AGRAMMATISM IN TAMIL SPEAKING BROCA'S APHASICS

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'Amma' & 'Appa'

- the everlasting sources of all my inspirations ....

'Thatha'

- 'evergreen' memories left behind...

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CERTIFICATE

This is to certify that this Dissertation entitled: Agrammatism in Tamil speaking Broca's aphasics is a bonafide work done in part fulfilment for the degree of M.sc.(Speech and Hearing) of the student with Reg.No.M8801.

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CERTIFICATE

This is to certify that this Dissertation entitled: AGRAMMATISM IN TAMIL SPEAKING BROCA'S APHASICS has been prepared under my supervision and guidance.

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DECLARATION

This dissertation entitled: Agrammatism in Tamil Speaking Broca's APhasics is the result of my own work undertaken under the guidance of Dr.Prathibha Karanth, Professor and Head of the Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore-6, and has not been submitted earlier at any University or Institution for any other Diploma or Degree.

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INTRODUCTION

Man has often been referred to as a social animal. Interpersonal communication is vital to foster this socialisation process.The term communication refers to the process of exchanging information, ideas and feelings. Human beings can communicate in many ways, but the most obvious method is through our use of words, that is, verbally. This verbal communication includes both oral (hearing and speaking) and nonoral (reading and writing) modes. Yet another feature of this verbal communication is that it is symbolic and hence is called 'language'. One form through which this language is expressed is speech.

Speech is a vital ingredient to keep the wheels of inter personal communication running smoothly, yet is hardly noticed in normal as it is often automatic. However if a person were to answer in response to a question as below:

"Ah Policeman . . ah . . I know . . . cashier . . money . . ah cigarettes . . . I know . . this guy . . beer . . mustache, etc. (Luria, 1970).

this surely catches one's attention. This is because not only is this conspicuous, but it also hinders the effective

communication of messages. The above speech sample describes how a Broca' s aphasic-specifically an agrammatic aphasic communicates.

What is aphasia? Aphasia/dysphasia is total or partial language disability in adults who earlier had normal language, following brain lesions. The primary causes for aphasia include cerebrovascular accidents, tumors, head trauma and infection. Of these, however, cerebrovascular accident (CVA) is the most common cause of aphasia. Aphasia not only affects speech output but language in toto.. (speaking, reading, writing, under - standing).

Aphasia has been often sub-divided into prototypical syndromes associated with specific lesion. sites based on differentiation of function within the left hemisphere (Goodglass and Kaplan, 1972; Kertesz, 1979; Albert et al. 1981). syndromes recognized by classical taxonomy include non-fluent or anterior aphasias such as Broca' s and transcortical motor aphasias; fluent or posterior aphasias like Wemicke's, transcortical sensory and conduction aphasi

Non-fluent aphasia is also called Broca' s dysphasia (named after Paul Broca). This type is characterised by

effortful speech, short phrase length, impaired articulation, restricted vocabulary, hesitancy. Yet another feature seen in majority of Broca's aphasics is agrammatism. Agrammatism (telegrammatism) refers to non-fluent aphasia in which utterances consist of strings of content words and lack grammatical function words. This simplification of syntactic structure is seen further in the difficulty aphasics have with inflections, auxiliaries, and in their tendency to drop unstressed syllables, particularly in initial position.

Another distinction, reported in literature is that of paragrammatism (Kleist, 1934). This refers to those disturbances often associated with sensory aphasias. This is characterised by substitution rather than omission errors. This syndrome is marked by motocically facile, sometimes excessively rapid speech output . The chief defect is paraphasias (phonemic and semantic).

Most of the studies on agrammatism and paragrammatism have been done in Western languages (like English) which is an uninflected language. Findings obtained from those studies cannot be applied in totality to other languages. This fact is especially important for Indian languages which are generally highly inflected and where word-order does not play as important a role as in English. Studies done on

Indian languages are not many barring a few like that by Bhatnagar and Whitaker, 1984, Who studied a Hindi speaking aphasic patient, in Whom they have shown that there is a dissociation between syntactic and morphological abilities.

With the above in mind, the following study had been attempted on Tamil speaking Broca's aphasics. The purpose of the study was to see the kind of agrammatic deficits seen in production tasks. Yet another aim of the study was to see whether parallel deficits in comprehension tasks are also present. In the following chapter a brief review of literature on agranmatism has been given, followed by chapters where the actual study attempted has been described.

REVIEW OF LITERATURE

Agrammatism has been the focus of attention over the past few years not only among aphasiologists, neurolinguists and psycholinguists, but also among theoretical linguists who believe that theories of language should be break-down compatible (Grodzinsky, 1986) . At the same time there has never been so much confusion over fundamental issues than in this area.

One must begin discussion about this area by pointing out the classic distinction between fluent and non-fluent aphasia, which is recognised across language communities. In Western literature on grammatical impairment in aphasia, a distinction is often drawn between agrammatic and para-grammatic symptoms (Goodglass and Kaplan, 1968).

Agrammatism is characterised by omission of grammatical inflections and function words, usually accompanied by a marked reduction in phrase length and syntactic complexity, giving the patient* s speech a ' telegraphic' look. These symptoms are generally seen in Broca's aphasics, i.e. in non-fluent patients with anterior focal lesions involving the Broca' s area. In fact, agrammatism is often viewed as a criterial symptom for the diagnosis of Broca's aphasia.

Thus the common configuration of agrammatism is as described by Alajouanine:

"Agrammatism is hard to define other than by the essential fact which the patient's speech makes evident; reduction of the sentence to its skeleton, relative abundance of substantives, almost invariable use of verbs in the infinitive, with suppression of the small words (the function words of language) and loss of grammatical differentiation of tense, gender, number as well as of sub-ordination. The richer the language is an distinction of these types, the more glaring agrammatism will appear and it will grow still more apparent as recovery of access to vocabulary takes place".

Thus from 1898 to 1970, agrammatism was defined only in terms of changes in the linguistic structure of speech output, in particular, the omission of grammatical morphemes. In the 1970's agrammatism was reinterpreted to extend across modalities: comprehension was assumed to be impaired in exactly the same way as production. Over the past five years, the discussion has centered on other lines, for instance - does agrammatism differ from paragrammatism? These latter speech symptoms are often associated with syndrome of Wernicke's aphasia.

Paragrammatigm in contrast to agrammatism is defined by substitution rather than omission errors. This kind of symptom is usually reported in fluent patients who suffer from moderate to severe word-finding problems. This syndrome is marked by motorically facile, sometimes excessively rapid speech output. The chief defect is paraphasias (semantic and phonemes) - or the unwitting substitution of ill chosen words and phrases in the stream of speech. Thus speech may sound normal where the incongruity of the verbal content may be missed.

The agrammatism/paragrammatism distinction has worked fairly well in English language studies of aphasia and seems to be a useful marker at the clinical level. However, for a variety of reasons to be discussed below, the Whole concept of agrammatism has recently come under fire.

An attempt has been made to provide a synopsis of the current advances. seen in this area, in this review of literature. The topics under which this review has been organize are as follows:

i) Historical background of agrammatism

ii) Production deficits in agrammatism.

iii) Comprehension deficits seen in agrammatism. This includes brief descriptions of the various theories on agrammatism.

iv) Agrammatism vs paragrammatiam: Is it a fictitious opposition?

v) Finally, methods of studying agrammatic speech have been discussed.

Historical background in agrammatism:

Arnold Pick (1851-1924) is generally credited with being the first aphasiologist to focus specifically on the question of grammatical impairment in aphasia. He explained agrammatism (motor) as a specific disorder and distinguished it from paragrammatism of sensory aphasia which he called as "pseudogrammatism". Thus, he distinguished two forms of expressive agrammatism*

a) Frontal: This is often seen in Broca's aphasics. Speech tends to be telegrammatic involving decreased complexity and occasional omission of function words and inflections. Grammatical symptoms seen in frontal agrammatism are essentially motoric in nature. This is the result of a principle of economy applied during the passage from inner speech to its outer realisation.

b) Temporal(Paragrammatism): This kind of expressive agrammatism is characterised by erroneous grammatical constructions; disturbances in the use of auxiliary words, incorrect word inflections, erroneous prefixes and suffixes. Thus, the tempo of speech is not retarded, tending towards

> logorrhoea with intact sentence pattern and intonation. These patients retain a certain amount of knowledge or "feeling for the language (Sprachgeful)". The problem in these patients lie in the access or use of grammatical forms, during a stage in which grammatical processes are applied and hence serve to match "what is said to be thought pattern".

Isserlin (1922) supports Pick's view holding that the abbreviated utterances of the agrammatic follows from his difficulty in uttering words. The result is the primitivisation of speech.

Kleist (1934) was the investigator responsible for introducing the term paragrammatism, which in contrast to agrammatism is marked by confusions in the choice and ordering of words and of grammatical forms.

Goldstein (1948) described agrammatism as a regular feature of motor aphasia, referring to the tendency of the motor aphasics to revert to the exclusive use of nouns and verbs. In inflected languages, however the verb tends to be spoken in the infinitive form.

The first attempts to subsume agrammatism in a linguistic framework came with the work of Jakobson (1956). He saw the

fundamental opposition between two components of language - paradigmatic and the syntagmatic. The former refers to the evocation of verbal symbols for specific referents, the latter refers to the sequential aspect of language, manifested in grammatical relationships. A breakdown in word finding (paradigmatic) disorder is known as similarity disorder, which is seen in temporal agrammatism. The breakdown in grammatical sequencing (syntagmatic) aspect is referred to as contiguity disorder which is seen in frontal agrammatism or the Broca' s aphasic type.

Luria (1970) shared similar views on agrammatism as those above. Agrammatism is seen in the context of efferent motor aphasia. He suggests that the motor agrammatism has a disturbance affecting the "dynamic context of language". The linguistic units that are aroused are isolated words used in nominative function. The predicative use of language drops out and hence speech consists of mainly substantives.

Production deficits in agrammatism:

Pick refers to English language "as an essentially form less language of high understanding". However the relative absence of grammatical morphology in English leads to a different picture of grammatical impairment, as compared to other languages.

Several studies have been conducted in this area and the characteristics of agrammatism recognised by different authors are as follows -

1. Loss of closed class words and predominant use of open class words (nouns and verbs).
2. Lack of fluency and use of stereotyped expressions and hence reduction in the variety of utterances.
3. Loss of syntactic rules which organise words into higher units, causing degeneration of sentences into a 'word heap'.
4. Ties of grammatical coordination or sub-ordination are dissolved.
5. Omission and occasional misselection of free and bound grammatical morphemes. Eg. Articles, preposition, conjunctions, participles, pronouns, verb inflections, case-markings, etc.

The first attempts to determine those syntactical operations which distinguish agrammatics from non-agrammatics can be found in the study by Goodglass and Mayer (i960). They chose agrammatic and non-agrammatic subjects. The two groups were equated for severity of aphasia and memory span. The test consisted of the following parts:

i) Repetition of series of phrases and sentences of increasing length and complexity following simultaneous oral and visual presentation.

ii) Synonym finding tasks,

iii) Auditory comprehension tasks.

iv) Finally a second score was given based on seven point rating scale for articulation.

Based on their study, agrammatics were found to show the following errors.

i) Omission of grammatical morphemes other than verb endings, eg. "Open window" for "open the window".

ii) Changes in verb form (a) simplification: Loss of inflectional ending or of the auxiliary word in a compound verb or changing the present indicative from to another form of the verb. Example; "he come" for "he will come", (b) Other(non-simplifled) changes in verb form: example. For "Has he seen his brother", he says, "did he see his brother"?

iii) Irrelevant openings and abortive starts. Example What is. . . . see his brother?

iv) Lose of inverted interrogative word sequence. Example "when he will see his brother". Instead of asking "When will he see his brother"?.

v) Loss of coordinating and sub-ordinating structure.

vi) Stereotyped repetitions of the same errors and loss of variety in syntactic forms.

These production wrrors have been reported in a variety of tasks. DeVilliers (1974) has analysed the speech transcripts

using spontaneous speech tasks of eight non-fluent aphasics and five normal controls for the presence/absence of fourteen grammatical morphemes in their obligatory contexts and has been reported the above findings.

Other studies have been done using sentence completion tasks (Gleason, Goodglass, Ackerman and Hyde, 1975); sentence repetition (Goodglass, Fodor and Schulloff, 1967) and also using picture descriptions.

Slowly, as different studies on the production deficits of agrammatlcs were carried out, divergent views regarding the underlying disturbance in agrammatism began to emerge. These views ranged from treating agrammatism as a phonological (Kean, 1983) to morphological and finally purely syntactic disorder (Schwartz, et al. 1960). Thus studies were done to isolate each of these processes which was thought to be impaired.

Goodglass and Mayer (1958) based on their study of five agrammatic and five non-agrammatic aphasics found that these groups differed sharply with respect to syntactic constructions (positioning of words by grammatical function), but differed much less in their tendency to omit or confuse inflectional endings and "small words" of grammar. Their findings suggested that the morphological aspect of agrammatism

can be well studied separately from the syntactic aspects.

Goodglass and Hunt (1958) compared the ability of aphasics to answer questions correctly with words ending in a plural 's' as opposed to a possessive 's'. They also required their subjects to judge the correctness of tape recorded sentences from which either plural 's' or final possessive 's' was omitted. The possessives were found to be more difficult than the plurals both in expressive and auditory receptive parts. Thus this study implicates that morphological aspects are affected in agrammatics.

Goodglass and Berko (1972) investigated the aphasic individuals ability to produce orally common English words with inflectional endings appropriate for the completion of English sentences. Total of ten inflectional morphemes in English were studied like third person singular, possessive /s/ and plurals. Results of this sentence completion task showed that aphasics vary widely in their ability to supply inflectional endings. Thus, morphological aspects were found to be impaired in agrammatic aphasics. This was shown by the pattern that the difficulty of various inflectional endings in aphasics followed a definite order, and were based on grammatical function but not on phonological similarity. Example - in those items in which exact homonyms

were used, agrammatics showed variations in difficulty. For example - 'Horses' as noun plural was failed by only three, but horse' s as possessive was filled by all the subjects.

In contrast to the above studies, other studies like that by Saffran, Schwartz and Marin (1980) states that the basic disorder in agrammatism is syntactic. Saffran et al (1980) were the first ones to state that disturbances of word order are part of agranmatic production.

Production tasks were elicited in their study by asking the patient to construct sentences for a set of pictures, and also by using tasks where words or phrases were printed separately on each ward. Task was to arrange the cards in linear order to produce a well formed unit. Both these studies showed that agranmatic patients made more word order errors when the two objects whose relations were to be described, were alike in animacy. Results of this experiment pointed to a word order deficit in agramma-tism.

Most of the knowledge of the grammatical deficits on agrammatism is obtained from English or other related languages, in which word order plays a predominant role as compared to inflections. These languages as a rule are analytical in their structural organisation (grammatical

relations depend in large measure on the ordering of words), hence the aphasiological data from this literature may have prejudged our analysis. Thus agrammatism has come to be associated with a disorder which consists of omission of function words and inflectional morphology in speech, leaving contentives intact. However this pattern of agrammatism may not hold good for syntactic languages or highly inflected languages where grammatical relations depend in large measure, on affixes/bound morphemes. Hence, eventhough agrammatism is taken to be a universal phenomenon, this syndrome may have different configuration depending on the language in which it occurs.

Grodzinsky (1984) draws support for the above explanation from a Hebrew speaking aphasic patient. This patient was found to retain the inflectional morphemes (bound grammatical morphemes) which are usually lost in agrammatism. This has been explained as due to the Hebrew language structure. In this language the uninfilected items is not only a non-word, but also an illegal phonological string in that language. Thus, lexical items depend both morphologically and phonologically on the inflectional morphology. Data showed that the pattern of agrammatism in this Hebrew speaking patient manifested as misselection of inflectional morphemes or the Bound

grammatical morphemes resulting in syntactically aberrant sentences, than omission of inflectional/bound morphemes.

Bhatnagar and Whitaker (1984) have described agrammatic pattern on a Hindi speaking patient which is again a synthetic language. This patient presented some difficulty lousing all the free grammatical morphemes (auxiliaries and modals), while his ability to produce bound grammatical morphemes (which are attached to verbs as suffixes to indicate number, gender and tense information) was severely impaired. In producing verb forms which contained grammatical inflections, he either deleted the entire verb or dropped the suffix. At times, he produced the root form and6ccassionally the infinitive form of the verb.

In a cross linguistic study of grammatical morphology in aphasia Bates, E; Friedrici, A; Wulfeck, B, (1987) have stressed this point; by comparing English language with Italian and German languages which have a rich inflectional morphology. Their question was if it is the case that agrammatic aphasics are particularly impaired in their production of grammatical morphology, are they at a greater communicative disadvantage in a morphologically rich language? Or, alternatively do the aphasic patients struggle to retain the rich morpho logical "shape" of their language.

In this study five to ten Broca's and Wernicke's aphasics in each of the three language groups (English, German and Italian) were compared with an equal number of normal controls. A set of nine picture cartoons were used, and these were presented to the subjects in a randomimed order. They were asked to describe the pictures. Though both aphasic groups were impaired in their production of grammatical morphology, they were found to retain the 'morphological shape' of their nature language evidenced in the preservation of language specific closed class ratios in all the aphasic groups; that is, significantly more morphology was produced by German and Italian patients. This provides support for Pick's notion of 'sprachgeful' or the 'feeling for language' and also proof that agrammation may have language specific manifestations.

Yet, another aspect of grammatical breakdown in production which has not been discovered concerns contextual effects in agrammatism. Traditionally, Broca's aphasics are thought to retain the contentive lexicon (nouns and verbs) while their impairment effects only non-contentive function words like grammatical markers.

Myerson and Goodglass (1972); Marin, Saffran and Schwartz(1976) have reported of patient types who present

with substantial difficulties in producing main (root) verbs including main have / be verbs. Two types of verb production difficulties have been noted.

a) Omission of verbs

b) Nominalisation of verbs

Miceli, Mazzuchi, Menn and Goodglass (1983) have detailed documentation of agrammatics tendency to omit main verbs. Miceli et al describe an agrammatic who omitted approximately 20% of main verbs.

Miceli and Caramazza (1984) investigated agrammatics abilities to produce names of objects and describing actions. Agrammatic patients as a group were found to present a marked deficit in naming of actions than naming objects. Similarly,Bhatnagar (1984) showed that his Hindi speaking aphasic patient had difficulty with verb forms which he either deleted or produced the first syllable of the verb or the infinitival verb form.

Thus agrammatism may affect wen the contentive (lexicon) words (like verbs) along with the function words, and hence a clear cut demarcation of a spared contentive lexicon while function words being affected is not possible.

Comprehension in agrammatics:

Around the mid 1970's agrammatism was reinterpreted to extend across modalities - comprehension was assumed to be impaired in exactly the same way as production (Bonhoeffer, 1902; Goldstein, 1913; Salomon, 1914; Kleist, 1916). Despite this, there were a few other studies which refuted the existence of any comprehension disorder.

Caplan (1981) did a study on eleven Broca's aphasics who were tested for comprehension of sentences containing gerundive constructions. Results showed that as a group, these patients were sensitive to grammatical distinctions signalled by function words, contrary to predictions about deficits seen in this syndrome. Further analysis revealed two subgroups of patients - one which showed sensitivity to distinctions in normal grammar and another who exhibited no such sensitivity. This shows that the syndrome may have different manifestations in different population.

Miceli et al (1983) too have reported on a pair of agrammatic aphasics without any comprehension defect. Their deficit pattern in spoken output can be interpreted as suggesting a syntax-morphology dissociation. In both these cases, there was no damage to the central language

processor. However, as the above are only two studies presented, the authors view that caution must be taken before generalising to other agrammatics.

Caplan (1986) is another strong proponent of intact comprehension of syntax in Broca's aphasics. He has studied sentence comprehension patterns in a agrammatic patient. He found that his patient was not randomly assigning thematic roles to noun phrases in sentences. Rather there were regularities in her comprehension performance which depended upon the syntactic structures of the sentence presented. However, these were not completely determined by the structures themselves as in normals.

Nespoulous (1988) too espouses Caplan's view, based on his studies of a Broca' s aphasic. This patient had a left hemisphere lesion involving sylvian region but sparing Broca' s area. This patient produced agrammatic speech in the absence of any comprehension deficit.

Studies have also been done on other languages than English which are highly inflected. In an another study by Lukatela and Shankweiler (1988) they found similar results as above on six serbo-croatian speaking agrammatic patients. The aim was to test inflectional morphology in

and subjects were asked to judge whether spoken sentences were grammatical or not. Sensitivity to two kinds of syntactic features was investigated in these aphasic patients. (1) sub-categorisation rules for transitive verbs (this must be followed by nouns in accusative case; intransitive verbs - followed by nouns in/other cases) (ii) Sensitivity to inflectional morphology marking noun cases. Test items were three word sentences (noun-verb-noun) in which verb transitivity and appropriateness of the case inflection of the following noun was manipulated. Results of grammaticality judgement tasks showed that both syntactic properties were preserved in these patients.

Despite the above reported findings, other studies conducted point to the existence of comprehension deficits in agrammatism. Based on these, several hypothesis/theories have been put forward regarding the nature of comprehension deficits in agrammatism.

THEORIES OF AGRAMMATISM:-

Several theories have been put forward. These are as follows:

Phonological Deficit Hypothesis: According to Kean, "In comprehension, production and on metalinguistic tasks, there is overriding regularity to the pattern of linguistic performance of Broca's aphasic..... major lexical items which carry word stress typically are fully attended to, but function words and inflectional morphemes which occur phonologically as elitics on major lexical items and which do not carry stress are ignored. Thus the dysprosody and agrammatism in Broca's Aphasics can be explained solely as phonological deficit".

Phonological component of grammar assigns to sentences their sound interpretation. On the one hand, it specifies the segmental sound shape of individual words, and on the other at specifies stress and intonation pattern of the words in a sentence and sentence as a whole.

There are two levels of segmental representationi-lexlcal representation where the generalization that the P's in 'Pan' and 'nip' are the same is captured, and the level of phonetic representations where the presence or absence of the properties of speech sounds in specified in degrees. In a true phonological deficit, both these levels of representation would be affected. In less severe deficits, the deficit in phonetic representations would manifest itself as articulatory variation from norm, in the degree to which properties of sounds are present in a given segment. Thus the data by

Blumstein that the articulation of Broca's aphasics is deviant from normal segmental articulation is consistent with the hypothesis that Broca's aphasics have a phonological deficit. Naming of a segment requires assigning a phonological interpretation to the perceived acoustic signal, and hence one with phonological deficit would be expected to perform poorly than normals. This pattern is indeed seen in Broca's aphasics, and this again supports the hypothesis that Broca's aphasics have a phonological deficit. Broca's aphasics typically make segmental paraphasias, like misreading 'pan' as 'ban', which again supports the hypothesis that they have a phonological deficit. Many of the morphological omissions of Broca's aphasics are conditioned by sonorance hierarchy. Consonantal morphemes, like the 'S' of the plural in English, are least likely to be deleted in the speech of Broca's after the most sonorant segments (vowels) and most likely to be deleted after the least sonorant segments (fricatives and stops).

Contd.....

When' word ' boundary morphemes like ' runs' and non-word boundary morphemes like sub-mit, re-ject, remit' are compared, the former are omitted by Broca's aphasics, but the latter are not. In terms of the structure of English, there are two arguments which supports the hypothesis that omission of word boundary suffixes in Broca's aphasics is the result of a phonological deficit: (l) although there are many different sources for those affixes, what unifies them is their phonological properties, (2) at some levels in the grammar, eg. level of word formation, there are different types of affixes which are effected differently in the verbal output of Broca's aphasics. It has also been found that Broca' s aphasics generally retain proper word stress. This is consistent, with the hypothesis that they ignore material which does not affect stress. In a sentence function words do not carry stress or affect the stress pattern of the sentence. Thus a Broca's aphasic tends to reduce the structure of a sentence to the minimal string of elements which can be lexically construed as phonological words in his language.

Criticisms for Kean's theory:- Kean makes too strong a claim when she says that Broca's aphasic ignore granmatical morphemies(i.e. function words and bound morphemes). This would mean that they will be unable to differentiate denials from affirmations.

Example: The collar is unbuttoned.

vs

The collar is buttoned

Similarly, they cannot differentiate one from many like "shoe" from "shoes" or "up" from "down". As Broca's aphasic do not fail to perceive these semantic distinctions, they must be attending to the grammatical morphemes which mark them (Goodglass, Glide, Gleason, Hyde, 1970; Schwartz, Saf f ran and Marin, 1980) . Or in other words, restating Kean' s arguments, Broca' s aphasics are then insensitive to purely syntactic aspects of grammatical morphemes, in particular to those aspects which mark semantic ally relevant grammatical functions like subject of a sentence, direct object and so on. Also, how central, then, is the so-called phonological deficit? Are Broca' s capable of recovering the underlying syntactic structures from constructions in which grammatical morphemes serve no essential role? Can they, for instance, decode simple declarative sentences in which grammatical roles are marked by the order of major

lexical items? According to Kean's phonological account, agrammatics will be able to do so, as failure to map a noun-verb-noun string into the canonical S-V-0 base structure would not be explicable in terms of phonological categories. Studies have shown that word order deficits are seen in agrammatism (Saffran et al 1980). Thus Kean's phonological theory cannot entirely explain all aspects of agrammatism.

Lexical deficit hypothesis:

Among the many theories on agrammatism, another widely accepted one is the lexical deficit hypothesis. Main proponents of this view are Bradley, Garrett and Zurif (1980). Bradley et al. (1978) did a study on agrammatics, where they found that agrammatics showed an appreciable effect for the closed class words when measured over the entire range, while normals did not. Bradley et al (1960) have suggested that there is normally a specialised brain system which mediates the lexical aceess and retrieval of the elements of the grammatical structure in the language. They have further suggested that agrammatic deficits (comprehension and production) seen in Broca's aphasics are due to damage to this specialised system. They conducted series of experiments to determine differences between

the frequency sensitivity of the two classes of words in a standard lexical-decision task. In normals the closed class words were identical to open class words. In striking contrast, the closed class words did show a frequency effect.in the experimental groups which comprised of fiveagrammatic Broca's aphasics.

Swinney, Zurif and Cutler (1960) too have done a study to determine the effects of sentential stress and word class upon comprehension in Broca's aphasics. While normals showed no effects of word class, aphasics were found to respond faster to open than closed class words. These results were interpreted as support for the theory that Broca's aphasics lack the functional underlying open/closed class distinction used in word recognition by normal listeners.

Miceli et al.(1984) in reporting on agrammatics who had difficulty in producing main (root) verbs speculate that agrammatics may be selectively impaired in processing a particular subcategory of the lexicon i.e. verbs. A major implication put forward in this study concerns the organization of the lexicon in which he proposes to be along form class. This specifies that the subcomponents of the lexicon may be separately affected like the

component for grammatical markers may be selectively impaired as distinct from the component for verb forms.

However, other studies have failed to find any support for the lexical deficit hypothesis. In a study on agrammatics (not synonymous with Broca's aphasia) by Gordon and Caramazza (1983), lexical decision tasks were used where the patient had to press a switch if they thought it was a word presented and no response was needed for non-words. Results showed that patients did not show any evidence of such dissociation as reported by Bradley et al (1978). There was no numerical difference in correlation coefficients between these groups. This study, thusfefutes the claim about the underlying basis for agrammatism i.e. agrammatism results from a disruption of the frequency in sensitive closed class access system.

Support against this hypothesis can also be obtained from the study by Grossman, Carry and Zurif (1986). They studied the agrammatic aphasics ability to comprehend sentences containing articles and compalred.their ability to distinguish between common nouns (Eg. A rose) and proper nouns (Rose). The three Broca's aphasics tested were found to point to pictures representing classes of objects when asked to point to 'a rose' and to pictures of unique

individuals when asked to point to 'X' or 'Rose'. Thus these studies show that agrammatics are able to keep track of the presence/absence of articles. Thus they can make grammatical decisions at the lexical node/level of linguistic analysis.

Study by Petocz, A; and Oliphant, G. (1988) too fails to provide support for this lexical deficit hypothesis according to which Broca's aphasics cannot make use of special retrieval mechanisms for closed class (function) words.

Existence of specialised mechanisms for open and closed class words were put forward based on two observations*

1) Recognition that open class words are frequency sensitive but closed class words are not.
2) Lexical decision tasks for nonwords which began with open class words were delayed, while there was no such interference for nonwords which began with closed class words.

In this study, three lexical decision experiments were done and it was found that the closed class words are not different from open class words with respect to either frequency sensitivity or to non-word interference. Thus the

proposed explanation of agrammatism as a lexical deficit hypothesis is left without any empirical support.

Yet another version of the lexical deficit hypothesis has been put formard. There is a recent body of evidence which now indicates that agrammatism does not involve loss of closed class processing abilities. Rather, the problem appears to be one of access. While agrammatics maintain a sensitivity to closed class morphemes, their ability to use them depends on specific task conditions. For instance, Linebarger, Schwartz and Saffran (1983) showed that the agrammatics were able to use closed class structures on a grammaticality judgement task even though they may have had difficulty using them for assigning thematic relations on a comprehension task. Further evidence that Broca's aphasics maintain sensitivity to closed class morphology comes from studies of sentence comprehension in German and Dutch agrammatics and in serbocroatian speaking Broca's aphasics. Results of these studies showed that the ability of agrammatics to make use of closed class cues to sentence relations depends upon factors like task structure and task demand. Smith and Mimica (1984) have shown that agrammatic Broca's aphasics ability to use closed class morphology in comprehending agent object relations depends upon specific interrelations between closed class, open class and position cues.

Smith and Bates (1987) did a study on Yugoslav agrammatic Broca's aphasics for testing the comprehension of agent-object relations in a series of simple serbocroatian sentenc in the conversational past tense, consisting of two nouns and a transitive action verb.

The availability of two closed class cues - case contrasts and gender contrasts as well as animacy contrasts was varied across sentences. The pattern of agent-object assignments for Broca's aphasia revealed that the degree to which they were able to access the two closed class cues depended on convergence of the various cues to agent-object relations. They again view that it is an access deficit than loss.

Syntactic deficit hypothesis:

The question of whether agrammatic language reflects selective damage to a component of the language system specialised for syntactic processing has been a major focus of research activity since 1970's. These agrammatic aphasics have been shown to be insensitive to the syntactic structure of sentences, in both production and in comprehension. In production, there is frequent omission of grammatical elements like determiners and auxiliaries, the

primary role of which is in the expression of syntactic structure and there is a general reduction of sentence structure to the point where major lexical items appear in isolation and are produced serially in list fashion.

In the receptive side also, difficulties involving syntactic aspects of sentence interpretation have been noted. In particular, agrammatic aphasics perform poorly on sentence comprehension tasks, which require the recovery of the thematic relation as signalled by grammatical morphemes and word order. Thus, they have difficulty in comprehending sentences like:

The dog chases the cat.

The cat that the dog is chasing in black(Schwartz, Saffran, Marin, 1980)

Schwartz et al concluded from their study, that agrammatics show a syntactic mapping defect such that they were unable to use a principled set of procedure to recover the relational structure of spoken sentences. According to them, it is word order which is affected in agrammatics.

Zurif, Caramazza and Myerson (1972) were the first who demonstrated that patients classified clinically as Broca's

aphasia were not only agrammatic in their speech output but also presented a pattern of receptive agrammatigm in their performance on a metalinguistic task. Zurif and Caramazza (1976) did a study on three Groups of aphasias - Broca' s, conduction and Wemicke' s. Three types of sentences were used (a) semantically loaded sentences (b) sentences for which knowledge of sentence structure is important (c) sentences which describe highly improbable events. Subjects task was to choose which of the two pictures captured the meaning expressed in the sentence, Broca' s aphasics performed near perfectly when they could use semantic information and performance dropped to chance when they had to use syntactic information. Their results support a neuropsychological dissociation of heuristic and algorithmic processes. Broca's aphasics are unable to use syntactic - algorithmic processes, while retaining the capacity to use heuristic procedures to assign a semantic interpretation to an incompletely represented syntactic organisation. Thus their impairment in comprehension is specific to syntactic abilities.

Other authors too view that syntactic aspects are affected in Broca's aphasics. Kinsella (1981) did a study of sentence completion in six Broca's aphasics. 150 sentences with one word being omitted were chosen as/est material.

Five syntactic categories were used - nouns, verbs, preposition and both versions of the particles. Along with this, three levels of constraint - high, medium and low were used. The subjects were asked to produce a single word to fill the gap in the sentence frame.

The primary aim of the study was to contrast syntactic type (content vs function words) and levels of sentential constraint as ways of determining whether there is a central syntactic component to the language deficit. There was a significant effect for word type and a significant interaction between word type and level of constraint was found.

General assumptions underlying the syntactic deficit theory in agrammatism (SDTA):

In Broea's aphasics, linguistic competence is often undermined by brain damage - specifically that Broca's aphasics can no longer fully control algorithmic procedures which are likely to operate independently from semantic content. Thus Broca's aphasics are found be as impaired in production, as they are in comprehension. The impairment is a spedific one - they are unable to use syntactic - algorithmic processes. Present data along with previously reported metalinguistic data suggest that atleast for the Broca's

aphasics, brain damage affects a general language processing mechanism which subserves the syntactic components of both comprehension and production. The implication which follows is that anterior language area of the brain is needed for syntactic like cognitive operations (Zurif, and Caramazza, 1975).

This SDTA has been argued more explicitly and forcefully by Berndt and Caramazza in their "redefinition of the syndrome of Broca's aphasia" (Berndt and Caramazza, 1980). They explain/the syntactic deficits seen in Broca's aphasics as follows: They begin with a breakdown of the normal language processing systems into four components: a phonological analyzer, a syntactic parser, a lexicon and a semantic interpreter. After reviewing the symptoms of Broca's aphasia, they conclude that these symptoms can be seen as "predictable benavioural manifestations of a central disruption of the syntactic parsing component of the language system, coupled with an articulatory deficit that affects only the speech output system. The syntactic deficit affects both productive and receptive aspects of language use".

Berndt and Caramazza described the consequences for production of a deficit which effectively subtracts out the syntactic parsing component:

"Without a planned syntactic frame to guide production, lexical items with a purely syntactic function would not be selected by the semantic interpreter, that is, patient's utterances would be expected to be agrammatic. Also, without adequately/selected syntactic structures, one can expect other output problems like word order disturbances. The characteristic dysprosody of Brocas aphasics is also a predictable consequence of a failure to select a syntactic frame to guide production,"

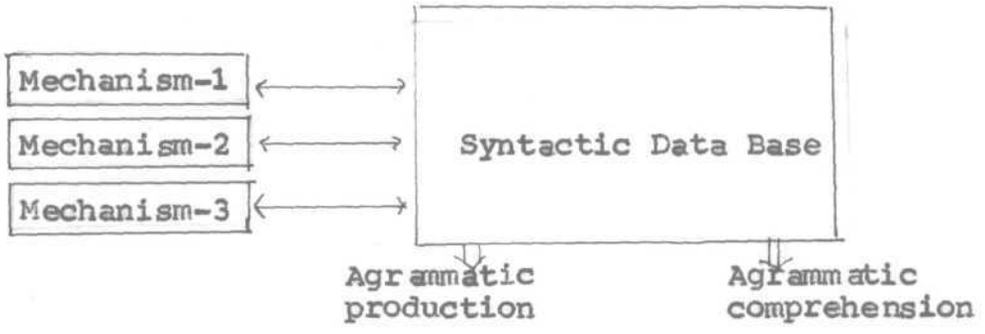
Granted, that there is a mechanism which functions to generate syntactic structures, several questions which arise are (a) Is syntactic analysis a necessary part of language production and comprehension. If so, is there a mechanism devoted to the realization of all and only those linguistic distinctions that are of a syntactic type? (b) Granted the existence of such a mechanism, how is it constituted -is the information that governs its operations represented explicitly, i.e. in the form of rules or statements or implicitly in the schedule of operations that it performs?

In an attempt to answer these questions, several possible versions of the SDTA have been put forward, each of which rests on an alternative conception to the syntactic

component. These are as follows:-

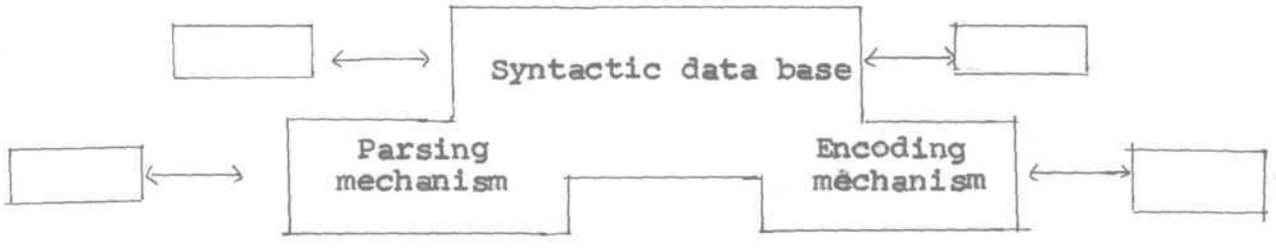
Alternative versions of the SDTA:

Version-I: Competence and transparency



This rule system - syntactic data base (SDB) er the syntactic data base is exploited directly in production and reception of sentences by means of various non-specific mechanisms, which are utilised in other nonlinguistic cognitive activities as well. In agrammatics, this syntactic component no longer operates, and hence speaking and listening proceed without the syntactic knowledge base and without the benefit of a syntactic analysis.

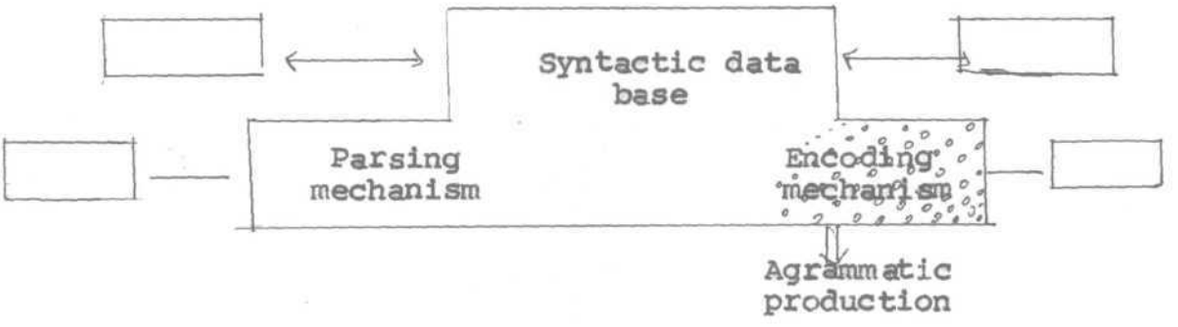
Version-2: Competence without transparency.



On version-2 of the SDTA, the syntactic component is made to embody a mental competence grammar which plays an

intimate but non-transparent role in language processing. The essence of such an account is that, in contrast to version-1, specialised mechanisms are now needed to access this 'rule library' and translate its contents into real-time processing operations.

Version-2 of the SDTA explains agrammatic language behaviour in terms of subtraction/of this syntactic component from the language sub-system. The difference in this version-2, lies in the fact that, this version admits possibility of deficits arising internal to the component, which by differentially affecting the parser or the encoding mechanism result in syntactic deficits restricted to the domain of production or comprehension as the case may be.



Version-3: Neither competency nor transparency.

This version embodies a rej action of the competency claim. The grammar, is not, in this view, a proper sub-part of the language processing system. Hence, though it is

reasonable to talk about stored knowledge of the syntactic patterns of language, this knowledge must not be viewed as entering into the actual production or perception of sentences. Instead, the relevant knowledge is implicit in the functional architecture of specialized computational mechanisms and in the schedule of operations they performs.

Thus given the assumptions that specialized computational mechanisms perform syntactic analysis during speaking and hearing, and that these mechanisms share at least some overlapping computational routines,it is possible to articulate version-3 of the SDTA as follows - where by damage to either parser or syntactic generator will necessary affect the functioning of the other, at least to the extent that shared operations are affected.

Overlapping computational routines.

The above are the several variants of the SDTA. The three versions differ, in their dharacterisation of syntactic component and the way in which syntactic knowledge and processes interact. Despite this, there are evidences which speak against the syntactic deficit hypothesis.

An evaluation of the syntactic deficit hypothesis:

The central fact which goes against this hypothesis is that the pattern of performance on comprehension and metalinguistic tasks which have been called'agrammatic comprehension' is by no means restricted to those aphasics who speak agrammatically. Similar performance patterns have been obtained from fluent speakers diagnosed as conduction aphasics. Caramazza and Zurif (1976) and Heilman and Scholes (1976) have reported that the sentence comprehension performance of conduction aphasics appears to be identical to that of Broca's aphasics (that is, it is asyntactic) although their speech is not agrammatic. This dissociation thus raises the possibility that the agrammatism and syntactic comprehension are not the result of a disorder to a single processing mechanism, but are related only accidentally. For example, it could be suggested that independent mechanisms for expressive and receptive language functions are represented in spatially adjacent areas of the brain and thus are likely to be damaged jointly, resulting in the observed co-occurrence of expressive and receptive agrammatism. If the two mechanisms are independent then it is possible that they can be impaired selectively. Secondly, there are several

reports in the literature of patients having agrammatism in sentence production but without any comprehension deficits. Nespoulous et al. (1988) reports of a French-speaking patient with Broca's aphasia. This patient produced agrammatic speech inthe absence of any comprehension deficits. They argue that the patient's deficit is not central and not crucially syntactic (at least} at the level of knowledge, but seems to disrupt specifically those (automatic) processes responsible for both retrieval and production of free-standing grammatical morphemes.

Branchermau and Nespoulous (1989) - based on their study of the ability of agrammatics to carryout syntactic parsing and to access and produce three different types of preposition, came to the condlusion that the interpretation of agrammatism as a central syntactic deficit must be rejected. This was based on the ability of agrammatics to judge the grammaticality of sentences. Agrammatics were able to distinguish between.ill and well formed sentences and also indicate the exact position/of the missing preposition in a sentence.

Evidence for receptive agrammatism often comes from sentence picture matching tasks (Caramazza and Berndt, 1978).

In recent attempts to test the syntactic abilities of agrammatic aphasias, tasks were constructed like grammaticality judgement, which reduces the requirement for semantic interpretation . This is done by asking them to judge the grammatical well-formedness of auditorily presented sentences embodying a wide range of syntactic constructions. Results showed that subjects were able to perform syntactic analysis of the input sentences, despite the fact, that they were agrammatic in comprehension. Above are the various theories of agrammatic deficits.

Methods of investigation in agrammatism:

Unlike investigations within the semantic level, where it is useful to have a specific stimulus, so that there is some certainity about the word the patient is trying to find, investigations at the syntactic level often rely primarily on spontaneous speech to provide data for analysis. Indeed, due to difficulties inherent in assessing patients abilities in syntactic comprehension, spontaneous speech is often used as the sole date for the analysis of grammatical disability. Most of these investigations make no distinctions between spontaneous speech as recorded in interviews and speech which has been elicited through story-

picture description. Often both are assumed to provide the same kind of data for syntactic analysis.

The primary difficulty in using spontaneous speech is that the number of occurrence of examples of what the investigator is trying to assess cannot be controlled, nor can the speaker's intentions always be clearly ascertained. To over come this difficulty, some have used formal materials designed to elicit specific construction* or words of certain syntactic classes, so that the patients rates of success on various tasks can be compared.

The method of doing this is to provide the patient with two, three or four high frequency words and to ask him to put them in a sentence. Other useful methods of eliciting structured speech samples include giving the patient a lead-in sentence (referring to a picture or real life action) so designed that there is high probability of a normal speaker producing a certain structure. Another method is to give the sentence to the patient and ask him to repeat it.

The above mentioned methods elicit speech in order to examine syntactic knowledge. Examples of these tasks are sentence-completion, repetition, spelling, construction of sentences from given words.

The final principal method of investigation of syntactic abilities does not require the patient to speak and hence provides a method of investigation of patients with major difficulties in speech. Tasks included under this method are the picture-choice, judgement of syntactic acceptability, sorting or pairing of words and following of directions. Picture-choice method is a clinically attractive method as it does not require speech, but limitations of the test is that it can be restricted to what can be unambiguously illustrated by pictures, and in that it does depend to some extent on visual interpretative abilities.

The above are the principal methods of investigations of syntactic abilities. This leads to the conclusion that there are advantages and limitations in each method. Combination of methods, however - time consuming, seems to be necessary both for individual diagnosis and for advancement of theories about aphasia.

In the following chapter, description of the methodology of the study done, has been given.

METHODOLOGY

The aim of the present study was to assess the following:

1. Do Broca's aphasics have difficulties in spontaneous speech? If so, what are the patterns of the deficits seen?
2. apart from deficits in production task are there parallel deficits in comprehension in Broca's aphasics?
3. Does the nature of the task used (Grammaticality judgement vs picture pointing) influence the test results?

Subjects: Pour Broca's aphasics in the age range of 40-70 years were studied. Mean age was 46 years. Out of the 4, 3 were female and one was a male. All the subjects had suffered a cerebrovascular accident. On the basis of both neurologic evaluation and linguistic criteria -Western Aphasia Battery (hence forth WAB), these subjects were classified as Broca's aphasid's. Apart from this, the subjects had to meet the following criteria:

a) They must have had Tamil as their mother tongue.
b) They should be right handed.
c) There should not have been more than a single attack of stroke.
d) Time following stroke must be from within 3 months to 1 year (till 2 years).
e) They should not have undergone any speech therapy.

The subjects (Broca's aphasias) performances were compared with a control group which consisted of four normals. Both the groups were equated in terms of variables like age, sex, socio-cultural status and literacy level so that the results can be compared.

Test environment: All patients were evaluated in quiet environment where distractions were minimum. Any potential visual distractlve stimulus were removed.

Tools/stimuli used in the present study were:

a) Tamil version of the Western Aphasia Battery.
b) Expression tasks:
c) Grammaticality - Judgement tasks.
d) Picture-pointing tests.

a) Western Aphasia Battery (WAS): This test was designed by Kertesz and Poole (1974). WAS was designed for clinical and research purpose. The oral language subtests are:-

i) Spontaneous speech
ii) Auditory verbal comprehension
iii) Repetition
iv) Naming

Norms are available for this test. This can be used to assess the severity and type of aphasia. The summary of their scaled scores provides the aphasia quotient (AQ). Each subject was given the Tamil Version of WAB, prior to their inclusion in the study.

b) Expression tasks: Two main types of tasks were used in order to elicit speech sample for analysis.

(i) Spontaneous speech sample was obtained through ordinary conversation. This conversational speech sample covered questions which included topics like nature of the illness, occupation, premorbid condition and narration of everyday activity. A corpus of 250-300 wordsspeech sample was collected for each aphasic through such conversation.

(ii) Story narration task was also included. The story chosen was that of the 'Fox and the Crow'. All the recordings (spontaneous speech and story narration tasks) were done on audio-cassettes. The samples were later transcribed and analysed.

c) Grammaticality judgement task: This task (metalinguistic) was used for assessing the syntactic abilities of the aphasics. Source material for this was the linguistic profile test (LPT) designed by Karanth (1960). This test was designed with the 'objective of evaluating the linguistic competence of aphasics by obtaining and analyzing adequate linguistic samples at the phonemic, syntactic and semantic levels both in reception and expression". (Karanth, 1980).

The test has three major sections:

(i) Phonology (ii) Syntax (iii) semantics.

The grammaticality judgement task has sub-sections which are based on similar lines as that of the syntax portion of the linguistic profile test. Thus, there are 10 sub-sections in the grammaticality judgement task. These include -

a) Morphophonemic structures
b) Plural forms
c) Case markers
d) PNG markers
e) Tenses
f) Intransitives, transitives, and causatives
g) Conjunctions, comparitives and quotatives.
h) Conditional clauses
i) Participal constructions
j) Sentence types.

Under each sub-section, 10 items were included for testing. Out of the 10 items, half of them were right and half of them were incorrect sentences. The distribution of correct and wrong items in the sub-sections were done in a random manner. The subjects were asked to judge whether the given sentences were grammatically right or wrong. Sentences were presented both aurally and in written form. Thus, a total of 100 items were included in this test.

d) Picture pointing tasks: This was used in order to assess whether the nature of the task can affect test results. A set of 40 pictures were used for this purpose. Each picture had 3 items - one of which is the correct response and the other two pictures being incorrect. Sentences were presented orally. The subject's task was to point to the appropriate picture for each of the sentences given. Sentences used tested similar aspects of syntax as in the grammaticality judgement task i.e. pictures were used for testing PNG markrs, case markers, plurals, transitives/intransitives, conjunctions, comparitives and quotatives,and sentence type

Procedure: Each subject was initially given the Tamil version of the Western Aphasia Battery to check whether the scores fall with in the range of Broca's aphasia. Only those subjects who had atleast some speech output and who fall in the category of Broca's aphasic'a were selected for the study. Each aphasic was tested individually. The study was then carried out in the following steps:

Step-1: Four Broca's aphasic's were chosen for the study, on the basis of the criteria listed above.For Each of them, conversational speech sample and story narration tasks were recorded. These recordings were done on audio-cassettes. All recordings were done over a span of 2-3 sessions so that adequate speech sample was available for analysis.

Step-2: After this, each aphaslc was given the grammaticality judgement task. Sentences for this task were presented in aural and written form. Subjects responses could be either verbal or non-verbal i.e. by pointing to papers marked ' ' or 'X' .

Step-3: After the above task was completed, subjects were given the sentence picture matching tasks. Each sentence was read out by the examiner and the subject had to point out to the picture which he thought to correspond best with the utterance.

The entire test procedure was carried out in intervals in order to avoid fatigue in the patient. Same set of recordings were carried out for the control group.

Analysis: The three sections were scored independently scoring of each of the section was as follows:-

b) Expression task: The kind of tasks included under this section were spontaneous speech and story narration task. Both these tasks were scored quantitatively and qualitatively. Quantitative scores obtained were:

1) Mean length of utterance - This was obtained by dividing the total number of words spoken by the total number of utterances:

$$\text{MLU} - \frac{\text{Total number of words}}{\text{Total number of utterances}}$$

2) Total number of content words - Each content word was counted independently. Categories which were included under the content words were noons, verbs and adjectives.

3) Total number of function words - In calculating the total number of function words, both free function words and bound grammatical morphemes were counted. Free function words include determiners like /adu/'that', auxiliaries like /padithu kondu/ (is reading'; post positions like /me:le/; 'above' /ki:le/ 'below', quantity like /konjam/ 'little'. Each bound grammatical morpheme was also counted independently. Bound grammatical morphemes include 'PNG' markers case-markers. and 'Tense-markers Example: In the word /pa:rtha:l/;/(pa;r/ was counted as one content word and /tha:l/ was counted as a bound grammatical morpheme.

4) Closed class density score - This was calculated as follows and expressed as percentage.

$$\text{closed class density} = \frac{\text{Total number of function words}}{\text{Content words + function words}} \times 100$$

5) Open class density score - Similarly, this was calculated as follows and expressed as percentage.

$$\text{Open class density score} = \frac{\text{Total number of content words}}{\text{Content words + function words.}} \times 100$$

Qualitative analysis: A qualitative analysis of both the speech tasks was also done separately for each of the four aphasics. Qualitative analysis was done in terms of the variety of syntactic structures used and the appropriateness of these structures.

b. Grammaticality judgement tasks: Responses of 'right' and 'wrong' as given by each subject were noted down on separate score sheets. After this, each accurate response (or a correct judgement) was given a score of '+1', while an incorrect judgement was not given any score at all. The scores on the different sub-sections were added to obtain a composite score out of 100. In addition to this, a 'Grammatical sensitivity index' was calculated for each sub-section; for all the subjects. This is given by the formula:

$$G.S.I. = 0.5 + \frac{(y-x)\,(1+y-x)}{4y\,(1-x)}$$

Y = Hitrate = No.of correct responses given for correct sentences = Score / 10

x = False alarm = No.of correct responses given for in-correct sentences = Score / 10

After this, error analysis was also done in terms of the following:

1) Were correct sentence judged to be right?

2) Were correct sentences judged to be wrong more.of ten than right?
3) Were incorrect sentences judged to be right than wrong?
4) Were incorrect sentences judged to be wrong more often than right?

c) Picture pointing tasks: in this task, a set of 40 sentences were used. Each correct response was given a score of '+1' and an incorrect response was not glven/any score at all. All the scores were added to get a composite score out of 40.

The above paragraphs describe the analysis, procedure used. In the following chapter, results obtained by the four aphasics have been discussed.

RESULTS AND DISCUSSION

The data collected from all the four aphasics (Illiterates and literates) and also the normal controls were subjected to both quantitative and qualitative analysis. The results obtained have been discussed in this chapter. Quantitative and qualitative analysis have been dealt with separately.

Quantitative Analysis:

a. Expression tasks: (Spontaneous speech and story narration) Both the normals and the aphasics speech sample were subjected to a quantitative analysis and the following were found:
   1) Mean length of utterance (MLU)
   2) Total number of content words
   3) Number of free function words
   4) Number of bound grammatical morphemes
   5) Closed class density scores
   6) Open class density scores

b. Grammaticality judgement tasks: For all the aphasics and the controls, the scores obtained on each sub-section was calculated, and then added to given the total score. Further for each sub-section, 'grammatical sensitivity index' (hence forth GSI) was calculated. This has been given by Linebarger, Schwartz, Saffran,(1983).

c) Picture pointing tasks: All correct responses were given a score of '+1', and the total was added to get a composite score out of 40. This was again obtained for all the four aphasics and normal controls.

Scores obtained by such quantitative analysis have been given in Tables,A, B, and C. respectively.

Performances of normals (literates vs illiterates):

From Table A (spontaneous speech and story narration), it can be found that performances of both literate and illiterate normal controls are identical in production tasks and their MLU's average around 5.1 and 5.65 for literates and 6.65 and 5.2 for illiterates. Similarly, the closed class and open class density scores are similar for the two groups.

However, in grammaticality judgement tasks there was a marked difference in performance between the two control groups. While literates scored 100/100 and a GSI of 0.875, the scores obtained by the illiterates were comparitively less averaging 57/100 and 69/100 respectively. Their GSI values were 0.591 and 0.674 respectively,indicating some amount of grammatical sensitivity, but it was significantly lower than the literate controls value of 0.875. The subjects

Table-A

	Normals				Aphaslcs.			
	Literates		Illiterates		Literates		Illiterates	
	Sub.l	Sub. 2	Sub.l	Sub. 2	No.l	No.2	No.3	No.4
I.Spontaneous speech								
a)Mean length of utterance (words/sentence)	4.5	4.0	7.0	5.4	3.0	3.5	2.4	2.8125
b) Total number of content words.	36.0	41.0	53.0	40.0	18.0	21.0	11.0	39.0
c)Free function words	6.0	4.0	4.0	9.0	4.0	3.0	3.0	6.0
d)Bound grammatical morphemes	16.0	18.0	23.0	20.0	6.0	8.0	0.0	3.0
e)Closed class density score	37.93%	34.92$%	33.75%	42.02%	18.0%	27.5%	21.6%	18.75%
f)Open class density score	62.07%	65.08%	66.25%	57.97%	82.0%	72.5%	78.36%	81.25%
II.Story narration tasks								
a)Mean length of utterance	5.7	7.3	6.3	5.0	2.5	5.0	2.16	3.40
b)Total number of content words.	50.0	56.0	52.0	30.0	22.0	24.0	13.0	44.0
c)Free function words.	20.0	25.0	16.0	10.0	2.0	10.0	1.0	3.0
d)Bound grammatical morphemes.	29.0	32.0	26.0	17.0	4.0	8.0	3.0	19.0
e)Closed class density score	49.49%	50.44%	45.0%	47.36%	21.4%	42.85%	30.7%	33.33%
f)Open class density score	50.51%	49.56%	55.0%	52.63%	78.6%	57.15%	69.23%	66.66%

Table-B: Grammaticality judgement tasks.

	Normals						Aphasics					
	Literates				Illiterates							
	Sub.l		Sub.2		Sub.l		Sub.2		No.l		No.2		No.3		No.4	
		GSI		GSI		GSI		GSI		GSI		GSI		GSI		GSI
1.Morphophonemics	10	0.875	10	0.875	5	0.50	6	0.598	5	0.5	5.	0.5	3	0.1667	3	0.1667
2.Plurals	10	0.875	10	0.875	6	0.5382	6	0.5916	5	0.5	6.	0.5916	3	0.1667	3	0.1667
3.Case markers	10	0.875	10	0.875	6	0.5916	8	0.743	4	0.375	6	0.5982	2	0.1667	3	0.2334
4.PNG markers	10	0.875	10	0.875	7	0.722	7	0.722	4	0.3393	7	0.6875	4	0.3393	4	0.4063
5.Tenses	10	0.875	10	0.875	5	0.500	6	0.6145	3	0.2715	6	0.5982	4	0.3875	4	0.3875
6.Transitives/ intransitives & causatives.	10	0.875	10	0.875	6	0.811	7	0.6714	3	0.2715	5	0.50	2	0.025	3	0.2715
7.Conjunctions, Comparitives & Ouotatives.	10	0.875	10	0.875	6	0.5916	7	0.6714	4	0.3875	6	0.5916	3	0.2334	4	0.375
8.Conditional clauses	10	0.875	10	0.875	5	0.500	7	0.6714	5	0.50	5	0.50	3	0.2334	4	0.3875
9.Participal constructions	10	0.875	10	0.875	5	0.50	7	0.6875	5	0.50	5	0.50	3	0.1667	2	0.025
10.Sentence types	10	0.875	10	0.875	6	0.5982	8	0.7708	4	0.50	7	0.6875	2	0.025	3	0.1667
Total	100	0.875	100	0.875	57	0.591	69	0.674	42	0.415	58	0.575	29	0.191	33	0.259

Table-C : Shows Picture Pointing Tasks

	Normals				Aphasics			
	Literates		Illiterates		Literates		Illiterates	
	Sub.l	Sub.2	Sub.l	Sub.2	No.l	No.2	No.3	No.4
Picture pointing Tasks	40/40	40/40	32/40	32/40	30/40	32/40	15/40	18/40

were found to be influenced more by the semantic content of the sentences, than the syntax, despite repeated instructions.

Similarly in the picture pointing tasks, while literate normals obtained a full score of 40/40, normal illiterate controls scored only 32/40. The better score obtained by illiterate controls on this task than the earlier task, might be because semantic cues could have helped in picture pointing tasks.

From the above data, it is clear that there is a definite difference in the performance pattern of normal controls (Illiterates vs literates) themselves. This emphasizes the need for different control groups for literate and illiterate aphasics. Hence the data of the literate and illiterate aphasics have been compared with the appropriate controls.

Performance of literate aphasics:

Both the aphasics = 1 and 2 (literate) had restricted speech output as compared to normal controls. MLU values averaged 2.75 for aphasic 1, and 4.25 for aphasic 2 as compared to 5.1 and 5.65 of normals. This aphasic 2's output consisted of slightly longer sentences. Closed and

open class density scores shows that open class density score was greater than closed class density scores (Table A) This might have been due to the greater use of content words than function words. However, closed class density score of aphasic 2 is higher than aphasic 1 (value being 27.5% and 18% respectively in spontaneous speech tasks, and 42.85% and 21.4% in story narration tasks). Closed class density score of 42.85% got by aphasic 2 in story narration tasks approximates the normal control groups values. Thus, greater usage of free function words and bound grammatical morphemes was seen in aphasic 2's spontaneous speech sample. Spontaneous speech sample of aphasic 1 shows that errors are seen in the usage of case markers, PNG markers and tenses. Especially, there is a tendency, to use or stereotyped form in all positions. Example: Future tense marker being used in the place of past, present and future tenses.

In the grammaticality judgement tasks, the aphasics scores were 42% and 58% respectively. The GSI values were around either 0.5 or slightly being much lower than that of their normal controls. Particularly low value of 0.375, 0.3393 and 0.2715 in the sub-sections of case markers, tenses and PNG markers was seen in aphasicl's GSI values.

Interestingly, errors on the same sub-sections were seen in the performance of aphasic-1, on picture pointing tasks also. The overall scores on the picture pointing tasks of both the aphasics were good averaging 30/40 and 32/40 respectively. In the performance of aphasic 2's also, it was found that they performed poorly on sub-sections of 'PNG markers' and 'tense markers' in sentence-picture matching tasks. Similar errors were also seen in the spontaneous speech sample and story narration tasks, in this aphasic.

Performance of illiterate aphasics:

Aphasic's 3 and 4's performance have been compared with their control group and the results on different tasks. Spontaneous speech, story narration, grammaticality judgement tasks, picture pointing tasks have been given in Tables A, B and C respectively.

From Table-A, it is clear that both the aphasics had restricted speech output in both the tasks. Average values obtained by aphasics 3 and 4 were 2.28 and 3.1 respectively, while their normals controls had average values of 6.65 and 5.2 respectively. Similarly, the aphasic group showed lesser.closed class density score in both the tasks, than

the corresponding values of the normal control group. (Table-B). Aphasics 3 and 4 obtained closed density score of 26.15% and 26.04% (average score of both tasks) respectively. While normals controls obtained average values of 39.37% and 44.69% respectively. This is due to predominant usage of content words and paucity of function words (Free and Bound grammatical morphemes) in their spontaneous speech. Also, the decreased MLU is due to simpler sentence structures used by the aphasics, as compared to normals.

In the grammaticality judgement tasks, scores obtained by the illiterate aphasics were poor, the values being 29 and 33 respectively. Further the GSI calculated shows a value of 0.1912 0.259 which is much lesser than 0.5 than that was obtained by the illiterate normal controls. As with the scores on the grammaticality judgement task, scores obtained by the illiterate aphasics on the picture pointing task were also poor to-tetling upto 15/40 and 18/40 respectively as compared to the score of 32/40 obtained by the normal illiterate controls.

Qualitative analysis:

A qualitative analysis of all the four aphasics speech sample was done, and this has been presented individually.

Subject-1: The subject 'J.R.' is an Indian adult female aged 48 years. She is a housewife and had been in good health until June 1988. She has been a hypertensive patient. on June 1988, she developed high fever along with which her blood pressure rose. Following this, she developed stroke and was hospitalised for 21 days for the same. This stroke resulted in right hemiplegia with total loss of speech. Premorbid history revealed her to be right handed. She is also a literate, and could read both English and Tamil.

At the time of evaluation, there was a partial recovery of both her limbs. Speech assessment showed that she could speak in single words, with occasional 2-3 word utterance. She could tell the names of most of the common objects and names of family members. The entire testing procedure was carried out in two sessions.

Initially, the WAB was administered and the scores were as follows:

I. Spontaneous speech:

a. Information content : 3)
) 3.0
b. Fluency : 3)

II. Auditory verbal comprehension: 7.1

a. Yes/No questions = 45/60

b. Auditory recognition = 52/60

c. Sequential commands = 45/80

III. Repetition: = $\frac{22}{10}$ = 2.2

IV. Naming = 4.0

Object naming = 24/60

Word fluency = 6/20

Sentence completion = 6/10

Responsive speech = 4/10

As her scores fall within the range of Brocas aphasic, she was taken as subject for the study. All the three tasks were given to her. Results of the quantitative analysis are given in the table.

Qualitative analysis of the spontaneous speech was done with reference to a core of syntactic structures such as tenses, imperatives, post-positions, transitives and intransities. This revealed that the subject had a limited stereotype of sentence structures. Content words (Nouns and Verbs) predominated in the speech. Usage of function words were very limited. Most commonly used words include /Illai/ for "No", /Appurama/ for 'after that'. Determiners, auxLllaries/modals and conjunctions were lacking in the speech. Usage of prepositions was restricted to /mele/ for 'up' and /kizhe/ for 'down'. Bound inflectional morphemes which include 'case markers', 'PNG markers' and 'tenses' were relatively better preserved than free functional morphemes.

Among case markers, she could use dative markers like /Enakku/ 'for me'; locative markers like in /kakka vayile vadai/ 'vadai in the crow's mouth'. Tense markers and PNG markers were inadequate in that stereotyped substitution of one marker was seen. For example, in narration of what she had done from morning, she used future tense markers consistently, in describing past actions.

/Inniku 6 maniku pal theipen; ka:pi, kudippe:n/
appurama, sapiduven/
/today 6'o clock will brush teeth, will drink and then will eat/.

Thus bound grammatical morphemes were not omitted but rather substituted. At times, the inflectional morphemes attached to the verb was found to be an unacceptable phonological string, and the resultant form an illegal word string in that language.

/Inniku 6 maniku ezhumben/
for
/Inniku 6 maniku ezhunthen/

Variety of sentence types were also limited to few simple sentences (declaratives) and few simple questions like /un pe:r enna/ 'What is your name'?. Other complex sentence structures like passives, intransitives, transitives and conditional clauses were lacking.

In the grammaticality judgement task, overall performance on this task was poor. The subject had lost all her earlier reading skills. Sentences were presented to her aurally. She did poorly on most of the sub-sections. Error analysis showed that she could judge grammatically correct sentences as often correct, but had difficulty in judging the acceptability of incorrect sentences. In this tasks, low scores were found on sub-sections of 'case markers' PNG markers' and tense markers'. In picture-pointing tasks, subjects score was good as compared to the earlier task. In this test, the subject was found to perform poorly on the sub-sections of 'tense markers', 'PNG markers' and 'case markers'. Performance on all other sub-items which includes 'plural forms', 'sentence types' 'conjunctions', 'comparitives' and'conditional clauses' was good.

Discourse analysis:

/kakka maram utkarndu patti vadai patti adippa kakka
crow tree sitting oldlady vada old lady will hit crow
vayile vadai odi pochu nari kizhe ninnu nari kakka
in the mouth vada ran away fox stand down fox crow
vadai nari vayile vizhunthiduchu. Nari odi pochu.
vada fell into fox's mouth. Fox ran away/.

The same was evaluated interms of length, content and cohesion. Length of utterances was short and maximum length

was only three words. Contentwise, all major nouns and actions were described. Verbs were often produced in root form, with the inflectional morphemes being absent. There was also no proper topic introduction, no proper transition from one sentence to another. Due to the abundance of content words, the theme was adequately described. Intra-sentential internal cohesion was lacking due to the inadequate syntactic structures and due to the omission of many of the free standing function words. Inter sentential connectives too were missing and hence sentence transitions were not clear.

Subject-2: The subject 'D' is a right handed literate male. Patient aged 55 years. He was a known hypertensive and a diabetic patient. On 27th of November, 1989 he became unconscious as he was walking on the road. When he came back to consciousness, he had lost his speech and his comprehension was also poor. Neurological examination done classified him as a global aphasic, and he was referred for speech therapy. His comprehension skills improved gradually and at the time of first evaluation done 25 days after the episode, the could be labelled as 'Broca's aphasic). A second evaluation was again carried out one month after the first evaluation, during which his spontaneous speech and reading skills had considerably improved. C.T. scan done after 21 days revealed a clot in the brain in the anterior region.

The WAB administered during the initial evaluation yielded the following scores.

I. Spontaneous speech:

a) Information content: 2)

b) Fluency : 1) 1.5

II. Auditory verbal comprehension: 6.10

a) Yes/No questions = 42/60

b) Auditory word recognition = 50/60

c) Sequential command = 42/80

III. Repetition = 3.0

IV. Object naming = 34/60

Word fluency = 5/20

Sentence completion = 4/10 3.7

Responsive speech = 4/10

Spontaneous speech recording was done on the second evaluation, when there was a marked improvement in his speech. However speech was unintelligible owing to marked dysarthria. Repeat WAB of the spontaneous speech section showed

Information content = 4

Fluency = 4 4.0

Following this, further evaluations were carried out as subject's score falls under the category of Broca's aphasia.

Qualitative analysis of the speech sample was done to further assess the syntactic structures used by the subject in his spontaneous speech. The subject speech showed a predominant usage of content words rather than function words. Among the content words, nouns (both personal and common) occurred with maximum frequency followed by verbs. However, function words were not totally lacking in the subject's spontaneous speech. Free function words which Were used included determiners like /oru/ 'one', /adu/ 'that', /idu/ 'this', Modals and auxiliaries were present like /matte:n/ 'will not', however usage of conjunctions could not be seen. Presence of other syntactic structures like the case markers; PNG markers and tense markers too were looked for in the speech sample. Case markers were found to be used adequately, and more frequently. For instance he said:

/bussle vande:n/

/came by bus/

/kakka marthele irukudu/

/Crow is sitting on the tree/.

/vadaiai thoo:kindu poyiduthu/

/took the vada and went/

PNG markers too were present. The subject was found to use both person and gender markers adequately. He used the correct

markers while referring to the old lady and then the crow. However the number marker was used incorrectly, for he described his own activities using plural markers which is as follows:

/na:n pal villakitoo:m/ for /na:n pal villakkite:n/
/I (we) brushed teeth/ /I brushed teeth/

Tense markers were adequate in that the subject could use both present and past tense markers correctly. This is in contrast to subject-1 who had inadequate usage of these markers. Similar to subject-1, at times the inflectional morphemes attached to main verbs were incorrect resulting in an illogical phonological string in the language.

Example: /pe:pr vittuto:m/ - apart from the mis-selection of /paper left/

bound grammatical morpheme, the main root form of the verb was also wrongly selected. Variety of sentence types was again limited. However, mean length of sentence was greater than subject-1. There were few sentence connectors which resulted in longer utterances like:

/patti ko:l eduthindu adicha/
/patti took the stick and hit/

Grammaticality judgement tasks: The subject scored a total of 58 out of 100. His scores were more or less identical on all the sub-tests. The subject had understood the nature

of the task. His responses showed that correct sentences were more often judged to be correct than incorrect. However, the subject was unable to judge the grammaticallty of incorrect/wrong utterances, for which he gave random responses. Hence, the score of 58 is that obtained on all the correct sentences in the list.

Picture pointing tasks: In this task, the subject's performance was adequate in all the sub-tasks. His score was 32 out of a total of 40. Most of his errors were seen in the sub-sections on PNG markers, and tense markers. These are the same grammatical features which were inadequately used in his spontaneous speech sample.

Discourse analysis:

/vadai kudithikittu irukanga. Oru kakka anda vadai vandu
Is selling vada.... One crow that vada then
vandu. Vittiku adiyil patti ukkamdu. Kakka mele irukudu
then old lady sitting under house. Crow is on top.
Vadaiai eduthu odi poi. Patti ko:l eduthindu. Mele kakka
Took vada... ran off. Old lady stick taking. On top crow
irukudu. Nari nari kakkava parkudu. Nari ah... kakka
is there. Fox .... Fox saw the crow. Fox....ah....crow
vadai nari vadai kondu.
vada fox vada took/

Discourse analysis was onceagain doBe in terms of length, content and cohesion. Content-wise, the subject was able to narrate all the major happenings and thus narrate the entire theme. Mean length of sentences were longer than aphasic:1. This subject was found to have more proper topic introduction. Sentences were started adequately using appropriate determiners and pronouns, but tended to be often incomplete. There was a tendency to nominalise many of the verbs, or produce them in the root form or even omit them. Both intra-sentential and inter-sentential cohesion was lacking due to lack of connectives and other function words. However intra sentential internal cohesion seems to be relatively well preserved than the other.

Subiect-3: Subject 'M' is a right handed illiterate female patient. She had first attack of stroke two years ago following which she developed right sided hemiplegia with aphasia. Neurological examination had been done. She was classified as an motor aphasic and she had been referred for both speech and physiotherapy. However she had not undergone any speech therapy. At the time of evaluation, the case was non-ambulatory and most of the testing was carried near the bedside. Her spontaneous speech was also limited.

Western aphasia battery (WAB) administered prior to testing yielded the following scores:

I. Spontaneous speech

Information content = 2

Fluency = 1 — 1.5

II. Auditory verbal comprehension = 6.0

a) Yes/No questions = 36/60

b) Auditory word recognition = 44/60

c) Sequential commands = 40/80

III. Repetition = 0.8

IV. Object naming = 24/60

Word fluency = 3/20

Sentence completion = 4/10 — 3.1

Responsive speech = 2/10

As she falls under the category of Broca's aphasia, she was given the full test.

Both quantitative and qualitative analysis of the spontaneous speech was done. Results of quantitative analysis are given in the table:A. Qualitative analysis of spontaneous speech was done with reference to a core of syntactic structures such as tenses, imperatives, post-positions, modals, idifferent types of verbs, relative and participal constructions. Spontaneous speech was severely retricted and consisted predominantly of content words, which averaged 78.36% of total proportion of content and

function word usage. Among content words, nouns were predominating - which included names of family members, names of common objects, followed by simple verbs like /va/ (come); /po/ (go); /sollu/ (tell). Case markers were totally absent in the speech sample analysed. (These are usually seen as bound grammatical morphemes attached to nouns). Nouns were seen to occur in isolation. The PNG markers and tense markers when used, were used correctly. The PNG markers were used correctly when narrating her own activities and in story narration tasks.

Example: She talked about her activities as

/so:lla matten/ /will not say(I)/

and described crow as :

/kakka parkudu/ /Crow is seeing/

(Parkudu-neuter gender marker).

Among the few verb forms that the case used, adequate use of past and future tense markers were seen; though the overall usage of PNG and tense markers was very limited.

Example: /'solla matte:n/ (I will not say/,

/kkkka poyiduthu/ (crow went off)

Occasional present tense markers too were used like

/ve:nda:m, ennaku ve:ndamm/ (Don't want, I do not want/

Other forms like "/intransitives, transitives, causatives.

conjunctions were lacking in her speech. Sentences were restricted to simple types of the 'S-O-V' type and Example: /kakka maram utkarndu/ (Crow tree sits). Complex constructions like the conditional clauses, concessional clauses were lacking. Similarly usage of questions or exclamatory phrases could not be seen.

A remarkable feature of this patient's language sample is that, the present account of the syntactic structures seen in the patient's spontaneous speech would, by itself present a totally misleading picture of the patient's spontaneous speech. This is because, the patient all through the interview communicated with a core of twenty five to thirty words. All the grammatical features listed were used within this limited vocabulary.

In the grammaticality judgement tasks, the patient scored 28 out of 100. Various sub-scores on the different subitems are given in Table-B. It was difficult to score the items,for the subject.rarely used any discrimination in judging the correct from the incorrect items. All the responses were random guesses of right and wrong. Hence the scores obtained too depended on such random correct responses.

In picture pointing tasks, the subject scored a maximum of 15 out of a total score of 40. The subject scored correctly on sub-items which included, conjunctions; transitives/intransities, sentence types and conditional clauses. However their responses for other sub-items which covered tenses, case-markers, PNG markers were wrong. This is in contrast to the pattern seen in spontaneous speech which shows retention of few of these syntactic features.

Discourse analysis: Sample for discourse analysis was drawn by using story narration activity like the 'fox and the crow'. The following sample was given by her in response to the pictures shown:

/kakka aachi maram. vadai... parkudu... theriyale... kakka
crow old lady tree. vada, seeing... dont know....crow
pochu ... Nayi...vadai vizhindu.... Nayi....thookl..
went....Dog....vada...fell. Dog took...
poyiduthu.
went/.

Severity of the language disorder is reflected in her discourse which is deviant in all respects-length, content and cohesion. Content wise, the subject succeded in communicating the essence of the story though there were no linguistic indicators as to the topic, events, participants and setting

of the picture. Discourse sample consisted predominantly of all major nouns and verbs through which the subject conveyed the message. Syntactic structures were lacking and hence there was lack of both intrasentential and intersentential internal cohesion due to lack of connectives.

Subject-4: Subject 'I' is an fifty-five year old illiterate female. On November 15, 1989 she became unconscious while at home for which she was hospitalised. On recoveringback her consciousness, the subject was not able to speak and had also developed right-side hemiplegia. Neurological examination was done and the diagnosis was Broca's aphasia with right hemiplegia. The subject was a known hypertensive patient. When the interviewer first evaluated the case it was one month post onset of stroke. Subject had a good amount of spontaneous speech, but there was marked dysarthria and hence was unintelligible.

WAB was administered to the subject and scores were as follows:

I.Spontaneous speech:

a. Information content = 4.0 :
: 4.0

b. Fluency = 4.0 :

II. Auditory verbal comprehension = 7.25

a) Yes/No questions = 45/60 :

b) Auditory word recognition=60/60 : 7.25

c) Sequential commands = 40/60 :

III. Repetition: 38/10 = 3.8

IV.Naming

i) Object naming = 27/60 :

ii) Word fluency = 5/10 :

iii) Sentence completion; 4/10 : 10 = 40/4.0

iv) Responsive speech = 4/10

As she could be classified as Broca's aphasic on the Western Aphasia Battery, the subject was included for the present study and results were as follows:

Subject 'I's spontaneous speech sample was subjected to both quantitative and qualitative analysis. Qualitative analysis of the spontaneous speech was done in terms of the syntactic structures present in the spontaneous speech sample. Subject 'I' was found to have greater usage of function words, both free and bound grammatical morphemes in contrast to subject-3. Free function words included determiners like /adu/(that); /idu/ (this); /ange/ (there); post positions like /mele/ (on top); and also adverbs like /koncham/ (little).

An analysis of the spontaneous speech was done to determine the syntactic structures used. Within the sample obtained, there were several instances of the past and present tense, but none of the future.Examples of past present tense include:

/ka:pi kudichene/ (Drank coffee);
/appaditha:n irukken/ (I am like that).
However, the tense markers were not used correctly in all instances. At times, there was omission of the past-tense marker producing only the root form of the verb. For instance, she said /idli sappidu/ for/idli sapite:n/
/idli eat/ for /ate idli/.
At other times, she even used illegal phonological strings instead of the correct bound morphemes. Eg.
She said /Methai mele thoxnginam/ (Sleep over sofa),
/nam/ (wrong/nonexistent marker)
She should have said
/methai mele tho:nginen/ (slept over the bed/
Lack of future tense marker does not mean that the patient was not aware of this. Rather, it may be an artifact of the sample, in that most of her spontaneous speech was about what had happened to her (her illness) and the current problems facing her. Case markers when present were appropriate, though the patient did not use them very often.

The patient however, was found to favour a few basic syntactic structures to the exclusion of others like the conditional clauses, transitives/intransitives, and predicates. There were no adverbial constructions,

relative clauses and participal constructions. Patient's sentences usually consisted of short phrases of two to three words. The noun phrases usually consisted of determiners like /oru/ (one), /adu/ (that), and /idu/ (this). At times common nouns and proper nouns were used. Some examples of her sentences are:

/vazhaipazham thinde:n/ (ate banana)

At times personal pronouns too were used,

/enga vittukarar peyar kumaragugu/

my husband's name is kumaraguru.

In the verb phrase, often the verbs were produced in root form. At times a wrong verb was uttered.

Eg: /appaditha:n pottine:n/ (like that ..)

PNG markers when present were appropriate. However, only the first person marker and the neuter gender marker were present in the spontaneous speech sample.

In the grammaticality judgement task, the subject scored an overall score of 33 out of total possible score of 100. Performance on all the sub-items of the task was equally poor. The subject was unable to understand the nature of the task and like aphasic-3, most of the answers were only random guesses. However the subject tended to point/respond by indicating responses to be more often right than wrong. All items were equally difficult in the sub-test.

In the picture pointing task, the performance of this subject was similar to that of subject-3. She scored a total of 18 out of 40. Her performance was good on those sub-items which involved conditional clauses, transitives/ intransitives, conjunctions as compared to case markers, plurals and tenses.

Discourse analysis:

/kizhe parkudu. Patti kannai mudindu utkarndikinu.
/looking down. Patti eye closing and sitting,
vadai kathundu irukkanga. Kurai utkarandu. kakka
vadai watching and sitting matched house sitting, crow
utkarndu parkudu. Kombu vacchundu parkudu vayil vadai.
is sitting seeing. Keeping stick and seeing vada in mouth.
Kakka vadai vachukudu kombala otturudu. Vadai thookindu
crow is keeping vadai. Driving with stock. Took vada
poi....kakka vadai thingidu. Kakka...ah parkudu. Nari odudu
and went. Crow eats vadai crow ...sees. Fox running
parthiya ....Nari vayaiah appadi parkudu. Kakka vai vadai
did you see. Fox sees vadai like that crow mouth mada
vizhindudu. Patti kaval vadai po:gum/
fell. Old lady watching vadai went/.

Quantitative analysis of the spontaneous narration tasks were done and this is shown in the table-A. Qualitative analy

was also done in terms of adequacy of length, content and cohesion. Length of the sentences were relatively longer than that of aphasic 3. It was found that the subject could convey all the relevant elements in the picture though there is no topic introduction or transition, from one topic to another. Intrasentential internal cohesion was maintained to some extent due to the adequate usage of case markers, tense markers and PNG markers. However, intersentential internal cohesion was lacking.

Discussion:

Results obtained by the aphasics and the normals in the different tasks studied have been dealt with separately.

Production tasks: Spontaneous speech sample and the story narration tasks of the normals and aphasics were analysed both quantitatively and qualitatively. Quantitative analysis of the normals speech sample (literates and illiterates) showed that they had longer MLU's. Their speech showed close density score averaging 36.7% and 48% in spontaneous speech and story narration tasks respectively; and open class density score averaged 62.5% and 51.75% respectively. Qualitative analysis of their speech showed that both the normal control groups used wide variety of syntactic structures. Also, performance of both literate and illiterate aphasics on this task was similar.

In contrast with the normals, aphasic groups were found to have shorter mean length of utterance and higher open class density scores, (reflecting greater usage of content words than function words) as compared to normals. Qualitative analysis of the speech showed 'dysprosody', and 'telegraphic' speech style. This is in accordance with the earlier reports in literature of the kind of production deficits, seen in agrammatics.(Goodglass, 1969). DeVilliers (1974), based on his study of the spontaneous speech of eight nonfluent aphasias has also reported similar findings.

One of the major proponent of the view that language structure plays an important role in the kind of agrammatic deficits seen was Grodzinsky (1984). Based on his study of a Hebrew speaking aphasic, he arrived at the conclusion that inflectional languages (having both bound and free morphemes), may show a pattern of agrammatism which is different from un-inflected languages like English. According to him, the pattern of agrammatism seen in these languages are :-

a) Omission of free standing grammatical morphemes like pre-positions, determiners, auxiliaries, etc.
b) Whenever the well formedness of the lexical item does not depend on its being inflected (it has a G-inflected, marked form), then the one chosen tends to be an unmarked one.

c) In every other case, where lexical items depend morphologically and phonologically on the inflection any form may be selected from the set of possible inflectional configurations, regardless of syntactic constraints.

Similar patterns as reported by Grodzinsky (1984) could be seen in the speech sample of all the four agrammatic aphasics studied here. Stereotyped usage of one or two inflectional morphemes, rather than omission of bound morphemes was seen. Same set of inflectional/morphemes were used to represent different teases and PNG forms. This is somewhat similar to the 'default' procedure reported by Grodzinsky (1984) - misselection/random substitution, of bound morphemes than omission.

A closer look at the quantitative scores obtained by aphasic 2 in spontaneous speech and story narration, may appear to be misleading. Mean length of utterance is longer than aphasic 1 and their closed and open class density scores approach near normal values in story-narration tasks. However qualitative analysis of the aphasic' s speech revealed that random substitution of inflectional morphemes were seen rather than omission. The slightly ambiguous results seen in this subject can be explained by Grodzinsky's hypothesis. English, being a word order language, the kind of deficit seen is mainly omission. However, Tamil is an inflected

language. Hence instead of omissions, substitutions are seen. This could have been the reason for the higher values in quantitative analysis. Thus, this fact again supports Grodzinsky's (1984) hypothesis and confirms the fact that language structure determines the kind of agrammatic deficit seen.

Agrammatism has often been defined as the retention of content words (nouns, verbs and adjectives) with loss of function words (free and bound). However, some authors have reported that in addition to their difficulty in producing verb morphology (bound and free), they have difficulties in producing main (root) verbs, including have/be verbs. Two types of verb production difficulties have been reported:

a) Omission of verb
b) Nominalisation of verbs

This has been reported by Miceli, Mazzuchi, Menn and Goodglass (1983). The present study supports the above reported finding. Apart from difficulty in using function words, the four agrammatic aphasics were found to have difficulty in using content words especially verbs. At times, omission of the entire verb was seen. Similar findings have also been reported by Bhatnagar and Whitaker (1984).

Grammatlcality judgement tasks: This task requires the subject to respond whether the sentences presented are grammatically acceptable or not. Earlier studies, like that done by Linebarger, Schwartz and Saffran (1983), have shown that the aphasic subjects are capable of performing such syntactic judgement despite the fact that they are agrammatic in comprehension. However, two interesting findings emerged from the present study:

(i) There was a discrepancy in the performance pattern between literate and illiterate normals, themselves. Illiterates were found to perform less effectively than literates, even when sentences were presented in spoken form. This may be because the nature of the task calls for ability of higher cognitive functioning (metalinguistics), and this difference in performance only suggests that this area of literacy and brain functioning needs to be probed into further.

(ii) Both literate and illiterate aphasics, were found to perform poorly on this task. This is in contrast to that reported in literature.

(iii) Illiterate subjects (normals and aphasics) were found to be influenced more by the "semantics" of the sentence than the "syntax".

Picture pointing task; In this task, both the normal groups (literates and illiterates) performed well. However, illiterate group did not achieve 100% score. The performance of the aphasic group showed that literate aphasics performed better than illiterate aphasics. Thus the performance of the illiterate aphasics was poor across all tasks and the nature of the task did not affect their performance.

Among the literate aphasics, a consistent pattern was seen especially in aphasic 1, in that,this subject was found to perform poorly on subsections of 'case marker' 'PNG-marker' and 'tense', in both grammaticality judgement task and picture pointing tasks. Errors on these same categories was seen in production tasks also. These findings may be explained if we assume that one way the grammatical structures are arranged in the mental lexicon is in terms of separate classes like nouns, verbs and adjectives, grammatical categories (Miceli and Caramazza et al. 1984). Hence damage to specific sub-components of the lexicon like 'case markmr' 'tenses' and 'PNG-markers' may be a possible explanation for this peculiar finding seen.

Thus the following findings have emerged from this study;

(1) The effect of influence of language structure on the kind of agrammatic deficits seen was noted in this study.

(2) The nature of the task did not seem to influence test results, and uniform pattern of performance across tasks were seen.

(3) Literacy seems to be an important factor, which needs to be probed into further in the future studies.

SUMMARY AND CONCLUSION

Most of the studies on agrammatism have been done in Western languages like English. Hence, the pattern of deficits seen in Western language may not be applicable to other Indian languages, especially synthetic ones, where inflections, unlike word order play a predominant role. The fact that there can be language specific manifestations of agrammatism was shown by Grodzinsky (1984) in his study of a Hebrew speaking aphasic patient.

Four Broca's aphasics (2 literates, 2 illiterates) were chosen for the study. Performances of the Broca's aphasics were compared with appropriate controls. All subjects were given the following tasks:
a) Spontaneous speech and (b) story narration tasks
c) Grammaticality judgement task (d) Picture pointing task.

Results of all the subjects were analysed both quantitatively and qualitatively. Quantitative analysis of the expression tasks included calculating mean length of utterance (MLV), content word/function word ratio; closed-class density score and open-class density score. In the grammaticality judgement task, scores obtained on each subsection was added to get a composite score. Further, an index called as

"Grammatical sensitivity Index" was calculated. Similarly, in the picture pointing tasks,the scores obtained was added to get a composite score.

Conclusion:

The following conclusions were arrived at:

1. In the production/spontaneous speech of agrammatics, same kind of agrammmtic errors were seen as reported in literature i.e. short mean length of utterance, dysprosody, abundance of content words with reduced closed class density score.
2. This study supports Grodzinsky's hypothesis, which says that the kind of agrammatic deficit seen will depend on the language structure. In this study, mis-selections rather omissions of function words was seen in all four aphasics.
3. In the grammaticality judgement task, aphasics were found to perform poorly which is in contrast to that reported in literature. Further, illiterate control group was also found to perform poorly when compared to literate controls. In picture pointing tasks, literate aphasics performed comparitively better than illiterate aphasics. Illiterate normals performed slightly poorly on this task also.

Limitation:

1. The study was carried out only on four aphasics. Hence, a larger group needs to be studied before further generalisations can be made.
2. Performance of different groups of aphasics (Broca's and Wernicke's) can be studied, so that more light can be thrown on the concept of agrammatism/paragrammatism.
3. Also, different tasks can be used so that a even more detailed analysis of syntactic abilities can be done.

BIBLIOGRAPHY

Bates,E., Friedrici, A., Wulfeck, B. (1987): 'Comprehension in Aphasia'. A cross-linguistic study. Brain and Language, 32(1), 19-68.

Bates, E., Friedrici, A., Wulfeck, B. (1987): 'Grammatical Morphology in Aphasia'. Cortex, 23(4), 545-574,

Bates, E., Wulfeck, B. (1989): 'Comparative aphasiology: A cross-linguistic approach to language break-down'. Aphasiology, 3(2), 111-142.

Berndt and Caramazza.(1980): cited in, 'The status of the syntactic deficit theory of agrammatism' by Schwartz, M.F., Linebarger, M.C., Saffran, E.M, in 'Agrammatism', by Kean (Ed), Academic Press, London, 1985.

Bhatnagar, S., and Whitaker, H.A. (1984): 'Agrammatism on inflectional bound morphemes: A case study of a Hindi speaking aphasic patient'. Cortex, 20, 295-301.

Bleser, R.D., Dronsek, C, Bayer, J. (1988): 'Morphosyntactic processing in German Agrammatism: A replication and revision of Von Stockert, Bader (1976), Cortex, 24(1), 53-76.

Bonhoeffer (1902): cited in, 'Recent developments in the study of agrammatism: their import for the assessment of biligual aphasia'by Paradis, M. (1988). Journal of Neurolinguistics, 3(2).
ten
Bradley (1978): cited in, 'Effects of sential stress and word class upon comprehension in Broca's aphasics' by Swinney, D.A., Zurif, E.B., Cutler, A. (1980). Brain and Language, 10, 132-144.

Bradley, Garrett and Zurif (1980): cited in, 'Sensitivity to inflectional morphology in agrammatism: Investigation of a highly inflected language'. Brain and Language, 33(1), 1-15 (by Lukatela, K, Crain, S., Shankweiler, D., 1988).

Branchereau, L., Nespoulows, J.L. (1989): 'Syntactic parsing and the availability of prepositions in Agrammatic patients', Aphasiology, 3(5), 411-422.

Caplan, D., and Flutter, C. (1987): 'Assignment of thematic roles to nouns in sentence comprehension by an agrammatic patient'. Brain and Language, 27(1), 117-134.

Caplan, D., Matthei, E., Gigley, H. (1981): 'Comprehension of gerundive constructions by Brocas's aphasias'. Brain and Language, 13(1), 145-161.

Caramazza, A., and Berndt, R.S. (1978): 'Semantic and syntactic processes in aphasia: A review of literature'. Psychological Bulletin, 85, 898-918.

Caramazza, M., Berndt, R.S. (1984): 'A multi-component deficit view of agrammatic Broca's aphasia'. In M.L.Kean (Ed), Agrammatism, Academic Press, New York.

Caramazza, A., Berndt, R.S., Basili, A., and Koller (1981): 'Syntactic processing deficits in aphasia'. Cortex, 17, 333-348.

Caramazza, A., Zurif, E.B. (1976): 'Dissociation of algorithmic and heuristic processes in language comprehension: Evidence from aphasia'. Brain and Language, 3(4), 572-582.

DeVilliers, J. (1974): 'Quantitative aspects of agrammatism in aphasia'. Cortex, 10(1), 36-55.

Friedrici, A.D., Schonle, P.W., Garrett, M.F. (1982): 'Syntactically and semantically based computations: Processing of prepositions in agrammatism'. Cortex, 18, 525-534.

Gleason, Goodglass, Ackerman and Hyde (1975): cited in, 'Recent developments in the study of agrammatism: their imports for the assessment of bilingual aphasia'.by Paradis, M. (1988). Journal of Neurolinguistics, 3(2).

Goldstein,(1913): cited in, 'Recent developments in the study of agrammatism: their import for the assessment of bilingual aphasia' by Paradis, M (1988), Journal of Neurolinguistics, 3(2).

Goldstein,(1948): cited in, 'Agrammatism' by Goodglass, H. (1976), 237-259, in 'Studies in Neurolinguistics, Vol 11; Whitaker and Whitaker(Ed), Academic Press.

Goodglass, H. (1976): 'Agrammatism'237-259 in 'Studies in Neurolinguistics', Vol.1, Whitaker and Whitaker(ed), Academic Press.

Goodglass, H., Berko, J. (1960): 'Agrammatism and inflectional morphology in English', Journal of Speech and Hearing Research, 3(3), 257-267.

Goodglass, H., Fodor and Schulhoff (1967): cited in 'Recent developments in the study of agrammatism: their imports for the assessment of bilingual aphasia' by Paradis, M. (1988), Journal of Neurolinguistics, 3(2).

Goodglass, H., Gleason, J.B., and Hyde, M.R. (1970): 'Some dimensions of auditory language comprehension in aphasia', Journal of Speech and Hearing Research, 13,59-606.

Goodglass,H., Hunt, J. (1958): cited in 'Agrammatism and inflectional morphology in English' by Goodglass, H., Berko, J. (1960), Journal of Speech and Hearing Research, 3(3), 256-267.

Goodglass, H., Kaplan (1968): cited in, 'Grammatical morphology in aphasia: Evidence from three languages' by Bates, E., Friedrici, A., Wulfeck, B., (1987), Cortex, 23, 545-574.

Goodglass, H., and Kaplan (1972): cited in, 'The interaction between communication and neurologic disorders' by Simmons, N.N, in'Speech and Language evaluation in Neurology;(1985), Adult Disorders', John. K.Darby (Ed), Grune and Stratton.

Goodglass, H., and Mayer, J. (1958): 'Agrammatism in aphasia'. Journal of Speech and Hearing Disorders, 23(1), 99-111.

Goodglass, H., Menn, L. (1985) 'Is agrgmmatism a unitary phenomenon', "Agrammatism" by Kean (Ed) (1-25), Academic Press, London.

Gordon, B., Caramazza, A. (1982): 'Lexical decision for open and closed-class words: Failure to replicate differential frequency sensitivity'. Brain and Language, 15, 143-160.

Gordon, B., Caramazza, A. (1983):'Closed and open class lexical access in agrmmmatic and fluent aphasics'. Brain and Language, 19(2), 335-346.

Grodzinsky, Y. (1984): 'The syntactic characterisation of agrammatism', Cognition, 16, 99-120.

Grodzinsky (1986): cited in 'Recent developments in the study of agrammatism: their import for the assessment of bilingual aphasia' by Paradis, M. (1988), Journal of Neurolinguistics, 3(2).

Grossman, M., Carey, S., Zurif, E., Diller, L. (1986): 'Proper and common nouns: Form class judgements in Broca's aphasia', Brain and Language, 28(1), 114-126.

Heilman, K.M., Scholes, R.J. (1976): 'Nature of comprehension errors in Broca's, conduction and Wernicke's aphasics'. Cortex, 12, 258-265.

Isserlin (1922): cited in, 'Agrammatism', 237-259, by Goodglass, H, in "Studies in Neurolinguistics", Vol.1, Whitaker and Whitaker (Ed), (1976), Academic Press.

Jakobson (1956); cited in, 'Agrammatism' , 237-259, by Goodglass, H., in "Studies in Neurolinguistics", Vol.1 (1976), Whitaker and Whitaker (Ed), Academic Press.

Jarema, G., Kadzielawa, D., Waite, J. (1987): 'On comprehension of active/passive sentences and language processing in a polish agrammatic aphasic'. Brain and Language, 32, 215-232.

Kean, M.L., (l977):'The linguistic interpretation of aphasic syndromes: Agrammatism in Broca's Aphasia - an example'. Cognition, 5, 9-46.

Kean, M.L. (1979); 'Agrammatism: A phonological deficit'. Cognition, 7, 69-83.

Kinsella, G., Wales, R. (1981): 'Syntactic effects in sentence completion by Broca's aphasics'. Brain and Language, 13, 301-307.

Kleist (1916):cited in 'Recent developments in the study of agrammatism: their import for the assessment of bilingual aphasia' by Paradis, M. (1988), Journal of Neurolinguistics, 3(2).

Kleist (1934): cited in, 'Agrammatism',237-259 by Goodglass, H. in "Studies in Neurolinguistics", Vol.1, (1976), Whitaker and Whitaker (Ed), Academic Press.

Kolk, H.J., Friedrici, A.D. (1985): 'Strategy and Impairment in sentence understanding by Broca's ' and Wernicke's aphasics', Cortex,21(1),47-67.

Lesser, R.: (1978): 'Investigations of syntax', in "Linguistic investigations of aphasia"(1978), by David Crystal and Jean Cooper (Ed),London.

Lukatela, K., Crain, S., Shankweiler, D. (1988): 'Sensitivity to inflectional morphology in agrammatism", Brain and Language, 33(1),1-15.

Luria (1970): cited in 'Agrammatism', 237-259 by Goodglass,H, in "Studies in Neurolinguistics", Vol.1(1976) Whitaker and Whitaker (Ed), Academic Press.

Marin, Saffran, Schwartz (1976): cited in, 'On the basis for the agrammatic's difficulty in producing main verbs' by Miceli, G., Silveri, M.C., Caramazza, A. (1984), Cortex, 20, 209-220.

Miceli, G., Mazzuchi, A., Menn, L., and Goodglass, H. (1983): 'Contrasting cases of Italian agrammatic aphasics without comprehension disorder'. Brain and Language, 19(1),65-98.

Miceli, G., Silveri, M.C., Villa, G., Caramazza, A. (1984); 'On the basis for the agrammatics difficulty in producing main verbs' Cortex, 20, 209-220.

Myerson, Goodglass,H.(1972)% cited in, 'On the basis for the agrammatic's difficulty in producing main verbs' by Miceli, G., silver!, M.C., Villa,G, Caramazza, A (1984), Cortex, 20, 209-220.

Nespoulous, J.L., Dordain, M., Perron, L., Ska, B., Bub,D., (1988) 'Agrammatism in sentence production without comprehension deficits: reduced availability of syntactic structures and/or of grammatical morphemes? A case study' by Caplan, D., Mehler, J., Lecours, A.R., Brain and Language, 33, 273-295.

Paradis, M. (1988): 'Recent developments in the study of agrammatism: their import for the assessment of bilingual aphasia'. Journal of Neuro-linguistics, 3(2).

Petocz, A., Oliphant, G. (1988): 'Closed class words as first syllables do interfere with lexical decisions for non-words: Implications for theories of agrammatism'. Brain and Language, 34, 127-146.

Pick,A. (1851-1924): cited in, 'Comparitive aphasiology: A cross linguistic approach to language break-down' by Bates, E., Wulfeck, B. (1989), 3(2), Aphasiology, 111-142.

Saffran, E.M., Schwartz, M.F., Marin, O.S.M. (1980): 'The word order problem in agrammatism-II.Produc-tion', Brain and Language, 10(2), 263-280.

Salomon (1913): cited in, 'Recent developments in the study of agrammatism: their import for the assess-ment of bilingual aphasia' by Paradis, M. (1988), Journal of Neurolinguistics, 3(2).

Schwartz, M.F., Linebarger, M,c., Saffran, E.M. (1985): 'The status of the syntactic deficit theory of agrammatism', 83-123 in "Agrammatism" by Kean (Ed), Academic Press, London.

Schwartz, M.F., Saffran, E.M., Marin, O.S.M. (1960):'The word order problem in agrammatism - I.Comprehension'. Brain and Language, 10(2), 249-262.

Smith,S., Bates, E. (1987): 'Accessibility of case and gender contrasts for agent-object assignment in Broca's aphasics and fluent anomics'. Brain and Language, 30(1), 8-32.

Smith, S.D., Ivo, M.(l984): 'Agrammatism in a case-inflected language: comprehension of agent-object relations'. Brain and Language, 21, 274-290.

Swinney, D.A., Zury, E.B., Cutler, A, (1980): 'Effects of sentential stress and word class upon comprehension in Broca's aphasics'. Brain and Language, 10, 132-144.

Zurif, E.B., Caramazza, A., and Myerson,R. (1972): Grammatical judgements of agrammatid aphasics', Neuropsychologica, 10, 405-417.

APPENDIX

WESTERN APHASIA BATTERY

PATIENT - BOOKLET.

I. SPONTANEOUS SPEECH:-

1. நீங்கள் இன்று எப்படி இருக்கிறீர்கள்?
2. நீங்கள் இங்கு முன்பு வந்துருக்கிறீர்களா?
3. உங்கள் பெயர் என்ன?
4. உங்கள் விலாசம் என்ன?
5. நீங்கள் என்ன வேலை செய்கிறீர்கள்?
6. நீங்கள் இங்கே எதற்கு வந்து இருக்கிறீர்கள்? உங்களுக்கு என்ன தொந்தரவு என்று சொல்லுங்கள்?

MAX SCORE :- 10. PATIENT'S SCORE : FUNCTIONAL CONTENT
FLUENCY.

II. AUDITORY VERBAL COMPREHENSION:-

	VERBAL	GESTURAL	EYE-BLINK	CORR... RE...
1. உங்கள் பெயர் ராமசுவாமியா?				
2. உங்கள் பெயர் கோபாலசுவாமியா?				
3. உங்கள் பெயர் _____ யா?				
4. நீங்கள் மதுரையில் வசிக்கிறீர்களா?				
5. நீங்கள் தஞ்சையில் வசிக்கிறீர்களா?				
6. நீங்கள் மதராசில் வசிக்கிறீர்களா?				
7. நீங்கள் ஆண்ணா? பெண்ணா?				

8 நீங்கள் வைத்தியரா?

9. நான் ஆணா : பெண்ணா?

10. இந்த அறையில் லைட் இருக்கிறதா?

11. கதவு மூடியுள்ளதா?

12. இது சாப்பிடும் இடமா?

13. இது காது, வாய் சோதனை செய்யும் இடமா?

14. நீங்கள் உடுத்தி இருக்கும் சட்டை சிகப்பா?

15. பேப்பருக்கு நெருப்பு வைத்தால் பற்றிக்குமா?

16. மார்ச் மாதம் ஜூன் மாதத்திற்கு முன்பு வருமா?

17. நீங்கள் வானைப்பழுத்தை தோலி உரிப்பதற்கு முன்பே சாப்பிடுவீரா?

18. ஜூலை மாதம் மழை வருமா?

19. இலுரை நானை விட பெரியதா?

20. கோடாலியால் புல் வெட்ட முடியுமா?

Max Score : 60

Patient's =

B. AUDITORY RECOGNITION.

REAL OBJECTS.	DRAWN OBJECTS.	COLOUR	FURNITURE
1. கப்	நெருப்புபெட்டி	நீலம்	மாசல்
2. நெருப்பு குச்சி	கப்	சிகப்பு	ஜன்னல்
3. பென்சில்	சீப்பு	பச்சை	சோபா
4. பூ	பூ	கறுப்பு	நாற்காலி
5. சீப்பு	லுங்குடையர்	மஞ்சள்	லைட்
6. லுங்குடையர்	பென்சில்	வெளுப்பு	பேன்.

BODY PARTS.	RIGHT-LEFT.
காது	வலது காது
மூக்கு	இடது தொடை
கண்	இடது முட்டி
பல்	வலது விரல்
கழுத்து	இடது கண்
கை.	வலது கன்னம்.

MAX SCORE - 60.
PATIENT's SCORE:

C. SEQUENTIAL COMMANDS:-

1. கை தூக்கு.	2
2. கண் மூடு.	2
3. சொ:.பா காட்டு.	2
4. ஜன்னல் காட்டி விட்டு கதவு காட்டு	4
5. பென்னும் பென்சிலும் காட்டு.	4.
6. பென்சினால் புஸ்தகத்தை காட்டு	8
7. பென்னை புஸ்தகத்தினால் காட்டு	8
8. சீப்பை பென்சினால் காட்டு	8.
9. சீப்பினால் பென்சிலை காட்டு	8.
10. பென்னை புஸ்தகத்தின் மேலே வைத்து அதனை என்னக்கு கொடு	14.
11. சீப்பை புஸ்தகத்தின் பக்கத்தில் வைத்து பென்னை திருப்பு	20.

MAX SCORE : 80.
PATIENT's :

III REPETITION :-

1. கட்டில்.	2
2. தேக்கு.	2
3. கை.	2
4. வாழைப்பழம்.	2
5. ஜன்னல்.	2
6. அம்புலில்.	4
7. நாற்பத்திரண்டு	4
8. ஆயிரத்தி முன்பதாயிரத்து ஐநூறு.	6
9. அறுபத்திரண்டரை	10
10. அவன் திரும்பி பார்க்கமாட்டான்.	10
11. **வியாபாரம் பண்ணுகிறவன் வியாபாரி**	18
12. மூதலாம் பார்த்தின் கப்பல் படை	10
13. **மின்னுவதெல்லாம் பொன் அல்ல**	8
14. **குப்புசாமி சீனாவுக்கு சென்றான்.**	10
15. அத்தைக்கொரு காலம் என்றால் மாமனுக்கு ஒரு காலம்.	20

MAX SCORE : 60.

IV NAMING.

A. OBJECT NAMING.

STIMULUS.	RESPONSE	TACTILE CUE	PHONEMIC CUE
1. பைசா			
2. பந்து			
3. கத்தி			
4. கப்			
5. பின்.			
6. ப்ரஷ்.			

7. அரிவாள்
8. ரப்பர்
9. பூட்டு
10. பென்சில்
11. ஸ்கூட்டர்
12. டேப்
13. சீப்பு
14. புஸ்தகம்
15. கண்ணாடி
16. பூட்டுகை
17. ஸ்பூன்
18. கைகடிகாரம்
19. கத்திரி
20. நெருப்பு பெட்டி

B. WORD FLUENCY

Ask the patient to name as many animals as he/she can in 1 minute. 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 (excepting for those in the example), even if distorted by literal paraphasia.

MAX SCORE : 20
PATIENT'S SCORE :

1. புல்லின் நிறம் ..... (பச்சை)

2. சக்கரை ..... இருக்கும் (திக்திப்பாக)

3. நோஜா சிகப்பு மல்லினை .... (வெள்ளை)

4.

5. நாம் இருவர் நமக்கு ... (இருவர்)

MAX SCORE : 10.

D. RESPONSIVE SPEECH

1. நீங்கள் எந்த ஊருலிருந்து வருகிறீர்கள்?

2. பால் என்ன நிறம்?

3. ஒரு வாரத்தில் எத்தனை தினங்கள் இருக்கின்றன?

4. வைத்தியர் எங்கே வேலை செய்கிறார்?

5. மருந்து எந்த இடத்தில் கிடைக்கும்.

MAX SCORE : 10.

SCORE SHEET.

	MAX. SCORE.	PATIENT'S SCORE	APHASIA QUOTIENT
I. SPONTANEOUS SPEECH.			
a). INFORMATION CONTENT.	10.		
b) FLUENCY	10.		
c) TOTAL.	20.		
(DIVIDE TOTAL by 2 - 10).			
II. AUDITORY VERBAL COMPREHENSION			
a. YES-NO QUESTIONS.	60.		
b. AUDITORY WORD RECOGNITION	60.		
c. SEQUENTIAL COMMANDS.	80.		
TOTAL.	200.		
DIVIDE the total by 20 - 10)			
III REPETITION.	100.		
(DIVIDE SCORE BY 10).			
IV. NAMING.			
a) OBJECT NAMING.	60.		
b) WORD FLUENCY	20.		
c) SENTENCE COMPLETION	10.		
d) RESPONSIVE SPEECH.	10.		
Total.	100.		
(Divide total by 10).			

GRAMMATICALITY JUDGEMENT TASK

	ORAL	WRITTEN	ACCUR
A. Morphophonemic Structures			
1. அம்மாவுக்கு			
2. *மாலாயால்			
3. காலையில்			
4. *கூவிவாள்			
5. *இந்திய நாடில்			
6. வீட்டுக்கு			
7. *பாடம் புத்தகம்			
8. பெண்டிடம்			
9. *சொனாள்			
10. ஆற்றில்			
B. Plural Forms			
1. பெண்கள்			
2. *புத்தகள்			
3. பசுக்கள்			
4. *பூகள்			
5. தோசைகள்			
6. *வானங்கள்			
7. *தண்ணீர்கள்			
8. வீடுகள்			

	RESPONSE		ACCU
	ORAL	WRITTEN	

D. PNa Markers

1. நாம் எல்லோரும் இந்தியர்கள்.
2. நான் நன்றாகப் பாடுவேன்.
3. *அவர்கள் ஓடினான்.
4. *பசு வருவார்
5. பூவெல்லாம் மலரும்
6. *நாங்கள் பார்க்கிறேன்.
7. அவர்கள் கடற்கரைக்குப் போகிறார்கள்.
8. *நீ வருவோம்
9. *கணேசன் ஓடினாள்.
10. நீங்கள் அவரைப் பார்ப்பீர்கள்.

E. Tenses

1. அவர்கள் வந்துகொண்டிருந்தார்கள்.
2. *அவர் போன வருஷம் இங்கே படிக்கிறார்.
3. ராமன் நேற்று சென்னைக்குப் போனான்.
4. *அப்பா நாளை இந்த நேரத்துக்குப் புறப்பட்டார்.
5. அம்மா வீட்டில் சமையல் செய்கிறாள்.
6. அவள் போன வாரம் இந்தி சினிமா பார்த்தாள்.
7. *ரமா நேற்று மாலை என்னைச் சந்திப்பாள்.
8. *டைரக்டர் போன மாதம் பணியில் சேர்வார்.
9. குயில்கள் பாடும்
10. *மயில்கள் ஆடுகின்றன.

G. Conjunctives, Comparatives and quotatives.

1. மாலாவும் கலாவும் பள்ளிக்குச் சென்றார்கள்.

2. *நான் கடையிலிருந்து புத்தகமும் பேனா வாங்கினேன்.

3. எனக்குக் காபி அல்லது டீ வேண்டும்.

4. ராமனோடு சீதையும் காட்டிற்குப் போனாள்.

5. *முரளி சுரேஷ் சின்னவன்.

6. கமலா தன் அம்மாவைப் போல அழகாக இருக்கிறாள்.

7. ஆசிரியர் நாளை காலை பாடம் சொல்லித் தருவேன் என்று கூறினார்.

8. *பாரதி சாயங்காலம் மழைவரும் சொன்னாள்.

9. *தஞ்சாவூரைத் தஞ்சை அழைக்கிறார்கள்.

10. *கமலா நாளை சினிமாவுக்குப் போவது சொன்னாள்.

H. Conditional Clauses.

1. நீ வேகமாய்ப் போயிருந்தாலும் பஸ் கிடைத்திருக்காது.

2. *நீ நன்றாகச் சாப்பிடவில்லை பெரியவனாக மாட்டாய்.

3. அவன் வீட்டுக்கு வந்தால் பணம் கொடுப்பேன்.

4. *கடைக்காரனுக்குப் பணம் கொடுத்து அவன் புத்தகம் கொடுப்பான்.

5. *நீங்கள் சொல் அவர் செய்யமாட்டார்.

6. என்று பணம் கிடைத்தால் நாங்கள் மார்க்கெட்டுக்குப் போவோம்.

7. அவர் இதை முன்பே சொல்லியிருந்தால் செய்திருக்கலாம்.

8. *நீ என் வீட்டுக்கு வந்திரு நான் பழம் கொடுத்திருப்பேன்.

J. Senntence types

1. இந்த ஊர்கான் சென்னை – இல்லையா?
2. *நான் உங்களோடு சினிமாவுக்கு வரட்டும்.
3. நீ அந்த வேலையைச் செய்யக்கூடாது.
4. *நாங்கள் ஒரு பாட்டு பாடலாம்.
5. நீ மனிதக் குரங்கைப் பார்த்திருக்கிறாயா?
6. *வீணற்றில் நீர் அல்லையா?
7. நீங்கள் எப்போது ஊருக்குத் திரும்புவீர்கள்?
8. *உங்கள் யார் மகள்?
9. இந்தப் பூ எவ்வளவு அழகாக இருக்கிறது!
10. *எது ஊர் உங்கள்?

K. Predicates.

1. இந்தப் புத்தகம் என்னுடையது.
2. *இந்தப் புடவை கமலா.
3. *உன்னுடைய அறை என்ன?
4. அவருடைய நாய் பெரியது.
5. *அந்தப் போவா அவனுடைய
6. *இந்தப் பையன் நல்ல
7. *கண்ணன் நல்ல படிக்கிறான்.
8. நேற்றுப் பாடியது என்னுடைய தங்கை.
9. [illegible]

PICTURE-POINTING TASKS

VERBAL / VISUAL STIMULI.	EXPECTED RESPONSE	RESPONSE ACCURACY
PLURAL FORMS.		
1. பெண் /Pen/.	Pict: 2	
பெண்கள் /Pengal/.	Pict: 3	
2. பூனை. /Pu:nai/.	Pic: 3	
பூனைகள் /Pu:naigal/	Pic: 1.	
3. குழந்தை /kuzhandai/	Pic: 2	
குழந்தைகள் /kuzhandaigal/	Pic: 4.	
C:- **TENSES:-.**		
1. அம்மா விளக்கு ஏற்றுவார்	Pic: 3	
/Amma will light the lamp/	Pic: 3.	
அம்மா விளக்கு ஏற்றுகிறார்	Pic: 2	
/Amma is lighting the lamp/.		
2. அக்கா பூ பறிப்பாள்	Pic: 1.	
/Akka will pluck flowers/.		
அக்கா பூ பறிக்கிறாள்	Pic: 2	
/AKka is plucking flowers/.		
3. பையன் சட்டை போடுகிறான்.	Pic: 1	
/Boy is wearing shirt/.		
பையன் சட்டை போட்டான்	Pic: 2.	
/Boy wore the shirt/.		
D: **PNG Markers.**		
தூங்குகிறான் /is sleeping/	Pic: 1	
தூங்குகிறது /neuter-is sleeping/	Pic: 4 or 5	
தூங்குகிறாள் /she is sleeping/	Pic: 3	
தூங்குகிறார்கள் /They are sleeping/	Pic: 2	
தூங்குகிறது / Theyare sleeping/.	Pic: 4 or 5.	

	EXPECTED RESPONSE	RESPONSE Acc
E. CASE-MARKERS.		
1. அம்மா பக்கெட்டில் தண்ணீர் கொண்டு வருகிறார்.	Pic: 1.	
(Amma is bringing water in the bucket).		
அம்மா பக்கெட்டிலிருந்து தண்ணீர் எடுக்கிறார்.	Pic: 3	
(Amma is taking water from the bucket).		
2. பையன் பேனாவினால் எழுதுகிறான்		
(The boy is writing with the pen)	Pic: 2	
பையன் பேனாவை ஜோபியில் வைக்கிறான்.	Pic: 3	
(The boy is keeping the pen in the pocket).		
3. பையன் கூடையில் மாம்பழம் கொண்டு வருகிறான்	Pic: 1	
(The boy is bringing mangoes in the basket)		
பையன் கூடையிலிருந்து மாம்பழம் எடுக்கிறான்.	Pic: 3.	
(The boy is taking mangoes from the basket)		
4. அக்கா குழந்தைக்கு பொம்மை கொடுக்கிறார்.	Pic: 2	
(AKKa is giving the doll to the boy)		
F. TRANSITIVES (INTRANSITIVES) CAUSATIVES.		
1. அம்மா தூங்குகிறார்.	Pic: 1	
(Mother is sleeping)		
அம்மா தூங்க வைக்கிறார்.	Pic: 2	
(mother is putting the child to sleep).		

F.

அப்பா சாப்பிடுகிறார் — Pic: 1.
|Father is eating|.
அப்பா சாப்பிட வைக்கிறார். — Pic: 3
|Father is making (him) to eat.

G. SENTENCE TYPES

புத்தகம் மேஜையின் மேல் இருக்கிறது. — Pic: 1.
|The book is on top of the table|.
குளத்தில் தாமரைப் பூக்கள் இல்லை. — Pic: 3
|There are no lotus flowers in the pond|.
குளத்தில் தாமரைப் பூக்கள் இருக்கின்றன
|There are lotus flowers in the pond|. — Pic: 2.
எதில் தாமரைப் பூக்கள் இருக்கின்றன
|where are the flowers| — Pic: 3 or 2.
யார் நடனம் ஆடுகிறார்.
|who is dancing?| — Pic: 3

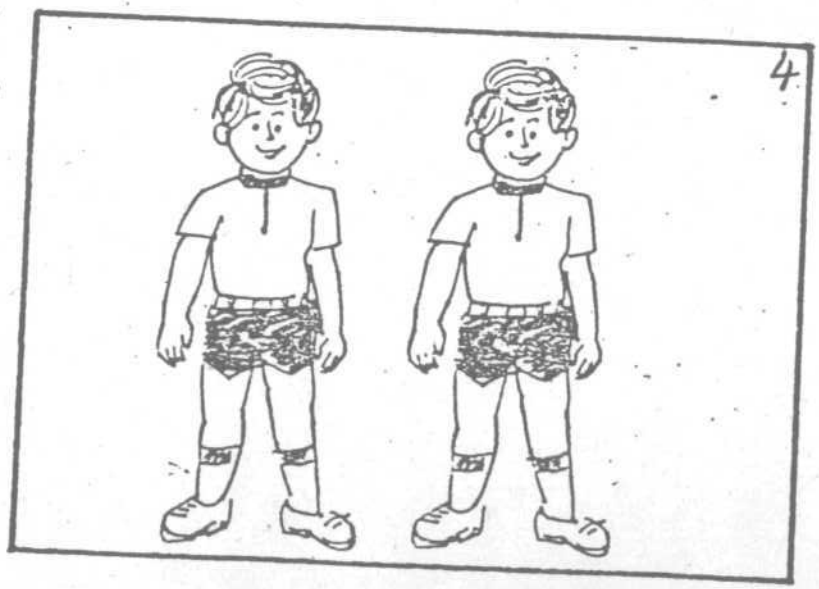
H. CONJUNCTIONS / COMPARITIVES.

பையனும் பெண்ணும் படிக்கிறார்கள்
|The boy and the girl are reading|. — Pic: 3

மாடு முட்டியதால் பையன் கீழே விழுந்தான்
|The boy fell down because the cow hit him|. — Pic: 1.
அம்மா அடித்ததால் பையன் அழுகிறான் — Pic: 3.
|The boy is crying because the mother hit him|.

	EXPECTED RESPONSE	RESPONSE
I- COMPARITIVES. எந்த பென்சில் மிகவும் சிறியதாக இருக்கிறது. /Which Pencil is the smallest/	Pic: 4	
எந்த இரண்டு பந்தும் ஒரே மாதிரி இருக்கிறது. /Which two balls are the same/.	Pic: 2 and 4.	
J- CONDITIONAL CLAUSES: இந்தப் படத்தில் ..பேன் இருந்தால் காண்பி. /Show the picture of fan, if there/.	Pic: 2.	
இந்த படத்தில் செருப்பு இருந்தால் கை தட்டு. /If there are slippers in this picture, clap your hands/.		
K- சாப்பிட்டுக்கு கொண்டே பையன் படிக்கிறான் /As he is eating, the boy is studying/.	Pic: 1.	
ஏனும் பொருதே அம்மா பாட்டுக் கேட்கிறாள். As she is writing, mother is listening to song.	Pic: 2	

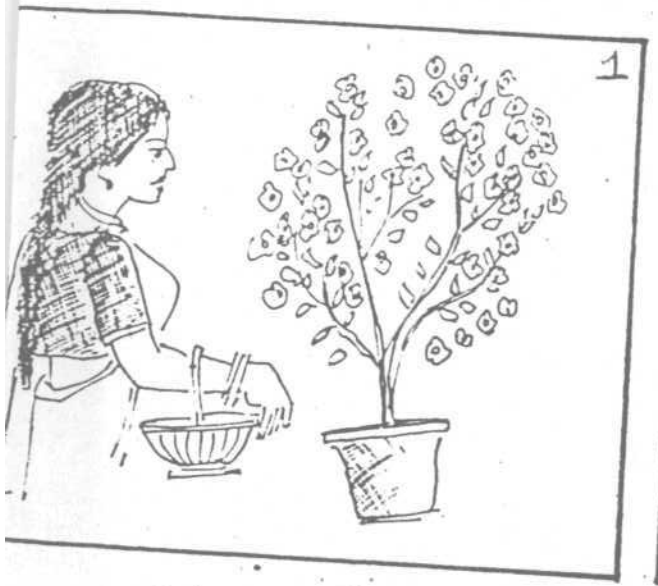
Plurals.



1. பெண் /girl/

2. பெண்கள் /girls/.

TENSES.



1. அம்மா பூ பறிப்பார் /Amma will pluck flowers/
2. அம்மா பூ பறிக்கிறார் /Amma is plucking flowers/
3. அம்மா பூ பறித்தார். /Amma plucked flowers/.

"PNG - markers"

D - a

1

ഉറങ്ങുന്നു. (He is sleeping)

2

ഉറങ്ങുന്നവർ (They are sleeping)

ഉറങ്ങുന്നവർ.

4

5

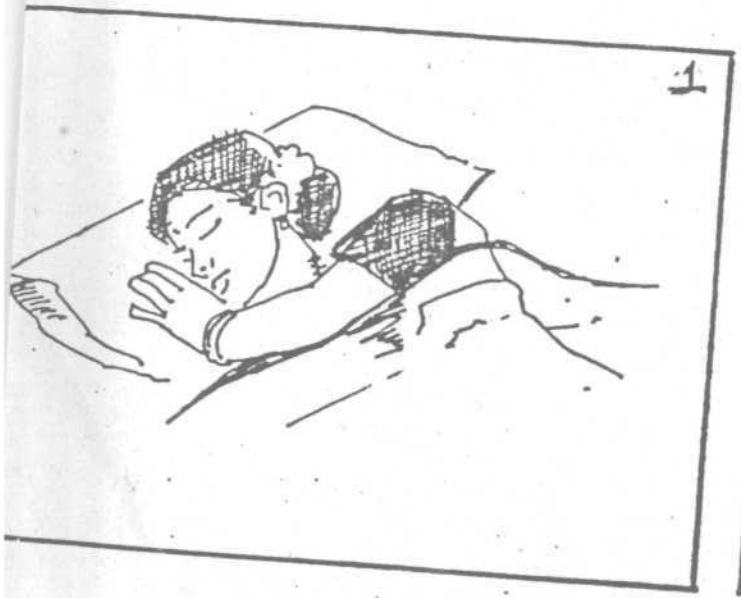
"PNG - markers"

CASE - MARKERS.

1. அம்மா பக்கெட்டில் தண்ணீர் கொண்டு வருகிறார்
/Amma is bringing water in the bucket/.

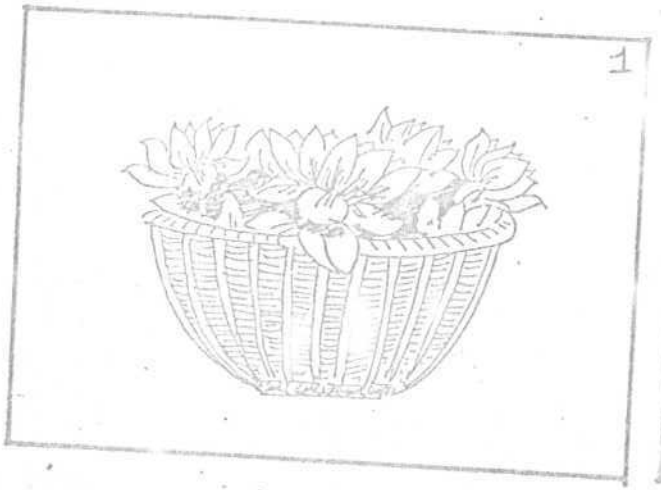
2. அம்மா பக்கெட்டிலிருந்து தண்ணீர் எடுக்கிறார்.
/Amma is taking water from the bucket/.

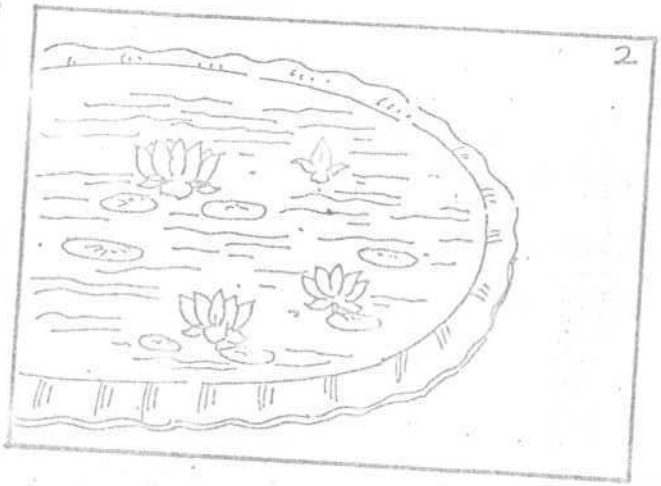
INTRANSITIVES, TRANSITIVES & CAUSATIVES.

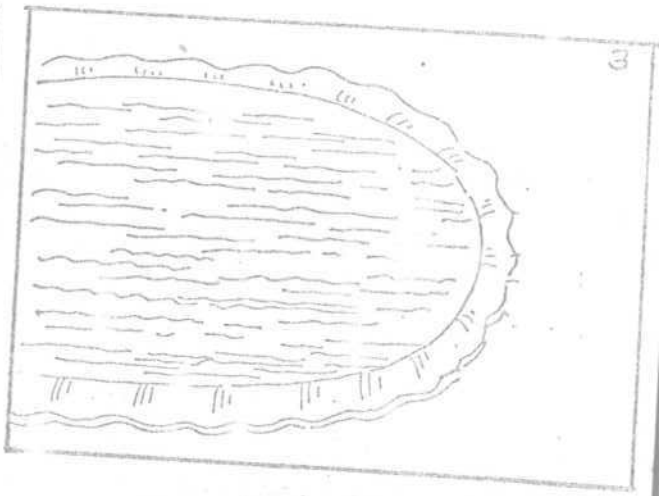


1. அம்மா தூங்குகிறார் /Mother is sleeping/
2. அம்மா தூங்க வைக்கிறார் · /Mother is putting the child to sleep/.

SENTENCE TYPES.



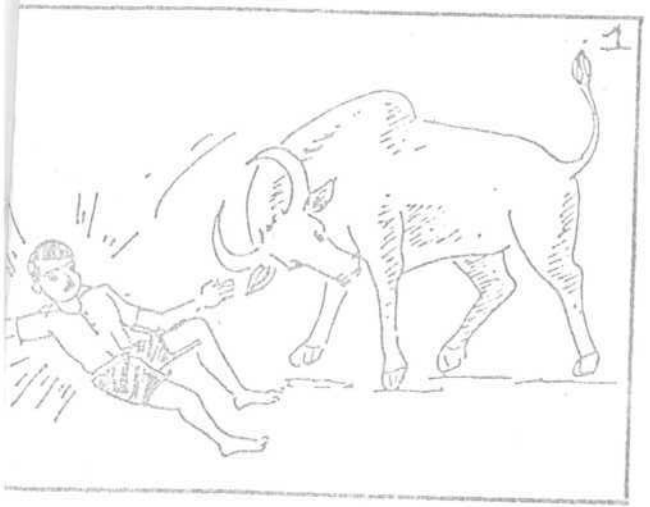


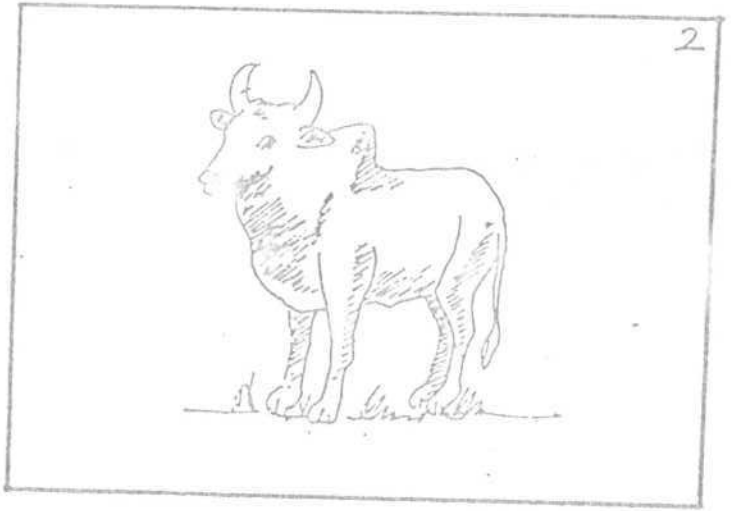


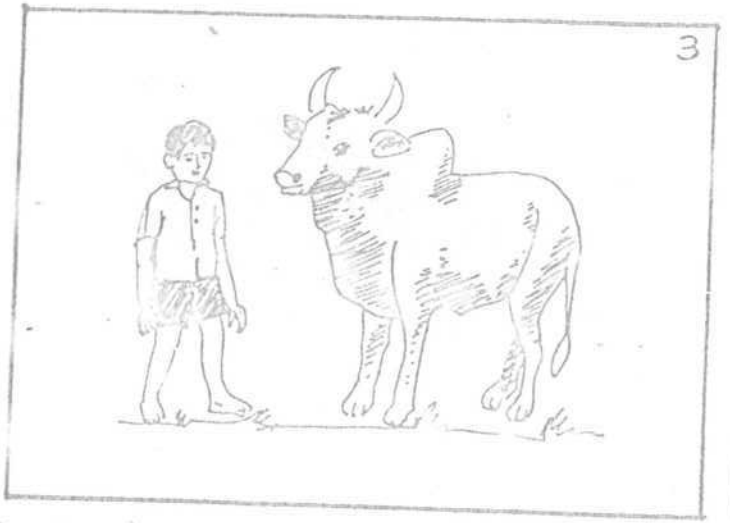
1. குளத்தில் தாமரைப் பூக்கள் இருக்கின்றன. There are lotus flowers in the pond.

2. குளத்தில் தாமரைப் பூக்கள் இல்லை. There are no lotus flowers in the pond.

Conjunctions/comparitives

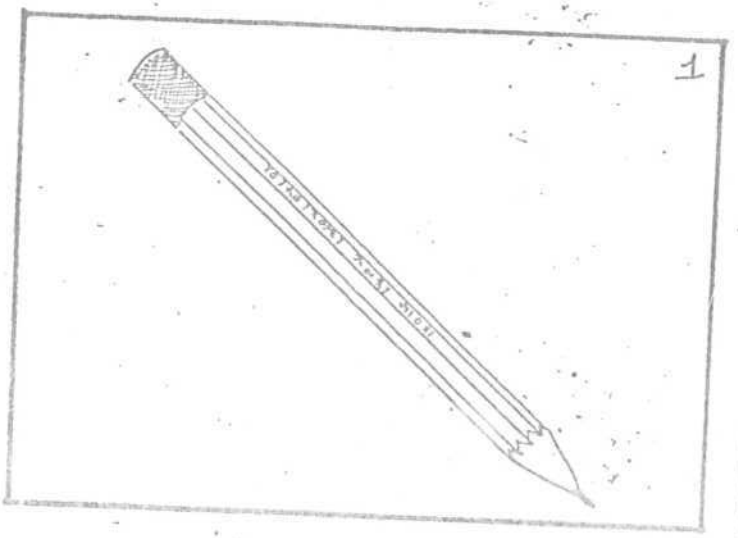


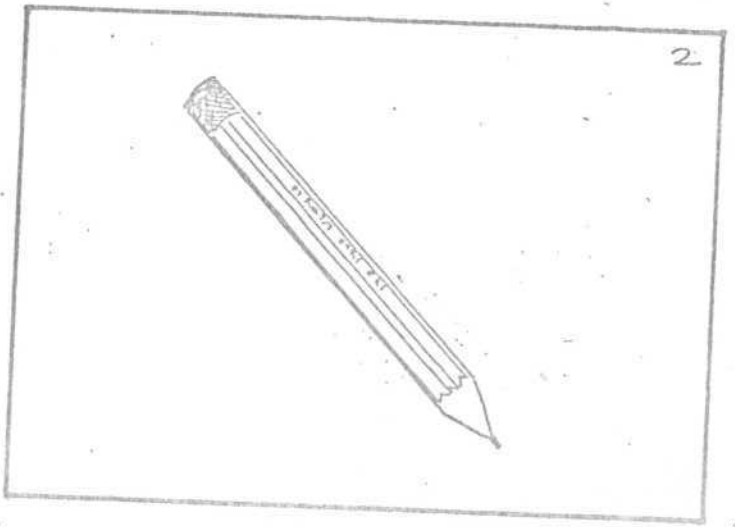


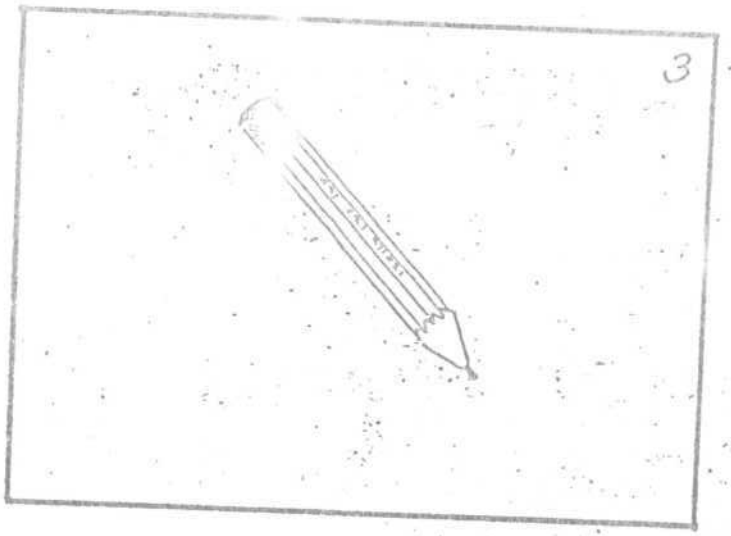


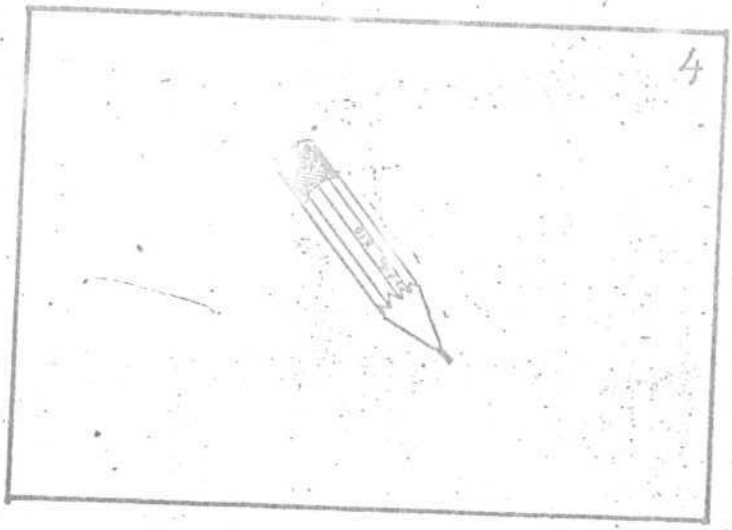
1. மாடு முட்டியதால் பையன் கீழே விழுந்தான்
(The boy fell because the cow hit him.)

Comparitives



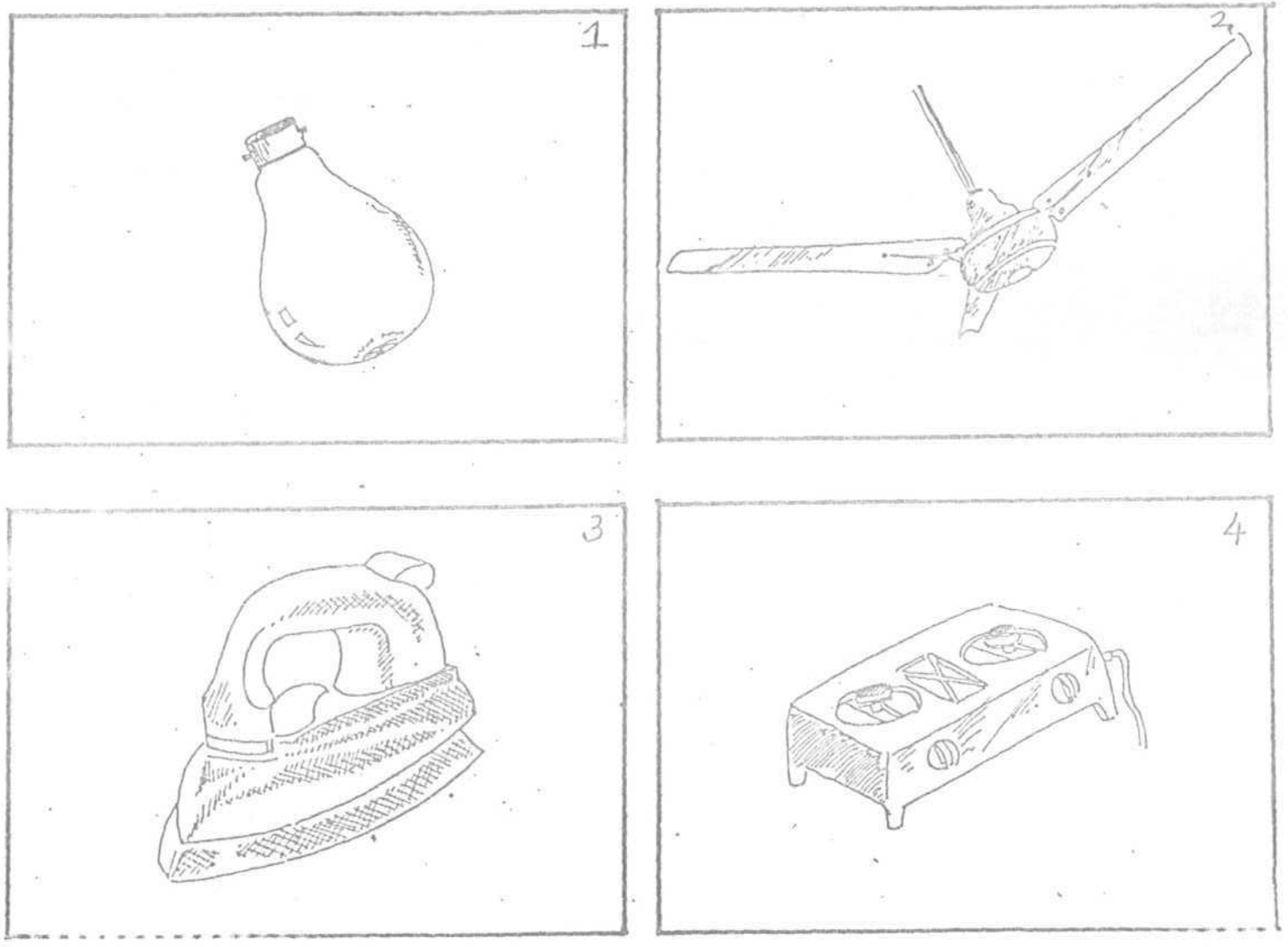






1. எந்த பென்சில் மிகவும் சிறியதாக இருக்கிறது
(Which pencil is the smallest)

Conditional clause



1. இந்த படத்தில் பான் இருந்தால் காண்பி

சாப்பிட்டுக் கொண்டே பையன் படிக்கிறான்

1. The boy is studying while eating.