PATTERNS OF MORPHOLOGICAL IMPAIRMENT IN HINDI SPEAKING APHASICS : A NEUROLINGUISTIC STUDY

Dissertation submitted to Jawaharlal Nehru University in partial fulfilment of the requirement for the award of the degree of

MASTER OF PHILOSOPHY

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This dissertation entitled "PATTERNS OF MORPHOLOGICAL IMPAIRMENTS IN HINDI SPEAKING APHASICS : A NEUROLINGUISTIC STUDY", submitted by Nishant Kumar Ranjan, Centre of Linguistics & English, School of Language, Literature & Culture Studies, Jawaharlal Nehru University, New Delhi, for the award of the degree of MASTER OF PHILOSOPHY is an original work and has not been submitted so far in part or in full for any other degree or diploma of any other university.

This may be placed before the examiners for the evaluation for the award of the degree of Master of Philosophy.

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foreword

The present research was impossible without the help, guidance and co-operation of Dr. Vaishna Narang who fortunately happens to be my supervisor. I sincerely thank her for the invaluable comments and critiques. Although I enraged her at times with my lack of sincerity, but she on the contrary always tried to improve upon my vices in the research.

I am greatly indebted to Dr. Ravi Nehru, Associate Professor, Dept. of Neurology, G.B. Pant Hospital, New Delhi, for including me in his crew, i.e. Neurobehaviour clinic and Neurolingustic lab, G.B. Pant Hospital, new Delhi. He introduced me to the clinical fields and 'interdisciplinary approaches. His insights were overwhelmingly remarkable. The fellow physicians, also were very supportive. Dr. Nehru provided me numerous occasions to meet, observe and talk to the aphasic patients. In the course of the strenuous data elicitation from the patients - S.G., M.S., K.N. (included in the text); T.C.S., R.S., C.L. and the list goes on -- I felt I was exploiting them at the cost of their weaknesses, insufficiencies and ,at times, tears too and ,many times I made them realize their deficits and thereby causing hurt. I will be obliged to them for their co-operation. In between, the streaks of hope and satisfaction came to me in the form of 'improvement' in a couple of cases and this fact has justified my commitment in helping these aphasics in the rehabilitation process in the future. If at all the present work adds to the ongoing debate & research over the processing of language in the mind, the credit must go to them (patients).

This 'word' won't be complete without a mention of my parents and brothers whose communications always encouraged me to work harder in terms of achievements and commitments at the same time. It will be equally dishonest if I don't mention and thank Rachna whose selfless support was strenghtening and enriching since the beginning of the work. Throughout the process she has been essentially inspiring.

I sincerely hope not to bring disgrace to the above mentioned by my work. In the end, I would like to express my gratitude to Delhi University Library, G.B. Pant Hospital Library and National Medical Library for obvious reasons.

KEY TO PRONUNCIATION

Vowels

'a' like 'a' (in the English word)		'about'
'ā' like 'a'	"	'car'
'i' like 'i'	"	'pin'
'ī' like 'i'	"	'machine'
'e' like 'e'	"	'pen'
'ae' like 'a'	"	'man'
'u' like 'oo'	"	'book'
'ū' like 'oo'	"	'fool'
'o' like 'o'	"	'both'
'ou' like 'o'	"	'or'

Consonants

'k' like 'k' (in the English word)		'kinship'
'g' like 'g'	"	'go'
'c' like 'ch'	"	'much'
'j' like 'j'	"	'jaw'
'ṭ' like 't'	"	'tin'
'ḍ' like 'd'	"	'hard'
'n' like 'n'	"	'not'
'p' like 'p'	"	'grasp'
'b' like 'b'	"	'but'
'm' like 'm'	"	'mind'
'y' like 'y'	"	'young'
'l' like 'l'	"	'long'
'w' like 'w'	"	'wave'
's' like 's'	"	'same'
'ś' like 'sh'	"	'shall'
'ṣ' (same as 's')		
'h' like 'h'	"	'hand'

'ṛ' like American 'r' (retroflex flapped)

't' like Italian 't'

'd' like Italian 'd'

'kh'	=	aspirated	'k'
'gh'		"	'g'
'ch'		"	'c'
'jh'		"	'j'
'ṭh'		"	'ṭ'
'ḍh'		"	'ḍ'
'th'		"	't'
'dh'		"	'd'
'ph'		"	'p'
'bh'		"	'b'
'ṛh'		"	'ṛ'

(pronounced with a distinct 'h' sound)

~ = nasalization

ABBREVIATIONS

S	----------	stimulus
R	----------	response
N/n.	----------	noun
ADJ/adj.	----------	adjective
pr.t	----------	present tense
pst. t	----------	past tense
per. asp	----------	perfective aspect
prog. asp	----------	progressive aspect
indef. asp	----------	indefenite aspect
VOC	----------	vocative
OBL	----------	oblique case
DIR	----------	direct case
V	----------	verb
pl	----------	plural
sg	----------	singular
fem	----------	feminine
mas	----------	masculine
M	----------	Male
F	----------	female
acc	----------	accusative
loc.	----------	locative
nom	----------	nominative
AGR	----------	agreement
poss	----------	possessive
adv.	----------	adverb
conj.	----------	conjunction

INTRODUCTION

LANGUAGE: A SYSTEM IN HUMAN BIOLOGY

Language is a part of human biology and it could be further derived that linguistic capacities of a man has some physical existence as an organ of the body which is organised and developed, and functions in a particular way. This organic structure has been called responsible for - 'a theory of innate mechanisms, an underlying biological matrix that provides a framework within which the growth of language proceeds' [Chomsky, 1980] - universal grammar (UG) or we can say that there is an existence of some cognitive system which takes care of the internalized knowledge of language - 'LRCS- language responsible cognitive structures' [Klein, 1977] who has strikingly postulated some hypotheses on language. LRCS varies from person to person excepting some 'commonality as universal phenomenon. Its physical realization is a brain structure which is sufficiently uniform in all neurologically normal human beings such that its description as a neural structure is possible and lastly but not of any less importance. It is restricted to humans only as language too is unique and universally present in all normal human beings and all human beings learn language without any formal and explicit instructions - which is said to be possible due to the presence of 'mental organ for language' [Chomsky, 1977] or

it can be said invertically that the above claims for language responsible structures form the basis of an existence of the 'mental organ'. If we further investigate the linguistic behaviour then we would be in a position to assume that the mental organ has two sets of structures - 'knowledge structures' and 'the structures' for utilising the knowledge structures' (consisting of procedures) and these structures are actually one of the Saussurian dichotomies, namely 'competence' and 'performance' (competence being the intuitive knowledge of a language of a native speaker' and the performance is 'the actual use of competence in articulating language behaviour').

Areas like neurolinguistics, psycholinguistics and cognitive linguistics probably presuppose and assume, somewhere, the fact that language is innate property of the humans. Chomsky supposes the existence of a genetically determined initial state of mind common to all humans with at most minor variations apart from pathology which (initial state of mind) when subjected to the external experience achieves a steady state' changing only in marginal ways and the grammar of the speakers' language is the partial characterisation of the steady state.

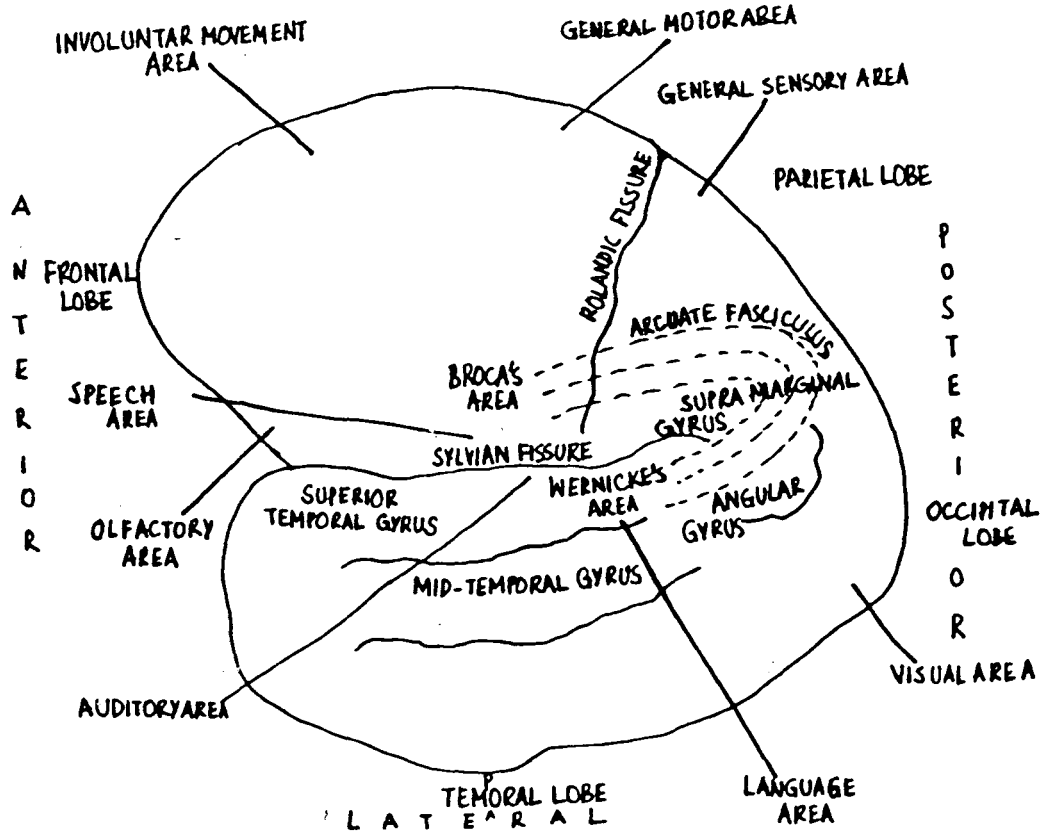
There have been studies presented as the models on 'language - brain relationship' starting from the 'localization - model' [Broca 1861] to the 'global model' [Pierre Marie, 1906; Goldstein, 1948]. The various stages

in between corresponding to various respective models are classical Connectionist model [Wernicke, 1874; Licktheim 1885], extension to Connectionism [Geschwind, 1965], Objection to connectionism [Freud, 1891; Herbert Head 1926] and Hierarchical model [Jackson, 1878 ; Jakobson 1955, 1964, 1968; Brown, J. 1975 a&b, 1976, 1977].

Connectionist model is essentially sensory-motor and based on afferent -efferent connections. Each psycholinguistic faculty (reading, writing, speaking and hearing) is considered as an individual faculty and connected to others with interactions among these components. This model helped the clinicians in hypothesizing the location of the lesion, although empirically detailed level of description was absent. Geschwind (1965), in extension to it, further, saw the relation between the (discovered) connective tracts and the disconnection syndromes. For Freud, 'word' was a set of neurons - the auditory, visual, tactile, object associations, kinesthetic and motor speech aspects of a word (in the form of a 'neuronal net') were all represented across the entire perisylvian area. Head (1926) said that language deficits couldn't be adequately expressed in terms of parts of speech or grammatical elements. For Hierarchical models, Jackson was of the opinion that there was a hierarchy (distinction) between emotional/ involuntary and intellectual/voluntary/ intentional behaviour & between automatic words and propositional use of language. In addition, Jakobson

Figure-1

Left cerebral hemisphere of man from lateral surface. (based on LESSER, 1978)



in his regression hypothesis, gave a hierarchy between elementary structures, versus difficult ones in terms of acquisition. Brown for his 'Microgenesis' said that language system consisted of a number of levels of symbols (to be sequential).

Luria in his Process models associated brain area to the specific language functions. He correlated - frontal lobes to forming of plans for speech; inferior fronto-temporal zone of dominant cortex to language structure, left temporal - occipital zone to naming (objects) ability and to evoking mental images for words; tertiary area of left parietal -occipital zone to inhibition of irrelevant alternative cords; left temporal region to the discrimination of acoustic features of phonemes and the differentiation of the sounds and to the discrimination of phonetic features; posterior zones of left temporal - occipital region to the evocation of visual /mental images; left parieto - temporal occipital zones to the understanding of logico-grammatical relationship and to the simultaneous synthesis of sentence-elements into a logical scheme.

Valenstein (1981) recognizes major language areas in the left hemisphere. Hescle's gyrus is the primary auditory receiving area of the cortex. Wernicke's area is the major auditory association area. Perisylvian region receives and analyses the auditory input and to produce verbal output via the motor cortex (acts as a repetition machine).

LANGUAGE IN THE BRAIN

Cerebral hemispheres (collectively called cerebrum and demarcated by a median or cerebral fissure) have often been thought to function as a whole and therefore damage to a portion will affect all the functions performed by cerebral hemispheres to a degree proportional to the volume of the brain destroyed. F.J. Gall was the first to suggest the existence of anatomo-functional relationship between between precise cortical areas and various modes of human behaviour.

In most of the people the left hemisphere is proficient in language functions but the right hemisphere in usually not devoid of language abilities [Krishner,1981]. However in right handed persons there abilities are slight in right hemisphere and in left handers these are likely to be better. Over 95% [99%, Krishner, 1981] right handers and most of the left handers are left hemisphere dominant for speech and language [Mohr, 1989]. Because of the importance of the language functions cerebral dominance is equated to the language dominance (here, onwards the words dominant or dominance will be used in the context of language functions).

It is also assumed that language lateralisation develops from a base state of no lateralization analogously. A child in the beginning of language

development uses both hemispheres for the purpose. It seems plausible now to assume that the rate of lateralization represents the rate of language development and the ultimate extent of lateralization represents its ultimate level of excellence. It can be argued that in a child the left hemisphere is only a part of a bilaterally developed and distributed language area, so damage to it deprives the child of only part of his language functions.

So we can say that the opposite hemisphere compensate, faster and better for the damage to the language relevant side of the brain the younger the individual when the damage occurs [Kinsbourne, 1975]. Even the evidences of 'right hemisphere damage related to the language deficits' are not satisfactory as the damage was not limited to the right, but was extended to other part also, or there might be the chances of infection through virus from the right to the left hemisphere. It can be presupposed then, that each hemisphere contribute some portion of total language facility and damage to either would result in some deficit or reduction. This deficit would always be partial, the reason might be - 'the other hemisphere was continuing its normal function' or 'umdamaged part of the same hemisphere continuing its work.'

Cerebral dominance for language doesn't develop, it is there from the start, so one could hardly relate the excellence of language behaviour

to the development of cerebral dominance [Kinsbourne, 1975]. Most striking neuroanatomical correlate of language deficit was Broca's finding (1865) that almost all the patients who lost there speech had pathology involving in left hemisphere. Language representation is in the form of functional gravity fields, within which the representation of specific skills, overlaps with that of other linguistic activities.

The dominance is functional and not anatomical although there are structural differences, between the two cerebral hemispheres, although the left hemisphere is generally accepted as having a preponderant role in verbal functioning; the nature of the relationship between the cortical areas and function is less agreed upon. Much of the early works on 'localization' of (language) functions was based on postmortem data. Patients with impairments of nervous system and language disorder were examined and their brains were evaluated after death to correlate the behavioural characteristics with the specific sites of lesions. Till now, there is no actual agreement among the investigators. On the one hand researchers like Geschwind (1965) say that constellation of language impairment can be accounted for on the basis of circumscribed lesions and on the other hand, people suggest that language impairments have limited localizing value. The brain is continuously active and has such a complex anatomical

connectivity that no part of it can be accounted for any functional isolation and therefore a lesion will not destroy a cortical area and its corresponding function but will damage a normal pattern of interaction of a whole network of functions.

Russell (1963) defined an area in the brain within which a small damage will cause language deficits. That area includes lower most part of the third frontal gyrus (Broca's area) and post central gyrus, the supra marginal gyrus, the angular gyrus, the inferior pareital gyrus and the superior aspect of temporal lobe (including Wernicke's area). According to him, a very small probability exist, that damage to the periphery of the hemisphere - the temporal, frontal and occipital poles, will cause significant language deficits.

Benson (1979) suggests another definition for 'dominance' - 'hemispheric lateralization of behavioural functions.' According to him, hemispheric dominances may exist for functions other than that of language but the unilateral lacalization language function to the left hemisphere in the right handers is certainly the absolute and fully accepted example of cerebral dominance.

The non - dominant (the half of the brain not primarily responsible for language) hemisphere is structurally similar to the dominant one but

displays a number of functions that are unique to it - spatial perception, body image, visual perception and constructional abilities. It has also functions relative to musical abilities, and elementary speech.

It is very difficult to determine the hemispheric dominance for language and for it a test, requiring no structural brain damage, is needed. There are two techniques for this determination although none of the two is satisfactorily proved - (1) Carotid amytal test [Wada & Rasmussen 1960] (2) Dichotic listening [Broadbent 1971, Kimura, 1967].

In the first test, fast acting barbiturate is injected into an internal carotid artery to paralyse the ipsilateral cerebral hemisphere effectively but transiently, with only minimal effect on the other hemisphere. If the drugged hemisphere is language dominant the patient will develop aphasia in addition to contralateral hemiplegia (= paralysis of one side of the body) and if the hemisphere is not dominant, there will be only hemiplegia. In the second test, patients are given ear-phones that carry separate messages to the right and left ears and theoretically to the contralateral hemisphere if different messages (usually short list of digits) are presented to the two ears simultaneously, due to the tendency for the extinction of one set of stimuli. The dominant hemisphere, it is surmised, perceives best and the message from the right ear will be the one most often repeated after dichotic stimulation.

Dichotic listening (especially for large group of young children) provides statistically significant evidence of language dominance in the left hemisphere [Kimura, 1967] and for the individuals, the tests have not proved reliable sufficiently to be acceptable as the indicator of the dominant hemisphere. There is still a need for a safe and accurate test for language dominance.

Benson (1979) provides neuroanatomical basis for language dominance. The anatomical asymmetries, between the two hemispheres have been demonstrated subtly and actually. There is asymmetrical crossing of pyramidal motorfibres in the medulla oblongata [Yakovlév & Rakie, 1966]. There is an asymmetry in the size of the size of occipital horns of the lateral ventricles, the left being both longer and broader (Mohr, 1968). The left sylvian fissure is consistently longer and more horizontally placed, suggesting that there is more cortex at the left temporal - parietal junction [LeMay & Culebras, 1972]. The most suggestive cortical asymmetry is that there is an asymmetry in the size of temporal (planum, the portion of the auditory association cortex lying on the superior surface of the temporal lobe). The left planum is usually larger in most of the brain (Geschwind & Levitsky, 1968). These observations indicate significant asymmetries between the two hemispheres. Dax (1836) also thought the cerebral representation for language was asymmetrical, lateralized

to an undefined yet consideration part of left hemisphere. Gratiolet and Broca had their own ideas about asymmetries, anatomical and functional.

Among the exceptions to the issues regarding the language dominance, these are mostly non-right-handers.

APHASIA : (I) INTRODUCTION

There is very negligible disagreement over the definition of Aphasia. It can be defined as loss or impairment of language caused by brain damage. Here language disturbance is not a disturbance of thinking capability or speech [Benson, 1979]. This language disturbance is, mostly, coupled with other language modalities disturbances (that of speech, thought or written form, reading etc.). This combination should be taken seriously for the exactness of the therapy techniques, prognosis and rehabilitation processes. Aphasia is quite different from the developmental language disorder where there is no normal language even present to be impaired or lost. It is a multimodality reduction in the capacity to decode (interpret) or encode (formulate) meaningful linguistic elements. Aphasia is the classic clinical example of language disturbance and it, while combining with speech or thought disorder, can occur as a pure language abnormality.

Underlying all speech behaviour (linguistic) or performance is the tacit knowledge of (or competence in) a given language. All the language modalities form an abstract complex network (for competence) and then their interaction for the actualization of behaviour is performance. Weigl & Bierwisch, 1981, assumed that linguistic competence underlies the complex system of performance strategies and in continuation hypothesized that aphasic syndromes in general are to be understood as disturbances of complexes of components and sub-components of performance, while the underlying competence remained intact. These hypotheses are on the claims that competence and performance are 'psychologically distinct', and in Aphasia, performance is disturbed. It can be further assumable that Aphasia is a disturbance of the access to the knowledge of a language which is intact. There is only one composite underlying competence, if competence is also impaired, then all the modalities as the components of performance will be impaired or we will have to assume a separate competence for each of the components of performance. The phenomenon of deblocking (a transference of one particular act of performance from a still intact component of performance to a disturbed one) will not be explicable if the competence is destroyed. Aphasia consists in the interference of different components of the system of performance abilities. Lenneberg (1967) supports this view. There are problems against the claim above

mentioned that in the cases of total aphasia, there is no evidence for or against preserved competence.

Disturbances in speech and language are usually caused by lesions in the region of the sylvian fissure of the dominant hemisphere. The sylvian fissure comprises the opercular and insular regions which are supplied by left sylvian artery. Syndromes arising from arterial disease in the two divisions form the basis for most of our concepts of disturbed language, a group of disorders known as aphasia.

Historically, these disorders were the first disorders of higher cortical functions to be correlated with focal brain lesions. The linguistic impairment affects semantic, syntactic, lexical and phonological aspects of linguistic processes. Patients demonstrate an impoverished vocabulary impaired ability to utilize more complex syntactic forms and difficulty with more abstract and less frequently occurring words.

The areas of deficits can be articulation, fluency, comprehension (auditory & visual), repetition, word-finding or naming objects, reading and writing. The linguistic areas which are impaired can be studied through descriptive categories of the main levels. For phonology, the categories or components to be examined are prosody, phonetics and phonology and for syntax (grammar) there are morphemes, syntactic structures (surface & deep), transformation, case relations and deep relations. For semantics these

can be syntagmatic and paradigmatic sense-relations and lastly for communication, these would be discourse (structure and sense relationship beyond and across sentences), structure of verbal communication and non-verbal communication.

There might be misproduction of words, or production of inappropriate words (paraphasia). It could be of non-dictionary words (neologism) and further with target word unidentifiable (neologistic jargon) & target word identifiable (Phonemic paraphasia). It could be dictionary word too with target word unidentifiable (semantic jargon). If the target words is identifiable (verbal paraphasia) it can be morphologically related (formal verbal paraphasia) or conceptually related (semantic verbal paraphasia) and sometimes both (semantic plus formal verbal paraphasia)[1]. Sometimes a patient (person with apahsia) could speak more than fifty words per minute (fluent) and sometimes it is just 10 to 20 words per minute (non-fluent), which could be decreased output [Benson, 1979] but sometimes the verbal production could be restricted to one-word speech (telegraphic speech). The fluent response could be without content words too (empty speech). In telegraphic speech all the syntactic elements are absent, this alteration of a grammatical sentence is 'agrammatism'. Sometimes the sounds are poorly articulated and difficult to be understood and it is

[1] Ruth Lesser (1978). (p. 187)

extremely difficult for a normal speaker to imitate, too (dysarthria). When the patient is fluent in the way of his speech, he pauses for a content word and he tries to define it instead of naming it, and in the course of defining it he again pauses when a specific and meaningful word is needed and he again tries to define it thus circling round the subject produces a meaningless fluent speech (circumlocution). Sometimes there is a pathological repetition of an earlier response (perseveration) and some times this repetition is of heard words or phrases (echolalia).

Aphasia has been viewed by some researchers as a unitary disorder (that may be) complicated by sensory, motor and dysarthric impairments.

(II) CLINICAL AND CLASSICAL TAXONOMIES

The case with which aphasia disturbance is described is more important that the schemas used to classify syndromes of impairment and the main aim of the entire process of the clinical practice is description. Aphasia can be divided behaviourally and neuroanatomically into syndromes involving the primary language cortex or those involving other cortical or subcortical centres. The primary language cortex is arranged as a circuit of tissue in the operculum of the sylvian fissure in the frontal, parietal and temporal lobes.

The Wernicke -Licktheim's classification assumes the existence of seven forms of aphasia. Cortical motor aphasia results from the destruction of Broca's area where motor images of words are stored. Sub-cortical motor aphasia is due to an interruption of the conduction pathway between Broaca's area and the articulatory apparatus. Transcortical motor aphasia results from the dissociation of Broca's area and other intellectual cortical areas. Cortical sensory aphasia results from lesions in the Wernicke's area where auditory word images are stored, sub- cortical sensory aphasia is produced by the interruptions between the projective auditory region and Wernicke's area. Trans-cortical sensory aphasia is due to disrupted conduction pathways between Wernicke's area and other intellectual cortical regions. Conduction aphasia comes from the dissociation of Broca's area and Wernicke's area.

Behavioural characteristics: Cortical motor aphasics preserves speech comprehension but the ability of spontaneous and repetitive speech is impaired. A sub - cortical motor aphasic can write too and this separates him from cortic motor aphasics. Trans-cortial motor aphasics can repeat speech they hear but can't speak fluently and comprehension is preserved. A cortical sensory aphasic can neither comprehend nor repeat the utterances he hears but he is able to speak fluently. Sub-cortical sensory aphasics

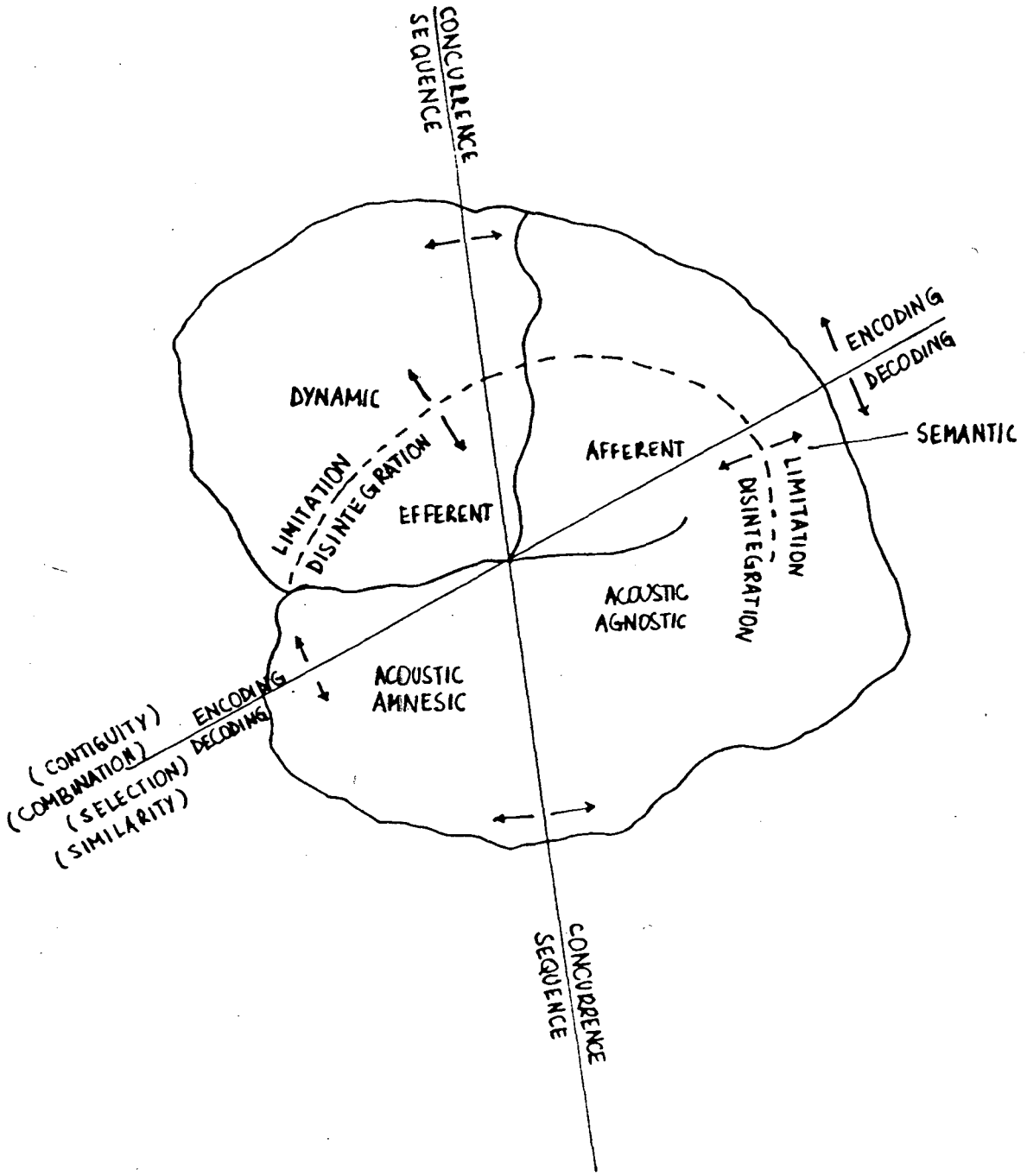
don't grasp what they hear nor can they repeat or write from dictation. Spontaneous speech, reading , and writing are retained. In transcortical sensory aphasia, the patient can repeat what he hears but doesn't comprehand the utterances, this results from the fact that although the auditory impulses reach the intact Wernicke's area, they are transmitted only to Broca's area thus making repetition possible and don't reach those areas where meaning is decoded (i.e. where words are assigned senses and concepts). A person with conduction aphasia has a typical symptom of disturbed repetition with intact comprehension and spontaneous speech. The naming ability is also preserved.

Several aphasiologists attempted classifying aphasia, with inconsistent terminology. They ideosyncratically used the terms for the same syndromes and sometimes same terms were used to describe different syndromes. David Crystal (1984) calls 'terminology' an 'evil-spirit' which 'seems to preside over all clinical language studies' and which 'tempts all to follow' for 'clarity and precision' but provides them 'only obscurity and quickstand'.[2] However, types of aphasia have a fair degree of uniformity, although the emphasis given in their description often varies.

Luria (1966, 1970) has distinguished six main types of aphasia. He, by a careful mapping of the sites of injury in the wounded soldiers and

Figure - 2

Schematic representation of Luria's syndromes of aphasia in relation to lesion sites in the left cerebral Cortex and to Jakobson's three dichotomies of encoding - decoding, concurrence - sequence and limitation - disintegration. (LESSER, 1978, p.42)



taking their language disorders into consideration, established the correlations between the syndromes he found (behavioural characteristics regarding language functions) and the areas of the brain which were damaged. He also distinguished between 'lasting' disorders and 'temporary' disorders. Acoustic-agnostic aphasia (sensory aphasia) was related to the lesion in the upper gyrus of the temporal lobe (Wernicke's area) - here the primary difficulty is in phonemic hearing. Acoustic - amnesic aphasia is related to the lesion in the middle gyrus of the temporal lobe. Here there was inability to retain the meaning of the series of words. Semantic aphasia was correlated to the lesion of the area where occipital, parietal and temporal lobes meet. Here phonemic hearing is preserved and system of simultaneous connections (beyond the immediate meanings of the words). In efferent motor aphasia there is a pathological intertia of the motor system so the patient has difficulty in initiating speech movements and in rapid transfer from one articulation to other. In afferent motor aphasia, the disorder is in the kinaesthetic feedback of the motor patterns of the speech - it becomes diffuse and loses its specificity so that there is difficulty in assuming the correct positions of the articulatory organs. Sometimes there are substitutions for individual articulemes. The sixth kind of aphasia is dynamic aphasia which like efferent aphasia is a disorder of the dynamic processes of neural exicitation. It may be considered as

one stage recovered from efferent aphasia. It is due to more anteriorly placed lesion, and the difficulty in initiating and transition is at the levels of phrases and sentences, thus a patient with this syndrome can't produce a string of sentences to describe episodes.

The Boston classification of aphasias by H. Goodglass and E. Kaplan (1972) uses a framework of component deficits rather than neurodynamics and the Pavlovion system of analysers as does Luria's classification. In the Boston classification the areas of deficit are -- articulation, fluency, word finding, repetition, seriatim speech, grammar, paraphasia, auditory comprehension, reading and writing. This Boston classification has been used in a large number of linguistic investigations of aphasic disorders in the English language.

In Boston classification types of aphasia are six -- Wernicke's aphasia (lesion on the posterior portion of the first temporal gyrus); Broca's aphasia (lesion in the third frontal convolution); Anomic aphasia (lesion in the temporal - parietal region - may extend to angular gyrus; Conduction aphasia (lesion in the supramarginal gyrus deep to 'arcuate fasciculus', i.e. a link between Broca's area and Wernike's area by a tract of short fibres making cortical - sub-cortical connections predominantly). Trascortical sensory aphasia or isolation syndrome (lesion in the band of infaceted tissues which cuts off an intact Wernike's - Broca area from rest of the

brain); and Transcortical motor aphasia (lesion in the tissue of frontal lobe marginal to third frontal gyrus).

CHARACTERISTICS : In Wernicke's aphasia, the auditory comprehension is impaired and speech is fluently articulated (but paraphasic). Patient may repeat uncomprehendingly or with literal/ verbal paraphasia. Word finding disorder (anomia) is a constant feature. Rate of speech production may be increased.

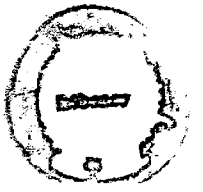
In Broca's aphasia, the features are awkward articulation, restricted vocabulary, restriction of the grammar to the simplest, most overlearned forms and auditory comprehension is retained relatively. Non speech oral movements are often, not always, affected. In Anomic aphasia, the major feature is the prominence of word finding difficulty in the context of fluent, grammatically well formed speech. It differs from Wernicke's aphasia in the absence of literal and verbal paraphasia and in the relative intactness of auditory comprehension. Patients may use circumlocutions in free speech and the speech is usually empty (free from content words) with very poor comprehension of isolated nouns and verbs with respect to their overall comprehension. Reading and writing may vary in severity from patient to patient and it is the least reliably localized of aphasias (as sometimes it seems there is a continuum between Anomic and Wernicke's aphasia).

In Conduction aphasia repetition is disproportionately and severely impaired in relation to the level of fluency in spontaneous speech and to the near - normal level of auditory comprehension. Spontaneous speech may be circumlocutory and inadequately structured with defective syntax and difficulty in findings words appropriate to a context. Defects of structure and gross - misspelling characterize the writing. Outstanding speech difficulty is in proper choice.

In transcortical sensory aphasia or isolation syndrome, there is a remarkable preservation of repetition in the context of features of a severe Wernicke's aphasia. Patient doesn't initiate speech. Speech is well articulated with irrelevant paraphasia and neologism. Patient is totally unable to name when confronted. Repetition is not limited to echoing (echolalia), with unusual preservation of memorized material.

Transcortical motor aphasia is marked by an absence of spontaneous speech and writing, although patient can reply to questions. Naming is relatively intact. There is difficulty in initiating and organising response but once initiated, it (speech) is well articulated. Auditory comprehension, oral reading, repetition and writing to dictation are relatively preserved.

Norman Geschwind in 'Neural Mechanism, Aphasia and Theories of Language' opposes the 'sensory - motor classification' as an 'inaccurate



representation of appasia'. He finds it absent in Wernicke's writing. This sensory - motor classification was - 'if a patient spoke incorrectly he had a lesion in Broca's area and if he didn't understand he had a lesion in Wernike's area. If he suffered from both deficits, he was presumed to have a lesion in both areas'. Wernicke made very clear that a lesion in superior temporal gyrus produced difficulty in all forms of language.

Sabouraud used Saussure's two linguistic planes - phonological and semiological planes with selection and combination axis for these two. On phonological plane selection is from the phonemes and combination is into a chain of words and on the semiological plane selection is from the lexicon and combination is into a text. Thus language's 'dual system of co-ordinate' is made the basis of a typology of aphasia - taking disorder along the two axes on the two planes. Broca's aphasia is characterised as disturbances along the combination axes and Wernicke's aphasia along selection axes. So there are four types - semiological Broca's (agrammatism etc.); phonological Broca's (breakdown in chaining of phonemes, paraphasia); Semiological Wernicke's (anomia); phonological Wernicke's (conduction aphasia).

Jakobson also has attempted one typology of aphasia based on three dictotomies--

(1) (Encoding - decoding);

(2) (Concurrence, - sequence); and

(3) (Limitation - disintegration)

His typology was close to the classical and traditional typology (i.e. sensory and motor).

Luria's syndromes could be classified into two - encoding disorders' (efferent, afferent and dynamic) and decoding disorders (acoustic amnestic, acoustic - amnesic and semantic).

According to disintegration/ limitation dichotomy, efferent motor and semantic aphasias have been distinguished from dynamic and acoustic-agnostic aphasia respectively and by sequence/ concurrence dichotomy, these aphasias with sequential disorders efferent motor, dynamic and acoustic amnesic; and three aphasias with concurrence disorder - afferent motor, semantic and acoustic agnosic aphasias. Thus Jakobson gives through his dichotomies a theoretical account of the distinctions amongst all these aphasia (Luria's).

(III) FORMAL TEST BATTERIES :-

To the date there are no universally accepted definitions of these neurolingusitic disorder - syndromes arising from brain damage and no test is so productive an aid to description or quantification of the communication disorders. Despite the presence of formal test batteries for the assessment of neurolinguistic language disorder these are not broadly used and are insufficiently standardised. There is considerable similarity in the tests and also there are significant differences too, and no consensus for the test battery is there. Almost all the batteries operate on the four modalities of language -- reading, writing, speaking and understanding; and all provide informations on the interpretation of the results but at the same time they differ in rationale, interpretation, scoring and comprehensiveness.

Examination for Aphasia (Eisenson, 1954) is a medium length test divided into expressive and receptive functional sections. It is developed on the premise that aphasia is the impairment in the patients' ability to handle situations involving internal and external symbol processing (thinking and reading; & writing and speaking, respectively).

The Language Modalities Test of Aphasia (LMTA) by Wepman and Jones (1961) and the Minnesota Test for Differential Diagnosis of Aphasia (MTDDA) by Schuell (1957) were presented for general use and were

similar in that aphasia is viewed as a unitary disorder which may be complicated by other communicative deficits. LMTA assesses calculation too in addition to the four modalities of language while MTDDA assesses auditory disturbances, visual and reading disturbances, speech and language disturbances, visuometer and writing disturbances, disturbances of numerical relations and arithmetic processes.

The Porch Index of Communicative Abilities (PICA) by Porch (1967) takes less time to administer than many of the formal aphasia batteries and can be repeated with excellent test-retest reliability. It assesses verbal, gestural and graphic abilities and offers excellent quantitative results by comparatively less qualitative information. Boston Diagnostic Aphaisa Examination (BDAE) by Goodglass & Kaplan (1972) provides the widest range of evaluation techniques and requires the knowledge of the system of the aphasic syndromes (which is neither widely known nor totally accepted). Western Aphasia Battery (WAB) by Kertesz & Poole (1974) is shorter language evaluation based on BDAE, and varies from BDAE in that results are expressed as quotients.

The Aphasia Language Performance Scales (ALPS) by Keenan & Brassell (1975) are time consuming and limited by space and environmental restriction. The test is composed for four scales - listening, talking, reading and writing - purported to be independent of one another.

MORPHOLOGICAL IMPAIRMENTS: A REVIEW

The disturbances affecting the production of morphological forms are - agrammatism & paragrammatism (arising in the problem with syntax) where morphological affixes are omitted and changed. Agrammatism is a component of the syndrome - Broca's aphasia - marked by greater retension of content (phonological content, Kean, 1977) words in the spontaneous speech and omission of function words and bound morphemes.

The patient can often communicate considerable information despite limitation of verbal production to one word sentences (i.e. telegraphic speech). This alteration of normal grammatical sentence structure is marked by -

(1) deletion of syntactic language structures (preposition, articles, adverbs, adjective, verbs)

(2) marked difficulty in handling relational words (big-small), plurals, pronouns, tense; and

(3) omission of (inflectional /derivational) affixes.

Since the aim is to study the morphology, the agrammatic patients will be useful as the impairments will be in the inflectional affixes (number, gender, person, tense, and aspect) and derivational affixes which add to

the root (stem) to derive nouns, adjectives, and verbs.

Badecker & Caramazza (1987) reported that grammatical category produced the errors and verbs were more affected than nouns and adjectives. Most of the regularly inflected verbs were impaired with respect to irregularly inflected ones. Derived verbs were more impaired than the simple ones.

Stimulus (word) → Response (Produced word)

[Root (stem) + Affix (legal/illegal/non existential)]

[Word/ non-word]

Sometimes there is substitution of an affix or an entire word for another and this supports the decomposition model (root/ stem and affixes are represented autonomously in the mental lexicon, Garrett (1980). But the patterns of the retension of the function words & bound morpheme vocablurly might be different for an individual patient with agrammatism.

Patterson (1982) reported that in the mental lexicon morpheme, bound morpheme & complex forms [(morpheme + bound morpheme) or (morpheme + {morpheme + bound morpheme})]are listed separately.

According to the cohort model [Marslen - Wilson, 1980] both base forms and complex forms (affixed forms) are accessed and the respective cohorts for the word 'Robert' will include - 'rob' to 'robin' (recognised at [t])

& 'robber', 'robbery', 'robs', 'robbed' (recognised again at [t]) [Kenyon & Knott, 1953].

Tyler and Wessels (1983) maintains that words are represented as base morphemes with inflectional & derivational markers attached to them. In [/sænɪtɪ/ – sanity] (derived from (sen) sane). The phonological change won't allow the accession of the base morpheme [sen] -- after the stripping off of the bound morpheme the stem remained will be [sæn] which will be invalid phonologically. While Taft & Forster (1975) are of the view that prefixed words don't have separate entries and are accessed by root.

I	II	III
Recognition of prefix & its removal for lexical search	Lexical Search for the root	After recognising the root recombination of root and prefix.

Later in 1979 Taft said that suffixed words also undergo the same 'affix - stripping' analysis (process). But the question remained - 'what happens when base is changed after suffixation?' The method, above, is only economical for non changing bases. Taft (1981) again said that pseudoprefixed words, take longer to recognise than prefixed words and they are initially misanalysed as 'prefix + stem'. In 'Addressed morphology model' (Caramazza

et al. 1985) there are two access procedures for reading morphologically complex words -- morphological parsing address procedure & whole word address procedure (constituting Lexical address system).

I	II	III
Output of real words	Activates pre assembled lexical forms	Preassembled whole word phonological forms (comparable to III of T&F, 1975)

Since non-words don't have a preassembled output form, these might be a mere outcome of the impairment in the assembly procedures for the activated morphological representations. All these disturbances (impairments) can be grouped together, for it can be said that these are at a particular level of sentence planning [Caplan, 1994] (i.e. positional level, Garrett, 1975)

III

positional level [Where function word-bound morpheme vocabulary is accessed and for the output of syntactic and morphological processing in language processing structures].

II

functional level [for semantic and thematic information]

I

message level [prelinguistic level for the intent]

Garrett (1975): Model of sentence production.

For morphemes, order of acquisition is usually the order of impairment (Caplan, 1994). Miceli & Caramazza (1988) suggested a dissociation of inflectional and derivational morphology as they found a selective deficit of inflectional morphology which proves the functional autonomy of the subcomponents -- inflectional & derivational morphology, in the mental lexical. Jarema & Kehayia (1992) show that morphological deficits can manifest themselves at distinct levels of grammar, the lexical and post - lexical. They worked on a pre-investigated statement that 'morphology can be selectively spared or impaired in aphasia'. Luzzati and Bleser (1996) showed that with respect to inflectional morphology of simple

and derived nouns the morphological features of gender and number are almost fully preserved. In Bleser & Bayer (1988) the agrammatic speech is more due to asyntaxia rather than due to amorphology as the patients couldn't process when morphology was implemented syntactically (i.e. problems at post-lexical level, Jarema & Kehaiya, 1992). The conflict is obvious between -- inflectional morphology (as part of the lexical component) [Kiparsky, 1982] vs. inflection are generated non-lexically or post-lexically (in the syntactic component of the grammar) [Backer, 1988; Per mutter, 1988] later a dissociation between spared inflection between at word level (morpholexical) and impaired inflections at sentence level (morphosyntactic) was observed [Luzzati and Bleser, 1996]. Friedmann & Gordzinsky (1997) observed a selective deficit of tense inflection, use of copula and embedded structures while a relatively more intact in the agreement inflections. They also concluded that all grammatical morphemes are impaired in agrammatism and as a result of tense impairment these have been syntactic impairment as consequences. Badecker (1997) proposes a dissociation between morphological processing mechanism and whole word processing system and his deduction is - 'inflected forms induce a higher error rate than corresponding base forms.'

METHODOLOGY

The methodology begins with the selection of the subjects with language deficits along the modalities (dimensions) - comprehension, speaking, reading and writing- usually in combinations, and then following will be applicable to them.

CRITERIA FOR THE SELECTION OF THE CASES :

(1) There will be an exclusion of the neuropathology involving non brain-portions of CNS (central nervous system) and non-neurological strates.

(2) The pathologies - trauma (dozed or - penetrated head injury) ; neoplasm (abnormal growth within brain); and other infections - will be avoided as there are fewer cases of aphasia arising from these.

(3) The patients with cerebral - vascular or cerebro-vascular (CV) pathology will be selected for the present study. This pathology affects cerebral (extracranial) blood vessels and produces, then, damage to selected areas of the brain. Its major varieties are Embolism, Thrombosis and Hemorrhage.

(4) Severe aphasics will also be excluded, for there won't be any out-

put (either orthographically or phonologically) and there won't be any data to be studied.

(5) Aphasics must have some comprehension to follow the commands to perform language - tasks otherwise there won't be any purposeful data (to be analysed).

For the diagnosis of aphasia and its syndromology, Benson's (1979) clinical test format will be used. His traditional bedside approach (a widely used method and a non-standardised method at the same time) tests the patient in four modalities - comprehension (by conversational speech or spontaneous verbalization); speaking (by repetition tasks); reading aloud; and writing. But for the questionnaire and its guidelines; types and aspects two standardized and formal test batteries will be consulted and considered - BDAE (1972) (Boston Diagnostic Aphasia Examination by Goodglass and Kaplan) and WAB (1974) (Western Aphasia Battery by Kertesz & Poole). These two batteries too, chiefly concentrate on (auditory) comprehension; Repetition, reading and writing. Questions for this purpose will be prepared by keeping a fact in the mind that patients might be illiterate or minimally educated and very common words will be considered for the structures in common use. Being the oldest, this clinical test [Benson, 1979] is still the most important technique for

the evaluation of the patients with aphasia. For example, the examination of the conversational speech will state certain feature system (important for deciding the syndrome) including - fluent/ non-fluent (posterior/anterior); (auditory) comprehension; dysarthria; agrammatism/ paragrammatism; telegraphic speech; circumlocution; empty speech and perseveration; and paraphasia. Other modalities like repetition are also important deciding factors. Thus primary examination (diagnosis) of the patients will be guided by both non-standardized (and clinical) and standardised (and formal) tests.

After the confirmation of the syndrome in the aphasiology, the patients will be subjected to the further elicitation for the main purpose of the present study - morphological analysis. This elicitation of data will be done on the basis of the spontaneous speech; repitition, reading aloud, writing (dictation and copying) tasks (simple to complex for testing omission, substitution and illegal use of affixes) and generation of semantic derivations (adjectives to noun, verbs to noun, noun to noun etc.) and these tests will include the most commonly used examples which will take care of the illeterate patients too (or patients from any educational background).

For the spontaneous speech a tape recorder will be used and then the data will be transcribed. Examination of the spontaneous speech and other tasks (reading, writing and repetition) will take care of inflections

- tense & aspect (on verb) and agreement (number/gender) - on noun, adjectie & verb; and person on verb only and semantic generation will take care of the derivational errors only.

For the basic terminology and avoiding the controversy regarding it in morphology Katamba (1992) will be followed. While analysing the data both generative and non-generative approaches will be considered for supporting the theses or hypotheses in the study.

The study of morphological patterns will be helpful in validating the hypotheses regarding dissociation (e.g. dissociation of inflectional & derivational morphology, Miceli & Caramazza, 1988) and the double dissociation (of functions, Teuber, 1969). The issue and debate regarding the conflict between autonomous representation and full word listing hypothesis will be looked into. The result will also be able to predict the validating of the decompositional model for the production of spoken words (speech output system). The results, will further be helpful in the issues regarding the hemispheric functions involving the linguistic functions. The difference in the output of the impaired language will be able to see the constituent structure of the word in terms of roots (or bases) and their affixes (inflectional and derivational). The controversy around the independence of morphology as a component in the mental lexicon between generativists and non generativists (meaning based and natural approaches) will be considered too.

OBSERVATION AND DATA

CASE - I

Patient	:	M.S. (M/70)
Handedness	:	Right
Education	:	10th
Onset	:	1993, April
Language(s) Known	:	Hindi
Clinical Report	:	Left MCA Infarct, Left temporo-parietal lesion Perisylvian Aphasia (Wernicke's) CVA
Clinical Test	:	**Comprehension** (Auditory) - Normal (Nearly) abnormality expressed in comprehending semantic generation tasks. **Fluency** - Nonfluent (less than 30 words per minute and sometimes 10-15 too) **Reading (aloud)** - Normal **Output** - Normal & grammatical (increased effort) **Naming** - Intact **Repetiton** - Impaired **Writing to dictation** - impaired **Syndrome** - Broca's (likely to be)

M.S.'s output was quite syntactic and those showed impairment. His comprehension was normal. His capacity in reading aloud and copying the written text was normal. Impaired modalities repetition and writing to dictation. He was asked to repeat and write words and sentences.

Spontaneous speech:	Normal but non-fluent (20-25 words per minute)
Repetition :	Single word - Near-normal
	Sentences - Impaired.
Writing to dictation :	Single word - normal
	Sentences - Impaired

Single Word Output:

STIMULUS	RESPONSE
(n.) 'capātiyã' (bread) (fem + pl)	- capātī (sg.)
(n) 'niwāsiyõ' (inhabitant) (mas+pl)	- niwāsī (sg.)
(n) 'irāde' (aim) (mas+pl)	- irādā (sg.)
(n.) 'badhāiyõ (congratulation) (fem.+pl.+OBL)	- badhāī (sg.+DIR)

SYNTACTIC OUTPUT :

(Only impaired responses have been given and the intact ones have been made redundant.)

1.S	dhobiyõ	ko	kapṛe	de	do
	(washermen)	(dat.)	(clothes)	(give + imperative)	
R	dhobī				
	(sg.)				
2. S	mociyõ	kī	āmdanī	kām	hogayī
	(cobblers/ + OBL)	poss.	(income)	less	(become+per. asp+fem+sg.)
R	mocī (sg.)				

3. S	paṛosiyõ̃	se	dūr	rahanā	cāhiye
	(neighbour + OBL)	(abl.)	(away)	(be)	(should)
R	paṛosī (sg. + DIR)		thīk nahī̃		
			(good) (not)		
4. S	dillī	ke	niwāsiyõ̃	jāgo	
	(Delhi)	(poss.)	(inhabitant+OBL)	(wake up + imperative)	
R		niwāsī (sg.)			
5. S	halwāiyõ̃	se	miṭhāiyā̃	banwāo	
	(cnfectioner + OBL)	(instr.)	sweets+pl.	(make+cause+imperative)	
R	halwāī (sg.+DIR)		Miṭhāī (sg.)		
6. S	carc	isāiyõ̃	ke liye	hae	
	(church)	(christians +OBL)		(dat.) (be+pres.t.+sg.)	
R		isāī (sg.)			
7. S	adhikāriyõ	se	bātẽ̃	mat	karo
	(officers+OBL)	(instr.)	(talk+pl.)	(not)	(do+imperative)
	adhikārī (sg.)				
8. S	maẽ̃	bhāiyõ̃	ke liye	kapṛe	lāyā
	(I)	(brothers+OBL)	(dat.)	(clothes+pl.)	(brought)
R		bhāī (sg.)			
9. S	aṇḍe	phuṭ	gaye		
	eggs	break	(per. +asp.+pl.)		
R			diye (V2")		
10. S	mere	irāde	acche	nahī̃	
	(I + poss.+pl)	(aims)	(good+pl)	(not)	
R	meṛā (sg.)	irādā (sg.)	thīk (good)	hae	
				(pr.t+sg.)	
11. S	kele	saṛ	gaye		
	bananas	(rot)	(per.asp+pl.)		
R		(kharāb ho)			
		(bad) (become)			

12. S	gale (throat + OBL)	mẽ (loc)	taklīph (pain)	hae (pre.t+sg.)	
R			thīk nahĩ (good) (not)		
13. S	caśmõ (spectacles + OBL)	kī (poss	dukān (shop)	hae (be+ present tense+sg.)	
R	caśme (sg)				
14. S	cuhe (rats)	baṛe (very)	badmāś (wicked)	haẽ (be+pr.t.+sg.)	
R		bahut			
15. S	badhāīyā̃ (congratuations)	lo (take)			
R	badhāī (sg.)				
16. S	dillī (Delhi)	kī (poss)	galiyā̃ (lanes)	sūnī haẽ (deserted+fem) (are)	
R				bahut choṭī (very small)	
17. S	kṛṣn (krishna)	kī (poss)	sau (hundred)	patniyā̃ (wifes)	thĩ (be+pst.t +.pl.+fem.)
R		ko (acc.)		rānī (sg.)	thī (sg.)
18. S	bhārat (India)	mẽ (loc.)	kai (many)	nadiyā̃ (rivers)	haẽ (be+pl.+pr.t)
R			kai ek	nadī (sg.)	
19. S	maẽne (I+nom)	kai (many)	bājiyā̃ (challenges)	jītī̃ (won)	
R		bahut sārī	bājī (sg.)	jīt lĩ (per.asp)	
20.S	āj (today)	reḍio (radio)	par (loc)	khabrẽ (news)	āyĩ (came)
R					ā gayī (perfective)

21. S	ghaṭnāẽ	ghaṭ	rahĩ	haẽ	
	(incidents)	(happen)	(pro.asp+fem+pl.)	(pr.t.+pl.)	
R		bahut ho			
		(many) (become)			
22. S	uske	hāth	bā̃dh	do	
	(he+poss.)	(hands)	(tie)	(imperative)	
R			bā̃nd kar		
			(close down)		
23. S	rātõ	mẽ	ghūmo		
	(nights+OBL)	(loc.)	(walk+imperative)		
R			nahĩ jāo		
			(not) (go+imperative)		
24. S	gā̃w kī	laṛkiyā̃	gorī	haẽ	
	(village+poss.)	(girls)	(fair)	(are)	
R		laṛkī (sg.)	acchī (good)		
25. S	unke	do	rāj kumar	the	
	(they) + poss.	(two)	(princes)	(be+pst.t.+pl.+mas)	
R			Larke		
			(boys/ sons)		
26.S	warṣā	nahĩ	hoī	hae	
	(rains)	(not)	(happen+ind.asp+fem+sg.)	(pr.t.+sg.)	
R			ho rahī		
			(happen+pro.asp+fem+sg.)		

CASE - II

Patient : SG (M/35)

Handedness : Right

Education : B.Com.

Languages Known : Hindi (Ist Language) ; English

Clinical Report	:	Left hemiplegia. Anterior Perisylvian Aphasia. Right parieto-temporal & basal ganglia infarct, Crossed Aphasia.
Clinical Test	:	**Comprehension** (aud.) - normal **Output** -single word (telegraphic speech), Dysartharic, Increased effort. **Fluency** - decreased word output (non-fluent), **Naming** - Normal only for high frequeny words, impaired for low frequency words (anomia) **Repetition** - Intact **Reading Aloud** - Impaired. **Syndrome** - Broca's Aphasia (crossed)

SG's output was single word-output (telegraphic speech) so, he was asked to perform tasks with only single words. (nouns & adjectives). He was also asked to generate plurals from singulars and changing the gender (masculine to feminine).

Tasks were repetition, reading aloud, writing to dictation and copying the written text (list of single words in this case). Semantic generations were also given to him. His speech (spontaneous) was also recorded.

Spontaneous Speech :	Single Word
Repetition :	Single Word - impaired
	Sentences - Impossible
Reading Aloud :	Single word - Impaired
	Sentences : Impossible (He could read the words (in a sentence) but not as parts of a unit (i.e. sentence) so the errors were not valid - as the agreement on the verb wouldn't be valid in isolation).

Spontaneous Speech ([ ] represents stimulus & ( ) represents the gloss)

nahĩ...	patā nahĩ...	[pareśāni hae]	ye hae nā...	
(no)	(don't know)	(difficulty)(is)	(it)(is)	(isn't it)
bolnā...	hāth...	bas...	matlab...	hae nā...
(to speak)	(hands)	(that's all/ interjection)	(means)	(is) (isn't it)
(showing his left arm)	bahut hae	[dard hae]...	hã̃...	
	(severe)(is)	(pain) (is)	(yes)	

SYNTACTIC OUTPUT :

(1) S	meri	mã̃	bahut	acchĩ	hae
	(I+poss)	(mother)	(very)	(good+fem.)	(is)
R	mammi... mammi				
(2) S	āj	mousam	acchā	hae	
	(today)	(weather)	(good +mas)	(is)	
R	mousam...				

SINGLE WORD OUTPUT

STIMULUS	RESPONSE
(Adj. with fem. gender)	
'acchī' (good)	'acchā' (mas)
'baṛī' (big)	'baṛā' (mas.)
(With mas. pl.)	
'lambe' (tall)	'lambā' (sg.)
'kāle' (black)	'kālā' (sg.)
'sacce' (true)	'saccā' (sg.)
(With mas.pl. in OBL.)	
'moṭõ' (fat)	'moṭā' (sg.+DIR)
'bholõ' (simple)	'bholā' (sg. + DIR)
'saccõ' (the true)	'saccā' (sg. + DIR)
(a - ending noun roots in plural)	
'gadhe' (ass)	'gadhā' (sg.)
'kamre' (room)	'kamrā' (sg.)
'kutte' (dog)	'kuttā' (sg.)
'hisse' (share)	'hissā' (sg.)
(fem. roots with pl. suffix showed no errors)	
(i/i - ending noun roots with pl.+OBL)	
'dhobhiyõ' (washermen)	'dhobī' (sg.)
'paṛosiyõ' (neighbour)	'paṛosī' (sg.)
'adhikāriyõ' (officers)	'adhikārī' (sg.)
'miṭhāiyõ' (sweet)	'mithāī' (sg.)
'sthitiyõ' (situation)	'sthitī' (sg.)
'śaktiyõ' (power)	'śakti' (sg.)
'beṭiyõ' (daughter)	'beṭī' (sg.)
(pl. + DIR)	
'capātiyã' (bread)	'capātī' (sg.)
'billiyã' (cat)	'billī' (sg.)
'galiyã' (lane)	'galī' (sg.)
(Consonant ending noun root with plural OBL)	
'sirõ' (head)	'sir' (sg.)
'bandarõ' (monkey)	'bandar' (sg.)
'samācārõ' (news)	'samācār' (sg.)

'khayālõ' (thought)	'khayāl' (sg.)
'pustakõ' (book)	'kitāb' (sg.)
'tārīkhõ' (date)	'tārīkh' (sg.)
'musībatõ' (difficulty)	'musībat' (sg.)
(DIR pl.)	
'imāratẽ' (building)	'imārat' (sg.)
'ouratẽ' (women)	'ourat' (sg.)
'kitābẽ' (book)	'kitāb' (sg.)
'basẽ' (bus)	'bas' (sg.)
(Derived Nouns)	
'buṛhāpā' (old age)	'buṛā' (adj./ n.)
'acchāī' (goodness)	'acchā' (adj.)
(Noun with fem. gender)	
'kuttī' (bitch)	'kuttā' (dog)
'cuhiyā' (mouse+fem)	'cuhā' (mas)
'thaelī' (bag)	'thaelā' (mas)

SG's semantic generation of changing gender and number) was normal but only when an example was supplied.

CASE - III

Patient	:	K.N.(F/52)
Handedness	:	Right
Education	:	10th
Languages Known	:	Hindi
Clinical Report	:	Right hemipaeresis and hemiplegia,
		Trans cortical sensory Aphasia
		(Global Aphasia)

Clinical Test	:	**Comprehension** (aud.) - normal (near)
		Fluency - Normal (Towards non-fluent)
		Output - Normal & Grammatical (with increased effort)
		Naming - Normal
		Repetition - Intact
		Reading Aloud - Normal
		Writing - (To dictation and copying) - Impaired
		Syndrome - Broca's Aphasia

K.N.'s output was also syntactic and the modalities which showed normal functioning were - repetition (speaking) and reading aloud, comprehension & the only impaired modality was writing. She was given sentences to write down in both verbal and print/ written form (to dictation and copying).

Spontaneous Speech	:	Normal
Writing to Dictation	:	Single word - Normal
		Sentences - Impaired
Copying the written text	:	Single word - Normal
		Sentences - Imaired

SYNTACTIC OUTPUT (only impaired faculty and only impaired responses have been given)

(1)	**S**	bacce	paṛhtẽ	haẽ
		(children)	(read+ind.asp+pl.mas.)	(pr.t.pl.)
	R			hae (sg.)
(2)	**S**	mere	kapṛe	purāne haẽ
		(my+pl.)	(clothes)	(old+pl) (be+prt. +pl)
	R			hae (sg.)

(3) **S**	meñ̃	kursiyā̃	tuṭī hāẽ̃
	(my + fem)	(chairs)	(broken + fem.) (are)
R			hae (sg.)
(4) **S**	dhobī	ghar	jā rahẽ̃ haẽ̃
	(washermen)	(home)	(go + prog. + pl.+mas+pr.t)
R			hae (sg.)
(5) **S**	kavitāẽ̃	acchī	thīṃ̃
	(poems)	(good + fem.)	(was + fem. + pl.)
R			thī (sg.)

DATA ANALYSIS & RESULTS

CASE - 1 (M.S.)

M.S. seemed like a case of Broca's aphasia whereas at the time of onset he was diagnosed clinically as having Wernicke's aphasia. Actually in five years his comprehension was improved, (along with the correlated features were improved too e.g. repetitions) and the feature which strongly belongs to the Wernicke's syndrome is semantic substitution (and semantic paraphasia) was still there in M.S.

In his spontaneous speech, M.S. was quite grammatical with decreased output (often 20 to 25 words per minute and sometimes even 10-15 words per minute). Part of spontaneous speech (timed 1 minute):

' ek din... baeṭhe-baeṭhe... acānak... āwāj band ho gayī...

(one) (day) (sitting/adv) (suddenly) (adv.) (sound) (stop) (be) (per.asp+fem+sg)

our... jān pahcān wāle ghar choṛ āye... bād mẽ houspiṭal

(and/ conj) (known-people) (house) (leave+pst.t+pl+mas) (afterwards) (hospital)

bhī... āyā... thā.

(also) (came) (pst.t+mas+sg.)

The problem of dysarthria was not there. His naming was intact, i.e. anomia was absent. The comprehension showed deficit when he was confronted with the semantic generation tasks (i.e. adj to noun; vert to noun; noun to adj and verb; noun to noun) of higher orders. One problem (he was aware of) was that of memory. His capacity in tasks of reading aloud & copying the written text was normal. The modalities which showed errors were -- repetition and writing to dictation. [Referred to fig. Caramazza et al.] The first dissociation found was between single word level (morpholexical level) and sentence level (morphosyntastic level) outputs[1]. In his single word output, i.e. nouns & adjectives in singular and plural number [in both direct (DIR) & oblique (OBL) cases] and masculine & feminine gender (in oblique cases too for masculine only), his error rate was - 7/400 which is approximately 2% while in sentence level output morphological errors were quite/ obvious and these were selectively for inflectional morphology, conforming to another dissociation between inflectional & derivational morphology[2].

In his single word output his errors were both rare and random. For the word 'cūhe' (rats) his response was 'cūhā' (rat) and for 'buṛhõ' (old men OBL) his response was 'buṛhe' (old men DIR). Sometimes his response was null also i.e. for 'hisse' (shares); 'kakṣāõ' (classes + OBL); 'kanyāẽ' (girls/ daughters) and; 'kavitāõ' (poems + OBL). Twice the errors were in the form of semantic formal paraphasia or semantic substitutions, e.g. 'kitābẽ' (books) for 'kāpiyā̃' (copies).

The error rate of the inflectional morphology at word (lexical) level was 3% and against the impairment of inflections at sentence level (post-lexical or non-lexical level) these can be assumed 'intact', fairly. This shows a dissociation between the morpholexical and morphosyntactic levels (for, inflections are spared and impaired respectively).

---

1. Luzzati & Bleser, 1996

2. Miceli & Caramazza, 1988

The errors morphosyntactically surfaced were very interesting and these strictly followed a very selective dissociation (dissociation within a dissociated element) and eventually a pattern (clear-cut) also emerged. The table/s given below show/s it --

TABLE - 1

	INFLECTIONAL						DERIVATIONAL
	NUMBER		GENDER		TENSE	ASPECT	PERSON	
	N/ADJ	V	N/ADJ	V	VERB	VERB	VERB	
PRESENCE OF ERRORS	YES	NO	NO	NO	NO	NO	NO	NO

TABLE 2

	IMPAIRED PLURAL INFLECTION	
	NOUN	ADJECTIVES
ERROR RATE	65%	0%

First there was a dissociation between inflectional and derivational morphology and then after further investigation into the inflectional morphology, it was found that agreements in the verb (i.e. tense, aspect, number, gender and person) were intact and error rate was absolutely 0%. But

errors were present in the attributional properties of nouns(N) and adjectives (ADJ). A clear cut dissociation between number inflection and gender inflection was revealed and their respective error rates were 65% and 0%. Surprisingly, the number inflections on adjectives were intact[3] (with error rate 11%, i.e.9/77) but in the cases of number inflections on nouns M.S.'s tendency was to convert the plurals into singular with error rate of 65%.

In Hindi usually a classification f nouns could be suggested on the basis of ultimate sound present in the noun concerned.

1) 'ā' ending nouns (mas & fem)

2) i /ī ending nouns (mas & fem)

3) Consonant ending nouns (mas & fem)

The data elicitation was aimed at this classification and M.S. was provided data (stimului) in the form of sentences containing the nouns with all the above three endings and a unique feature was found (i.e. presence of a third dissociation).

TABLE - 3

	NOUNS (NUMBER IMPAIRMENT)			
	ā- ending	consonant ending	i / ī ending	Others
ERROR RATE	11.5%	14.2%	94.6%	5.5%

3. Impaired adjectives were possessive (where plurals were converted to singulars) and quantifying adjectives (where there was a substitution of the stimulus)

The individual error rates in the above table suggest a dissociation between the nouns (of different endings) -- or between i/ ī ending and the rest of the nouns, (error rates will be 94.6% and 10.4% respectively).

(1) **S**	carc	isāiyõ	ke liye	hae
	(church)	(christians)	(for/dat.)	(is)
R		isāī (sg.)		

(2) **S**	dillī ke	niwāsiyõ		jāgo·
	(delhi) (poss.)	(inhabitants/ OBL /VOC.)		(wake-up /imperative)
R		niwāsī		
		(sg.)		

(3) **S**	badhāiyẽ	lo	
	(congratulation + pl)	(take + imperative)	
R	badhāī		
	(sg.)		

(4) **S**	beṭiyẽ	acchī	hoṭ̃	haẽ
	(daughters)	(good)	(are/ fem/ pl.)	(pr. t/pl.)
R	beṭī		hoṭī	hae
	(sg.)		(sg.)	(sg.)

M.S. converted all i/i ending nouns in plurals to singular with 5.4% exceptions. For example, he converted all Mas. (OBL) plurals -- 'dhobiyõ' (washermen); 'mociyõ' (cobblers); 'paṛosiyõ ' (neighbours); 'halwāiyõ' (confectioners); 'adhikāriyõ' (officers); 'bhāiyõ' (brothers); -- into singulars -- 'dhobī' ; 'mocī' ; 'paṛosī' ; 'halwāī' ; 'adhikārī' ; 'bhāī' respectively. Nouns with other endings were also converted to singulars -- irāde (aim+ mas +pl) - to irādā (sg.); hīre (diamond + mas + pl.) - hīrā (sg.); ouratẽ (women + pl. + fem) - ourat women (sg.). Sometimes, exceptionally enough, M.S. substituted the suffixes, [e.g. casmo (spectacle + pl. + OBL) - caśme (DIR)]. He sometimes omitted the aspect - inflection (which carries gender and number attributes too) --

(5) S	basõ	mẽ	ø	bhīṛ	hotī	hae
	(buses + OBL)	(loc.)		(rush)	(be+inde. asp + fem + sg.)	(pre.t + sg.)
R		baṛī (great)				

(6) S	sukh	our	dukh	ātẽ	haẽ
	(happiness)	(conj.)	(sorrow)	(come+pl.+indef.t + mas)	(pre.t + pl.)
R				barābar	
				(equal)	

These aspect have been substituted by adjectives.

M.S. having Wernicke's syndromes) was witnessed having tremendous semantic verbal paraphasias (and semantic substitutions) eg.

(1) S	(verb)	kamijẽ	phaṭ		gayĩ
		(shirt + pl.)	(tear)		(per. asp. fem + pl.)
R			kaṭ (cut)		
(2) S	(adj.)	āpke	khayāl	acchẽ	haẽ
		(your + pl.)	(thought + pl.)	(good+mas. + pl.)	(pre.t + pl.)
R				ṭhīk (just)	
			(with no specificity of number/ gender.)		
(3) S	(adv.)	mere	pās	āo	
		(my + poss)	(near)	(come/ imperative)	
R			sāmne		
			(infront)		
(4) S	(noun)	unke	do	rājkumār	the
		(they + poss.)	(two)	(prince + pl.)	(past.t. mas + pl.)
R				laṛke	
				(sons)	

Some other substitutions or semantic verbal paraphasias are listed below :

	STIMULUS	RESPONSE	CATEGORY IN SUBSTITUTION
1.	gorī (fair + fem.)	acchī (good + fem)	(adj.)
2.	dhyān do (pay attention + imper)	dhyān karo (meditate + imperative)	(verb)
3.	wāpas karo (give back + imperative)	de do (give away + imperative)	(verb)
4.	khānā (food)	capātī (bread + sg.)	(noun)
5.	kursiyā̃ (chairs)	mej (table + sg./pl.)	(noun)
6.	beṭe (sons)	laṛke (sons)	(noun)
7.	bacciyā̃ (chileren + fem)	larkiyā̃ (girls)	(noun)
8.	mujhse (I + instr.)	mere se (I + instr)	(noun + case)

CASE - II

S.G.'s output was highly agrammatic, with omissions of verb, adverb, adjective, prepositions and other grammatical elements, to the extent of one word (content word) output, i.e. telegraphic speech.

Tasks were repetition, reading aloud, writing to dictation, and copying the written words. His copying and repetition were intact. His writing to dictation was fully impaired, i.e. the task was impossible. The only impaired modality left with a good output was reading aloud. The patient was asked to read nouns and adjectives in masculine and feminine gender and in both the numbers (singular and plural) and in both the cases-direct (DIR) and oblique (OBL). He was also given derived complex forms (nouns & adjectives) to read aloud.

His spontaneous speech was marked by pauses and perseveration -

nahĩ...	patā nahĩ...		[pareśānī hae]	ye hae nā...		
(no)	(don't know)		(difficulty)(is)	(it)	(is)	(isn't it)
bolnā...	hāth...	bas...	matlab...	hae nā...		
(to speak)	(hands)	(that's all/ interjection)	(means)	(is)	(isn't it)	
(showing his left arm)	bahut hae		[dard hae]...	hā...		
	(severe) (is)		(pain)(is)	(yes)		

Out of 36 words (timed five minutes) he repeated 'matlab' (means) and 'hɑ̃/hɑ̃ jī' (yes/ yes sir) - for 6 times and five times respectively. This output was the result of increased effort as after the output S.G. seemed tired. He was obviously non-fluent and sometimes dysarthric.

It should be noted that S.G. was a case of crossed afhasia (which is very rare wordwide) - his right hemisphere was impaired and the symptoms suggested the shift of Broca's area to the right hemisphere (from the left hemisphere) - the characteristics were left hemiplegia, right-handedness, non-fluent speech, decreased word output, telegraphic speech, word hunting and anomia, agrammatism, impaired writing (dictation) and reading aloud. Although he was asked to generate plurals and to give the opposite gender (masculine to feminine) -- which were very simple semantic generation - tasks, he could only generate the gender (opposite). So he was provided a broad word-list (of nouns & adjectives) in both gender and number (in both direct and oblique cases), for tasks in reading aloud. Writing to dictation as well as spontaneous writing was conpletely impossible.

In the beginning he was given a series of simple and basic sentences, to repeat and the result was dissolutions of the grammatical elements reduced to content words only --

(1)	unke	do	laṛke the
	(they + poss.)	(two)	(sons) (were)
			beṭe
			(sons)

(2)	merī	hālat	kharābhae
	(I+poss.)	(condition)	(bad) (is)
			kharāb
(3)	mousam	acchā	hae
	(weather)	(good)	(is)
	mousam...		
(4)	laṛki	acchī	hae
	(girl)	(good + fem + sg.)	(pr.t+sg.)
	laṛki...	acchī	

Sometimes nouns and at times adjectives, were the sole response for these (above sentences). These also confirmed his single word output. He was also given a list of words (complex / affixed/ derived forms) and the result was the intactness of the derivational morphology(he could read the words correctly with an error rate of 14%). In 8%, there was no response. For the rest of the words, he just omitted the affixes (bound morphemes) --

(i)	pāgalpan (n.)	-	pāgal (adj.)
	(mad-ness)		(mad)
(ii)	buṛhāpā (n.)	-	buṛhā (adj./ n.)
	(old-ness)		(old)

But the inflectional morphology was impaired with an error rate of 69.9%. The error rates for inflectional & derivational morphology were – 6% & 69.9% rspectively. Dissociation was, therefore, present between them. Findings in the impaired inflectional morphology are-shown in the tables below.

(Table 1)

GENDER IMPAIRMENT

	Masculine	Feminine	Aggregate
	N / Adj.	N. / Adj.	
Error Rate	0% / 0%	20% / 35%	13.75%

(Table 2)

PLURAL NUMBER IMPAIRMENT

Adj./Mas.		N./OBL					Aggregate
		Derived . from Adj.,	i/ī ending,	Consonant ending,	ā ending,	others	
Error Rate	90.9%	77.3%	84.2%	100%	M F 91.6% / 8%	100%	77% (Appr.)

N.DIR

	Consonant ending	ā ending	i/ī ending	Others
	M / F	M / F	M / F	M / F
Error Rate	100% / 100%	92% / 0%	* / 90%	96% / 91.2%

* No difference in Morphological forms in both numbers (sg. & pl.)

Gender suffixes (masculine & feminine) were intact with error rate of 13.75%. He converted -

	Into		
(fem) lambī (tall)	--	lambā	(mas.)
(") moṭī (fat)	--	moṭā	(")
(") sīdhī (simple)	--	sīdhā	(")
(") śernī (lioness)	--	śer (lion)	(")
(")kuttī (bitch)	--	kuttā (dog)	(")
(")gadhī (she-ass)	--	gadhā (ass)	(")

In cases of plural forms - error rate for the adjective (mas.) plural forms was 90.9%. For nouns. in OBL. plural forms the impairment was 77% (individual percentage, i.e. for nouns with different, sound-endings, could be checked in the tables above). The aggregate error rate for nouns in the Direct, plural forms was 81.3%. S.G. converted plural (OBL) nouns into singular form of adjectives this class-change was due to the fact that these OBL (pl.) noun forms are actually derived from adjectives only.

	N. pl	Sg. (Adj.)
1.	acchõ	acchā
	(the good people)	(good)
2.	moṭõ	moṭā
	(the fat people)	(fat)

S.G. also omitted other OBL - plural affixes and changed them to DIR - singular forms.

OBL (pl.)		DIR (sg.)
(ass) gadhõ	--	gadhā
(room) Kamrõ	--	kamrā

(contd.)

(class) kakśāõ	--	kakśā
(leaf) pattõ	--	pattā
(neighbour) paṛosiyõ	--	paṛosī
(monkey) bandarõ	--	bandar
(cat) billiyõ	--	billī
(wind) hawāõ	--	hawā

S.G. converted DIR pl. forms (noun) to DIR singular ones in 81.3% cases.

pl.		**sg.**
(diamond) hīre	--	hīrā
(book) kitābĕ	--	kitab
(sweets) miṭhāiyã	--	miṭhāī
(thing) vastuẽ	--	vastu

The list of these nouns (DIR. pl.) were arranged and tabulated according to the ultimate sounds in the root and the data acquired from S.G. showed impairment to all forms (with all sounds) in the ultimate position of the root) except one list containing plural forms (with 'ā' as ultimate sound of the feminine roots) which showed 0% error rate. In OBL. form these roots showed 8% error rate. This was a very selective deficit, a highly selective impairment. The deficits could be declared to state a dissociation (between 'ā'-ending feminine roots and other roots).

S.G. also showed semantic formal paraphasias/ semantic substitutions. His response was

	For	
(gem) nagīnā	--	hīrā (diamond)
(mother) mã	--	mammī (mother)
(poem) kavitā	--	kahānī (story)
(unhappiness) dukh	--	sukh (happiness)
(money) paesā	--	kharc (expense)

(book) kitāb	--	pustak (book)
(student) stụḍent	--	vidyārthī (student)

All the above substitutions are within category substitutions except 'paesā' (money) for 'kharc' (expense) which belong to two different hierarchical categories. 'Kharc' could be taken as super-ordinate entry with respect to 'paesā'.

Like M.S. in the semantic substitutions of S.G.'s output, the accessing procedure is impaired along two lines - paradigmatic ['dukh' (sorrow) - for 'sukh' (happiness)] and hierarchical [paesā (money) 'kharc' (expense)] - both these substitutions belong to 'semantic verbal paraphasia's where the 'stimulus' and the 'response' are conceptually linked. (with error rates 91% and 9% respectively). The 'hierarchy' misproductions could be related to the problems in accessing of the mental lexicon.

CASE - III

K.N., a female of 52-years, was a non-fluent (20-25 words per minute) aphasic with intact - (auditory) comprehension, naming, repetition, reading aloud and grammatical output. The only impaired modality was of writing (in both writing to dictation and copying the written or printed text).

The errors were absent in single word- output. When she was given a list of sentences to write, impairment was surfaced out. Errors were solely inflectional and more specically in the verb-agreement. Tense, gender, aspect and person inflection were intact. Impaired subcomponent was number.

Plural Number - AGR on verb

	PRESENT	PAST	FUTURE
	M / F	M / F	M / F
Error Rate	97.7% / 100%	0% / 100%	0% / 2.5%

K.N. always omitted the number inflection of the verb-agreement in present tense (with error rates 97.7% for masculine and 100% for feminine subjects and aggregate was 98.75% as the tense marker is same for both genders, i.e. 'hae' (is) pre.t.+sg. In future tense the number agreement was quite intact with an error rate of 1.2%. But in the cases of past-tense inflections, the results were quite interesting - she wrote correctly mas.plural. past tense (i.e. 'the'- was+pl.) but she converted all fem. plurals to singulars [i.e. 'thĩ̃' (was+fem.+pl.) to 'thī' (was + fem.+ sg.)]. This is also a case of very selective impairment.

(1)	mere ('I' + poss.)	kapṛe (clothes)	purāne haĕ̃ (old+pl.)(is+sg.pl.) hae (is+sg.)
(2)	laṛkiyā̃ (girl+pl.)	gāfī̃ (sing+indef.asp.+pl.+fem)	haĕ̃ (is +pl.) hae (sg.)
(3)	galiyā̃ (lane+pl.)	sunsān (deserted)	thĩ̃ (was+pl.+fem.) thi (was+fem.+sg.)

There was dissociation of number inflection in the verb agreement (between 'present & past tense' and 'future tense') and another dissociation was in the past tense (between masculine & feminine tense inflectional morphology).

CONCLUSION

This chapter includes a discussion on Hindi inflectional morphology followed by the inferences and hypotheses and a summary of the text.

Number & Gender in 'Hindi'

Looking at the these morphological forms :

1. laṛkā (boy)
2. laṛkī (girl)
3. laṛke (boy + pl.)
4. Laṛkiyə̃̄ (girl + pl.)
4. laṛkõ (boys + OBL)
5. laṛkiyõ (girls + OBL)

The morpheme / laṛk/ could be extracted whose semantic interpretation will be - (+ human + young) and all the above formes could be derivable by adding 1) ā (mas.); 2) ī (fem.); 3) e (mas + pl.) ; 4) iyə̃̄ (fem + pl.); 5) õ (mas + pl. + OBL) 6) iyõ (fem + pl. + OBL) respectively.

But this split was not found in the cases who were studied. The data hinted at the 'laṛkā' (boy) as the basic (could be equivalent to the root as being the ultimate decomposed form available in the cases). As in the examples of number and gender (not many) impairment, the impairment was always the omission of 'plurality' and 'feminity' respectively to the forms 'singular' and 'masculine' respectively (which according to the morphological analysis are the result of the addition of the

'singular' and 'masculine' bound morphemes (represented by one in the present cases) to the 'root' (bound). But the evidences are insufficient due to the absence of female aphasics with number/ gender impairment (on nouns & adjectives). However a syntactic evidence couldn't be overlooked :

X - ne	Y - Ko	piṭā
(nom.)	(acc)	(beat + pst.t. + mas. +sg.)

In the above sentence 'X' and 'Y' are variables and these could be replaced by a pair of 'subject + object' (+ human) with any number and gender but the agreement on the verb will remain (mas +sg.) (i.e., a neutral form, as both X and Y are oblique to the verb by a post - position each and hence no agreement to any of these takes place). The following tree could be suggested --

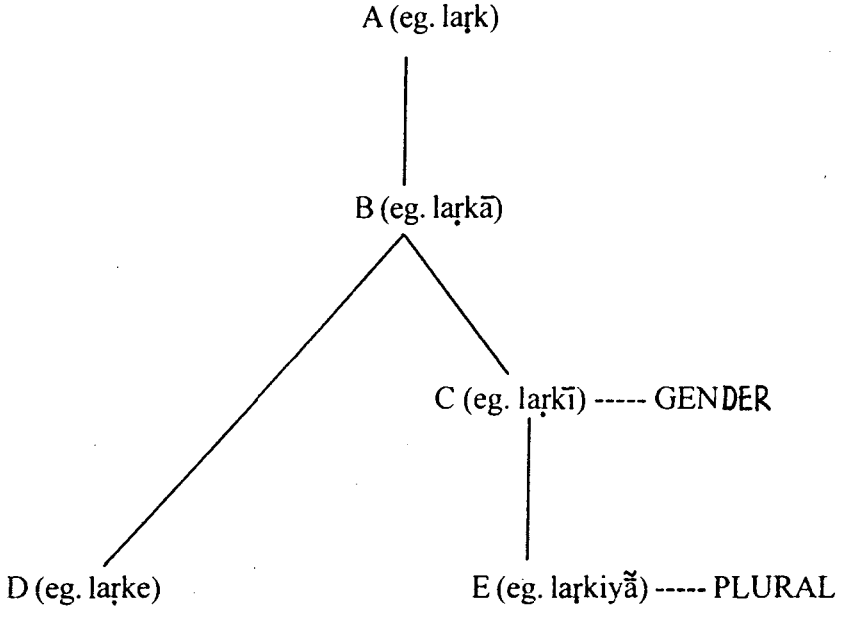


FIG - A

Another tree could be suggested too for the same nodes ---

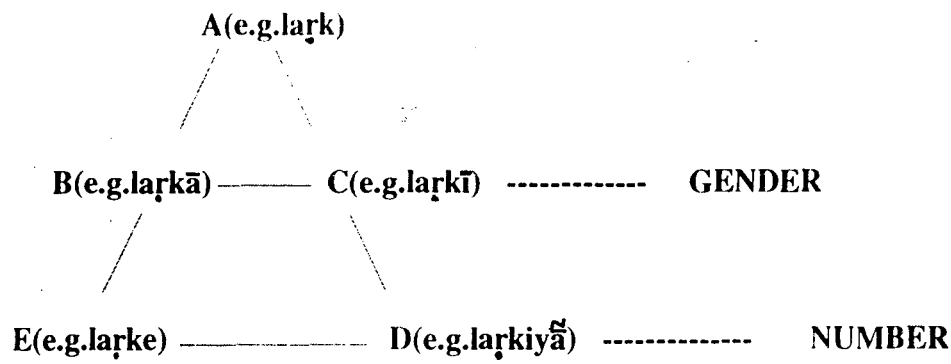


FIG.B

The above two possible figures are based on the following data-results --

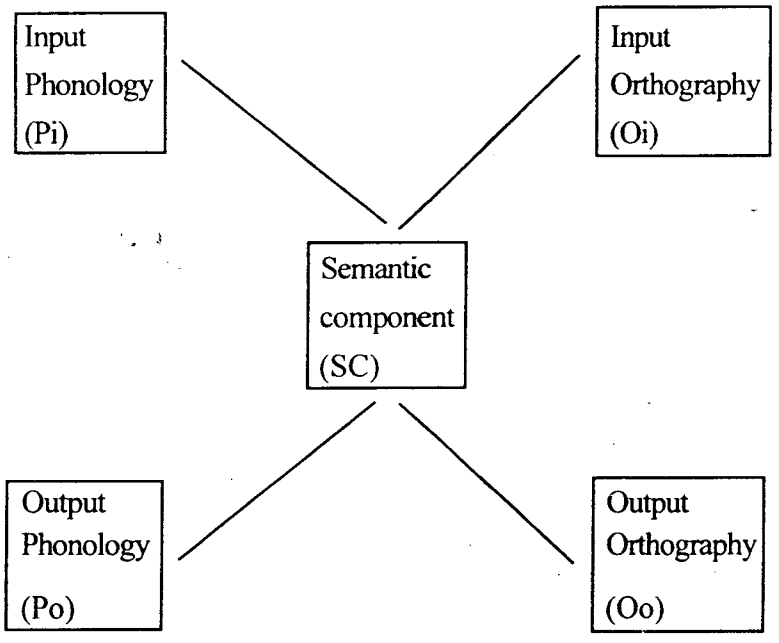
1. for D, the response was either D itself or C and never B or E.
2. for E, the response was either E itself or B and never D or C.
3. for C, the response was either C itself or B and never D or E.
4. for B, the response was either B itself or null.
5. A was not at all a response and neither could be a stimulus.

(For the above statements responses other than A,B,C,D,&E have been avoided , on purpose.)

Here A is bound and morphologically real (derivable after comparing morphologically related existing forms) and it has abstract semantics.These also aptly hint at the accessibility hierarchy.Even taking B & C on the same level, where B as a response of the stimulus C will be a simple categorical semantic substitution, the fact remains that in a fully inflected (for number & gender) noun-root the impairment first affected the number-inflection and only then gender was affected [M.S; S.G; K.N].This suggests that **number-inflectional component would be accessible after the accessibility of gender-inflectional component in the mental lexicon** in normal conditions.

The impairment and intactness of the modalities could beseen alongwith the structure of the

mental lexicon [Caramazza et al. 1985]



Phonological output will consist of - reading aloud (input will be orthographic) and repetition (input will be phonological); and orthographic output will consist of - writing to the dictation (phonological input) and copying the written / printed form (orthographic input). These four modes of the output are normal for a normal human but in an aphasic, the impairment could creep into any combination of these modes (very rarely an isolated impairment, i.e. one mode - deficit).

CASE	IMPAIRED MODALITIES	
1. M.S.	(i) Pi ——— SC ——— Po (Repetition)	
	(ii) Pi ——— SC ——— Oo (Writing to dictation)	
2. S.G.	(i) Pi ——— SC ——— Po (Writing to dictation)	
	(ii) Oi ——— SC ——— Po (Reading aloud)	
3. K.N.	(i) Oi ——— SC ——— Oo (Copying)	
	(ii) Pi ——— SC ——— Oo (Writing to dictation)	

As a consequence, the impairment could be suggested in the semantic component (SC) which is always the common for the impaired pathways, the findings in all the cases investigated could be summarized --

i) a dissociation between spared single - word output and impaired sentence - level output [M.S. & K.N. and in S.G. both these lexical & post-lexical outputs were impaired with great relative difference.]

ii) a dissociation between impaired inflectional morphology and spared derivational morphology [M.S. ; S.G. and K.N.]

iii) a dissociation between the impaired number inflectional morphology and spared gender inflectional morphology [M.S.; S.G. & K.N.]

iv) (a very selective deficit caused) a dissociation between ' i '/ ' ī ' ending, (masculine & feminine) nouns (which had impaired accessibility to the plurality bound morpheme) and other (rest of the) nouns having spared accessibility. [M.S.]

v) (again a very selective deficit caused) a dissociation between spared ' ā ' ending feminine pl. noun roots and impaired other noun roots [S.G.]

vi) dissociation between "present tense [mas & fem] & past tense [fem] - morphemes" (having impaired accessibility to the plural bound morpheme) & "past tense (mas) & future tense (mas & fem)" (having access to the plural morpheme) [K.N.]

vii) presence of semantic verbal paraphasias/ semantic substitutions which run parallel to the paragrammatism (where there is substitutions of grammatical elements unlike that of content words in semantic paraphasia/ substitution).

The above cited findings are the basis on which the following inferences have been stated about the processing of language in the mental lexicon --

a) autonomy of lexical (word - level) output and post-lexical (sentence - level) output [Luzzatti & Bleser, 1996]

b) autonomy of inflectional & derivational morphology [Miceli & Caramazza, 1988]

c) **autonomy of number inflectional morphology and gender inflectional morphology**

d) **autonomy of ' i '/ ' ī ' ending noun roots and other noun roots**

e) **autonomy of ' ā ' - ending feminine noun roots and other noun roots**

The fact that morphology can be selectively spared or impaired [M.S. & K.N.] proves the independence of the component. In S.G., the output was selectively morphological and syntactic output was impaired and absent.

(d) & **(e)** could be put together to formulate a hypothesis **"noun-roots with different sounds at their respective ultimate position constitute autonomous subscomponents in the mental lexicon"** (for Hindi) - it will need validity from the patients with autonomy of noun-roots (other than ' i ' / ' ī ' ending & 'ā' - ending)

On the basis of **(c)** another hypothesis could be suggested - **" 'tense' inflection', 'aspect' inflection' and 'person' inflection are also autonomous"** which is partly supported by K.N's data showing a dissociation [i.e. **(vi)**].

To summarise, human beings' language does get affected after damage to certain areas of the cerebral hemisphere and this proves that language does have its physical realisation. Within that area, there are specified premises attributed to modalities and the sections of grammar. Physician like Paul Broca contributed a lot by localising the various language-functions in the brain. Language

scientists and physicians, in combination, have been trying over the previous discoveries and thereby putting them to validity tests. This collaboration should remain.

There are different taxonomies by different aphasiologists and surprisingly all these have subtle difference among themselves with distinct evidences from neurology and language. But the point of satisfaction is the commonality among them., It could be dangerous to follow and to stick to one taxonomy, and neurological evidences also don't support the localization at times e.g. in the cases of crossed aphasia. Language area couldn't be specified before damage and; each and every damage has its own idiosyncratic list of deficits. Such as in the present context, Wernicke's aphasia seemed like Broca's after one year from the onset. The tests (batteries) of aphasia are also various with each claiming to be more accurate. These could be misleading too due to the unnatural circumstances these create in the course. The bedside casual and informal approach to testing such as Benson's, could be more useful and successful in that case .

The methodology was to elicit morphological data from the aphasic cases and it was a difficult job to put them in natural environment and at ease. The cases selected did have the auditory comprehension intact to the level enough for the elicitation of data. The data were of both levels - lexical (word - level) & post - lexical (sentence - level) - for the errors of inflectional & derivational types, eg. the errors of the agreements on verbs could be detected in post-lexical output only. Since the aim was to analyse morphological impairments so the complex and complicated syntactic constructions have been avoided as these were also incomprehensible to the patients. In the data analysis the no. of errors was counted and then the percentage was

deducted to see the impairment in gestalt. The dissociations were marked on the basis of relative impairments in difference. The comparisons between the cases weren't drawn due to the distinct lines drawn among them in terms of deficits and performances. The tabulation of the data presented a closer look at the impairment in the respective areas of morphology. Conclusion consists of inferences & hyphotheses and hypotheses are again based on the inferences (results) from the data analysis.

Features (of impairments & intactness) can't be accurately attributed to a certain syndrome of aphasia and it can be said that there is always a combination of features which always varies from case to case.

Neurolinguistics is a challenging field and there have been many researches and in the future there is a great need of it to validate the hypotheses regarding language processing in the mental lexicon and only neurolinguistic data can actualize the 'psychological reality of the structure of linguistic competence'[Weigl & Bierwish, 1981] and the processes through the impaired (break down) patterns of language which are otherwise hidden in normal circumstances in normal human beings.

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