 0.106 and on the semantics section was 0.41.

4 b). Correlation coefficient between the global and anomic aphasics on the syntax section of KLLT was 0.32 and on the semantics section was 0.50 indicating a low positive correlation, which means that there is a major degree of difference between the more severe and the least severe form

of aphasia. Here also the correlation on semantics by both aphasics was better than correlation on syntax.

5). The correlation coefficient between the two anomic aphasics (i.e the intra-group variation) on the syntax section of LPT was 0.80 and on the semantics section was 0.97 & the correlation coefficient on the syntax section of KLT was 0.81 and on the semantic section was 0.84 indicating a high positive correlation on both tests which led to the conclusion that there is no intra group variation seen.

6). On the other hand, the coefficient of correlation between the two global aphasics on the syntax section of LPT was 0.12, indicating a low positive correlation and on the semantics section of LPT the coefficient of correlation was 0.93 (a high positive correlation). Correlation coefficient on the syntax section of KLT was 0.88 and on semantics section was 0.82 indicating a high positive correlation on both the tasks of KLT.

The discrepancy between the performance on syntax section of LPT and KLT could be due to the difference in the nature of the syntactic tasks across the two tests, with grammaticality judgement ability relatively better preserved in one of the Globals.

From the above results it can be said that:

1) Aphasics performance does not differ to a great extent on

different modalities and so the language disorder is not necessarily modality bound.

2) All the aphasics have performed better on semantics than on syntax irrespective of the test, which means that either the semantic ability is better retrieved or better retained.

3) In terms of Fluent and Non-Fluent aphasics, they are related to each other, that is to say perform almost similarly in semantics and further on perform differently in syntax which becomes the differentiating criterion between the two.

4) Also the Broca's and the Global aphasics perform better on the grammaticality judgement task than in syntactic performance. i.e. to say the capacity to judge whether sentences are grammatically correct or wrong, is relatively better retained and not lost.

SUMMARY AND CONCLUSIONS

The present study was undertaken to investigate the performance of aphasic subjects on two formal language tests namely the Linguistic Profile Test and Kannada Language Test (a picturized version of Linguistic Profile Test). Seven aphasics were taken up for the study of which two were Global aphasics, two were Anomic, aphasics, two were Wernicke's aphasics & one was Broca's aphasic. The subjects were native speakers of Kannada and had not undergone any formal speech and language training. The aphasics were studied for their performance on the verbal and picturized version of the same test and a quantitative statistical analysis of the results was carried out.

The results led to the conclusions that:

1) There was no difference of performance on the verbal or picturized version of a test i.e. the language disorder in aphasics is not modality bound
2) The correlation between the Fluent and Non-Fluent, Wernicke's and Broca's aphasics was higher on semantic tasks than syntactic tasks indicating that the performance on syntax is of greater differentiating value than that on semantics.
3) Intra group correlation within the subtypes of Anomics and Globals was relatively high,.indicating that the linguistic abilities of aphasics within a subtype are comparable.

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APPENDIX

I. Spontaneous Speech

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

1. ನೀವು ಇವತ್ತು ಹೇಗಿದ್ದೀರಿ ?

2. ನೀವು ಇಲ್ಲಿಗೆ ಮೊದಲು ಬಂದಿದ್ದೀರಾ ? ಅಥವಾ ನಾನು ನಿಮ್ಮನ್ನು ಹಿಂದೆ ಪರೀಕ್ಷಿಸಿದೆನಾ ?

3. ನಿಮ್ಮ ಹೆಸರೇನು ?

4. ನಿಮ್ಮ ವಿಳಾಸವೇನು ?

5. ನೀವು ಏನು ಕೆಲಸ ಮಾಡುತ್ತಿದ್ದಿರಿ ?

6. ನೀವು ಇಲ್ಲಿಗೆ ಏಕೆ ಬಂದಿರುವಿರಿ ? ಅಥವಾ ನಿಮಗೆ ಏನು ತೊಂದರೆ ಹೇಳಿ ?

7. ಈ ಚಿತ್ರದಲ್ಲಿ ಏನು ನಡೆಯುತ್ತಿದೆ ಎಂಬುದನ್ನು ಹೇಳಿ.
Present test picture (Card 1) and say : "Tell me what you see. Try to talk in sentences". Encourage the patient to pay attention to all aspects of the picture. Move the picture towards the patient's intact visual field. Ask for more complete response if only a few words are produced.

Maximum Score 20
Patient's Score———

SCORING OF SPONTANEOUS SPEECH

A. Information Content

(0) No Information.

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

(2) Correct response to any 1 item.

(3) Correct responses to any 2 items.

(4) Correct responses to any 3 items.

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

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

(7) Correct responses to 4 of the first 6 items on page 2 and a mention of at least 6 of the items in the picture.

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

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

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

B. Fluency, Grammatical Competence, and Paraphasias

(0) No words or short, meaningless utterances.

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

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

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

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

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

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

(7) Phonemic jargon with semblance to English syntax and rhythm with varied phonemes and neologisms. May be voluble ; must be fluent.

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

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

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

II. Auditory Verbal Comprehension

Yes/No Questions

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

	Verbal	Gestural	Eye Blink
1. ನಿಮ್ಮ ಹೆಸರು ಕುಪ್ಪಸ್ವಾಮಿ ಏಂದೇ ? ("no" should be correct)			
2. ನಿಮ್ಮ ಹೆಸರು ರಾಮಕೃಷ್ಣ ಏಂದೇ ? ("no" should be correct)			
3. ನಿಮ್ಮ ಹೆಸರು (ನಿಜವಾದ ಹೆಸರು) ಏಂದೇ ? (real name)			
4. ನೀವು ಬೆಂಗಳೂರಿನಲ್ಲಿ ವಾಸಿಸುತ್ತೀರಾ ? ("no" should be correct)			
5. ನೀವು (ನಿಜವಾದ ಊರು) ವಾಸಿಸುತ್ತೀರಾ ? (real residence)			
6. ನೀವು ಕಲಕತ್ತೆಯಲ್ಲಿ ವಾಸಿಸುತ್ತೀರಾ ? ("no" should be correct)			
7. ನೀವು ಗಂಡಸರೇ/ಹೆಂಗಸರೇ ? ("yes" should be correct)			
8. ನೀವು ವೈದ್ಯರೇ ? ("no" should be correct)			
9. ನಾನು ಗಂಡಸೇ/ಹೆಂಗಸೇ ? ("yes" should be correct)			
10. ಈ ಕೋಣೆಯಲ್ಲಿ ದೀಪ ಇರೆಯೇ ? ("yes" should be correct)			
11. ಬಾಗಿಲು ಮುಚ್ಚಿರೆಯೇ ? ("yes" should be correct)			
12. ಇದು ಫಲಹಾರ ಮಂದಿರವೇ ?			
13. ಇದು ಆಸ್ಪತ್ರೆಯೇ ?			
14. ನೀವು ತೊಟ್ಟಿರುವ ಬಟ್ಟೆ ಕೆಂಪು ಬಣ್ಣದ್ದೇ ? ("no" should be correct)			
15. ಕಾಗದಕ್ಕೆ ಬೆಂಕಿ ಹತ್ತಿಕೊಳ್ಳುತ್ತದೆಯೇ ?			
16. ಮಾರ್ಚಿ ತಿಂಗಳು ಜೂನ್ ತಿಂಗಳಿಗಿಂತ ಮೊದಲು ಬರುತ್ತದೆಯೇ ?			
17. ನೀವು ಬಾಳೆಹಣ್ಣನ್ನು ಸಿಪ್ಪೆ ಸುಲಿಯುವ ಮೊದಲೇ ತಿನ್ನುತ್ತೀರಾ ?			
18. ಜುಲೈ ತಿಂಗಳಿನಲ್ಲಿ ಮಳೆ ಬರುತ್ತದೆಯೇ ?			
19. ಕುದುರೆ ನಾಯಿಗಿಂತ ದೊಡ್ಡದೇ ?			
20. ಕೊಡಲಿಯಿಂದ ಹುಲ್ಲನ್ನು ಕತ್ತರಿಸುತ್ತಾರೆಯೇ ?			

Maximum Score 60

Patient's Score———

B. Auditory Word Recognition

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

Real Objects	Drawn Objects	Forms	Letters	Numbers
ಕಪ್	ಬೆಂಕಿಕಡ್ಡಿ	ಚೌಕ	ಜ	5
ಬೆಂಕಿಕಡ್ಡಿ	ಕಪ್	ತ್ರಿಕೋಣ	ಪ	61
ಪೆನ್ಸಿಲ್	ಬಾಚಣಿಗೆ	ಗುಂಡು	ಬ	500
ಹೂವು	ಚಾಕು	ಬಾಣ	ಕ	1867
ಬಾಚಣಿಗೆ	ಪೆನ್ಸಿಲ್	ಕ್ರಾಸ್ (ಇಂಟು)	ಮ	32
ಚಾಕು	ಹೂವು	ಅರ್ಧಚಂದ್ರ	ದ	5000

Colors	Furniture	Body Parts	Fingers	Right-Left
ನೀಲಿ	ಕಿಟಕಿ	ಕಿವಿ	ಮೆಚ್ಚಿರಳು	ಬಲಬುಜ
ಕಂದು	ಕುರ್ಚಿ	ಮೂಗು	ಉಂಗುರದ ಬೆರಳು	ಎಡ ಮೊಣಕಾಲು
ಕೆಂಪು	ಮೇಜು	ಕಣ್ಣು	ತೋರು ಬೆರಳು	ಎಡ ಹಿಮ್ಮಡಿ
ಹಸಿರು	ದೀಪ	ಎದೆ	ಕಿರು ಬೆರಳು	ಬಲ ತೊಡೆ
ಹಳದಿ	ಬಾಗಿಲು	ಕತ್ತು	ಮಧ್ಯ ಬೆರಳು	ಎಡ ಮೊಣಕೈ
ಕಪ್ಪು	ತಾರಸಿ	ಹಣೆ	ಬಲ ಕಿವಿ	ಬಲ ಕೆನ್ನೆ

Maximum Score 60
Patient's Score————

Sequential Commands

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

	Scores
ಕೈಯೆತ್ತಿ	2
ಕಣ್ಣು ಮುಚ್ಚಿ	2
ಕುರ್ಚಿ ತೋರಿಸಿ	2
ಕಿಟಕಿ[2] ತೋರಿಸಿ ಆಮೇಲೆ ಬಾಗಿಲು[2] ತೋರಿಸಿ	4
ಪೆನ್ನು[2] ಮತ್ತು ಪುಸ್ತಕ[2] ತೋರಿಸಿ pen n book	4
ಪೆನ್[4]ನಿಂದ ಪುಸ್ತಕವನ್ನು[4] ತೋರಿಸಿ	8
ಪೆನ್ನನ್ನು[4] ಪುಸ್ತಕದಿಂದ[4] ತೋರಿಸಿ	8
ಬಾಚಣಿಗೆಯನ್ನು[4] ಪೆನ್[4]ನಿಂದ ತೋರಿಸಿ comb pen	8
ಪುಸ್ತಕ[4]ದಿಂದ ಬಾಚಣಿಗೆಯನ್ನು[4] ತೋರಿಸಿ	8
ಪೆನ್[4]ನ್ನು ಪುಸ್ತಕದ[6] ಮೇಲಿಟ್ಟು ನಂತರ ಅದನ್ನು[4] ನನಗೆ ಕೊಡಿ	14
ಬಾಚಣಿಗೆಯನ್ನು[5] ಪೆನ್ನಿನ[5] ಪಕ್ಕ ಇಟ್ಟು ಪುಸ್ತಕವನ್ನು[5] ತಿರುಗಿಸಿ	20

Maximum Score 80
Patient's Score———

III. Repetition

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

	Maximum Score
1. ಕೈ	2
2 ಮೂಗು	2
3. ಹಾಸಿಗೆ	2
4. ಕಿಟಕಿ	2
5. ಕಿತ್ತಳೆ	2
6. ಕಾಮನ ಬಿಲ್ಲು	4
7. ನಲವತ್ತೈದು	4
8. ಶೇಕಡ ತೊಂಬತ್ತೈದು	6
9. ಐವತ್ತೈದುಪರೆ ಕಿಲೋಮೀಟರ್	10
10. ರೈತನು ಹೊಲ ಉಳುತ್ತಿದ್ದಾನೆ	8
11 ಆವನು ಹಿಂತಿರುಗಿ ಬರುವುದಿಲ್ಲ	10
12. ಹೊಳೆಯುವುದೆಲ್ಲಾ ಬಂಗಾರವಲ್ಲ	10
13. ಪೊದಲನೆಯ ಭಾರತೀಯ ನೌಕಾ ಪಡೆ	8
14. ಆದರೆ ಬಂದರೆ ಆಥವಾ ಮತ್ತು ಇಲ್ಲ	10
15. ಸಣ್ಣ ಗಾಡಿಯನ್ನು ಐದು ಡಜನ್ ಬಿಳಿ ಗೋಡಿಯ ಮೊಟ್ಟೆಗಳನ್ನ ತುಂಬಿ	20

Maximum Score 100
Patient's Score———

IV. Naming

A. Object Naming

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

Stimulus	Response	Tactile Cue	Phonemic Cue	Score
money	ದುಡ್ಡು : ಪೈಸೆ			
ball	ಬಾಲ್ (ಚೆಂಡು)			
knife	ಚಾಕು			
cup	ಕಪ್			
pin	ಪಿನ್			
mirror	ಕನ್ನಡಿ			
toothbrush	ಟೂತ್‌ಬ್ರಷ್			
book	ಪುಸ್ತಕ			
lock	ಬೀಗ			
pencil	ಪೆನ್ಸಿಲ್			
scissor	ಕತ್ತರಿ			
key	ಬೀಗದಕೈ			
needle	ಸೂಜಿ			
temple	ಬಳೆ			
comb	ಬಾಚಣಿಗೆ			
watch	ಕೈಗಡಿಯಾರ			
spoon	ಚಮಚ			
flower	ಹೂವು			
plate	ತಟ್ಟೆ			
matchstick	ಬೆಂಕಿಕಡ್ಡಿ			

Maximum Score 60
Patient's Score———

B. Word Fluency

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

Maximum Score 20
Patient's Score———

C. Sentence Completion

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

1. ಹುಲ್ಲಿನ ಬಣ್ಣ ——————— (ಹಸಿರು)
2. ಸಕ್ಕರೆಯು ——————— ಇದೆ (ಸಿಹಿ ಅಥವಾ ಬಿಳಿ)
3. ಗುಲಾಬಿ ಕೆಂಪು, ಮಲ್ಲಿಗೆ ——————— (ಬಿಳಿ)
4. ಅವರು ನಾಯಿ ——————— ಗಳ ತರಹ ಕಚ್ಚಾಡಿದರು (ಬೆಕ್ಕು)
5. ಭಾರತದ ಸ್ವಾತಂತ್ರ್ಯ ದಿನವನ್ನು ——————— ರಿಪಬ್ಲಿಕ್ ದಿನದಲ್ಲಿ ಆಚರಿಸುತ್ತಾರೆ (ಆಗಸ್ಟ್)

Maximum Score 10
Patient's Score———

D. Responsive Speech

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

1. ನೀವು ಯಾವುದರಿಂದ ಬರೆಯುತ್ತೀರಾ ? (ಪೆನ್ : ಪೆನ್ಸಿಲ್)
2. ಹಾಲು ಯಾವ ಬಣ್ಣ ? (ಬಿಳಿ)
3. ಒಂದು ವಾರದಲ್ಲಿ ಎಷ್ಟು ದಿನಗಳಿವೆ ? (ಏಳು)
4. ವೈದ್ಯರು ಏನು ಕೆಲಸ ಮಾಡುತ್ತಾರೆ ? (ಆಪರೇಶನ್)
5. ಆಂಟಿ : ಸ್ಟಾಂಪ್ ಎಲ್ಲಿ ದೊರೆಯುತ್ತದೆ ? (ಆಂಟಿ ಕಛೇರಿ : ಪೋಸ್ಟ್ ಆಫೀಸ್)

Maximum Score 10
Patient's Score———