PHONEMIC VARIATIONS IN HINDI SPEAKING APHASICS DURING THE IMMEDIATE POST-MORBID PERIOD

NEENA SURI

'If Aphasia is defined first and foremost aa a language disorder then a linguistic analysis of the condition is a priority' (Roman Jakobson 1956).

'Aphasia is primarily an interference with language process resulting from brain damage. The interference that produces aphasia, disrupts both analysis and integration of verbal messages' (Joyce W. Safer and Robert Shaw 1962).

Aphasia in adults, usually has a well-defined and often abrupt onset. The most frequent cause of aphasia in adults is the vascular lesion. Cerebro-vascular accident is due to thrombosis (Occlusion of the vessel due to a fixed clot), embolism (a clot travelling in the blood stream until it is arrested by the narrowing bunch of the branching vessel), or hemorrhage (rupture of a vessel and oozing of blood into the tissue which gradually becomes a large hematoma).

In each case, the brain tissue is deprived of its blood supply and gets necrosed, resulting in a series of pathological changes. The disturbances can lead to functional disorders belonging to two classes, *(a)* linguistic and *(b)* non-linguistic.

In the non-linguistic class the disorders included are dysarthria, apraxia or agnosia while in the linguistic class it is described as aphasia. In vast majority of cases the lesion occurs in the left hemisphere.

Various behavioral changes observed in aphasia have been grouped differently. About 113 types of aphasia have been mentioned in the literature by various experts interested in the subject. Some classifications are based primarily on the language behavior of patients, others are based on the anatomical locus of brain injury causing aphasia, whereas, others have tried to correlate certain loci with certain behavioral deficits.

Often, there have been questions as to what sort of language disorders occur in aphasia. Various schools of linguistics have compared the view of aphasia with that in generative linguistics. In structural linguistics aphasia is considered as a breakdown of the linguistic code or the set of linguistic signs, that is some sort of disturbance of the abstract set of relations between sound and meaning. However, in generative linguistics a distinction is made between competence and performance (Chomsky 1965). Competence referring to the knowledge of language or set of abstract symbols and performance to the actual use of language in concrete situations. Linguistically a single competence underlines the major part of our ability to speak and understand, which have been considered as the

Miss Neena Suri, Final M.Sc. Student, A.I.I.S.H. Mysore.

processes of performance modalities. According to this school of thought what has happened in aphasia is that the connections between competence and the components of performance involved in speaking and/or understanding have been disturbed. Here, the knowledge of language is thought to be intact.

Joyce W. Safer and Robert Shaw (1962) agree with Chomsky that both competence and performance are involved in language and consider that the aphasic has the competence but that performance is impaired through the language disruption. Many studies of aphasia support the hypothesis that aphasics follow the same rules of language (i.e. have competence) as nonaphasics. Schuell (1960), Wepman (1956), Schuell, Jenkins and Landis (1961), Rosenzweig and Postman (1958), G. M. Siegel (1959) Soloman and Postman (1952), Howes (1964), Bricker (1964) and Safer (1966) all support the regularities of language behavior in aphasia, indicating the underlying structure of language is preserved. Lenneberg (1967) says, 'the patient with aphasia has not strictly speaking lost his language habits the way we may "lose" a poem once memorized and now forgotten, nor is he in a cognitive state that is comparable to the twenty month old infant before the advent of language learning. The language is not lost but that its proper organization in either the expressive or the receptive process or both, is interfered with. He cannot organize his cognitive activities to recruit, integrate and inhibit the many partial processes, which when consolidated are pre-requisite for speaking and understanding'.

Language disorder in aphasia has been studied at different levels -phonology, semantics and grammar. Some of the features have been considerably studied and others have been largely neglected. Among the neglected studies is the 'disturbance of phonology and its recovery'. Phonology pertaining to the smallest unit of language has got important implication for the construction of words and sentences. Phonemes and words are related in different ways to the sign function of language. While every word has its own particular and constant meaning, the phoneme performs only the function of distinguishing meaning without possessing any positive meaning of its own. Phonemes lose distinctive values, words lose lexical meaning, morphology and syntax lose grammatical meaning in aphasics (Jakobson 1941).

On this aspect certain studies have been undertaken and some laws formulated.

Jakobson (1941) put forward the theory that the phonological system in aphasia is subject to systematic disordering, the breakdown is not haphazard. He proposes general laws of phonemic pattering.

'Phonemic progress of the child and the regression of the aphasic obey the same laws of implication. The dissolution of the linguistic sound system in aphasia provides an exact mirror image of the phonological development in child language'.

The theory has been subject of study since 1941 but in general the opinion is divided.

Various studies conducted to ascertain the nature of the phonological errors in the speech of aphasic patients, had similar observations. The errors included the substitution of one phoneme for another, addition and loss of phonemes and improper sequencing of phonemes. Sound disturbance in aphasia can be traced to one or more of three different disorders:

1. a disturbance of the abstract system of phonemes,
2. a disturbance of the neuromuscular encoding of the phonological unit (the syndrome of phonetic distintegration), and
3. an associated apraxia of motor speech mechanism.

The present study was an attempt to describe the phonological disturbances and their process of recovery in the speech of aphasics. The main questions were:

1. What changes does the phonemic system undergo in aphasics?
2. Are the changes systematic?
3. Is the phonemic recovery systematic?
4. Is the recovery process sequential?

Hypotheses:

1. Phonemic loss in aphasic speech is systematic.
2. The process of phonemic recovery is systematic and sequential.

Methodology:

Five aphasic subjects were selected from the in-door patients of the Safdarjung Hospital, New Delhi. The selected subjects had to satisfy the following criteria:

1. Subjects must be adult aphasics
2. The aphasia in these subjects must have resulted from lesions of vascular origin according to the medical diagnosis.
3. They must not have experienced aphasia previously.
4. They must be 'fresh' aphasics.
5. Subjects should have been either using Hindi as their 'first language' or the pre-morbid language must indicate considerable proficiency in Hindi.
6. They must pass the screening test of 'hearing' and 'vision'.
7. They must obtain 'aphasic score' on the 'Porch Index of Communicative Ability'.

General Methodology:

1. After the selection of the subjects, information was obtained regarding their education, job, special interests, etc., to obtain some idea of the subjects' pre-morbid speech and language proficiency.

Speech sample of one of the close relations of the subject was also recorded as a clue to pre-morbid speech.

2. Physicians' reports of various investigations and examinations done for the subject were noted.

3. Any treatment given to the subject was noted.

4. Samples of the conversational speech of all subjects was tape recorded everyday for the entire period of their stay at the hospital (7-10 days).

5. Along with the recording of conversational speech,a 'say after me'test was given every day and the responses were tape recorded. Thus attempt was made to ensure the occurrence of all the phonemes in all phonetic positions, which may have been omitted by the subject during spontaneous speech.

The recorded speech included the investgators' stimulus questions, comments and the subjects' speed. However, a lot of subjects'speech telligible' because the target words were not available or could not be guessed. Only the intelligible speech samples were used for analysis.

6. Each taped interview was listened to completely and transcribed with the help of two judges. The attempted traget word was determined by the surrounding context. Analysis of each sample was made on the following basis.

(a) *Phoneme frequency distribution Randomly selected speech* samples of two subjects consisting of 1000 phonemes were analysed for the frequency of occurrence of phonemes. The frequency tabulation was based on the actual phonemes produced by the subject and not on the attempted target phonemes. This was compared with the normal phonemes frequency distributation in Hindi.

(b) Distribution of errors: With the phonemic frequency distributation established for the aphasic speech sample,it was possible to consider the relationship between the phoneme error rate and frequency of occurrence. A rank order correlation coefficient between the errors made on each phoneme and its actual frequency of occurrence in aphasic speech was computed.

(c) Total phonemic error: Total number of uttered phonemes. and target phonemes were counted and an overall error percentage was calculatedd for each sample. This gave an idea of subject linguistic recory at the recovery at the phonological level leaving quotient was computed for each subject to know the rate of recovery.

(d) Distribution of error types: All the phonemes were compared with the target phonemes and the deviations were categorized into:

(i) severe distortions

(ii) substitutions

(iii) mild distortions

(iv) omissions

(v) additions

The percentage of each error type was determined for each speech sample of every subject. Phonological recovery could be arrived at by comparing the error percentage of each type for each day.

(e) Analysis of substituted phonemes: Phoneme substitution errors were analyzed in terms of distinctive features. They were classified into errors of one or more than one distinctive features. Each phoneme substitution error characterized by a single feature change was classified according to the direction of the eiror made—whether the phonemic change was from marked consonant to an unmarked or from unmarked to marked.

Results and Discussion

All the subjects showed a similar pattern in their phonemic disturbance and its recovery, however they differed in severity. Analysis of the 'Say after me' test showed fewer errors than errors made on spontaneous speech, but the errors were made on the same direction.

Description of cases

Subject	*Age*	*Medical diagnosis*	P/CM *(overall score)*
A	35 Yrs	C. V. A.	8.37
B	45 Yrs		8.95
C	38 Yrs	J)	9.53
D	42 Yrs		8.40
E	55 Yrs		8.80

Although all the subjects obtained the scores in the range 8.00-10.00, they showed different rates of recovery from the first to the last day of the study.

1. A rank order correlation coefficient to measure the degree of concordance between the consonant distributions reflected in aphasic and normal speech was .91, highly significant at the .01 and .05 levels of confidence.

This suggests that an analysis by phoneme frequency distribution is not sufficient enough to differentiate pathological from normal speech.

2. No statistical significant relationship between the actual occurrence of phonemes in aphasic speech and the errors made was noticed.

3. All the subjects showed a gradual improvement in terms of increase in the number of 'intelligible' phonemes from the first to the last session. This gradual increase in the number of 'intelligible' phonemes each day is indicative of phonemic or phonetic recovery.

4. All the subjects showed a gradual reduction in the total phoneme error from the first to the last session. However, there were differences in the degree of error and improvement in each subject.

Learning quotient

Subject	A	218.7
	B	142.2
	C	450
	D	165
	E	185.8

5. All the subjects made following types of errors:

(a) severe distortions

(b) substitutions

(c) omissions

(d) mild distortions

(e) additions.

6. All the subjects showed a general pattern of improvement during the post morbid week.

(a) There was a gradual reduction of all other types of error except substitution.

(b) There was a gradual increase in the substitutions. This pattern shows a direction towards recovery. As the severe distortions and omissions decrease, the subjects may add some new phonemes to their phonological system which may be substituted by some other phonemes. Another possibility of the increase of the substituted sounds could be that the severely distorted sounds had been the distortions of the substituted sounds and as the neuro-muscular problem which often co-exists with aphasia improved. The substituted phonemes were identified. Or at this level of articulation the subjects may have merely made a poor attempt at the correct phoneme.

7. The following observations were made from the phoneme substitution analysis:

(a) the distinction between /e ,/r/and w/was observed to have been lost in all the subjects. The distinction is acquired late in the child's acquisition of language and the error is often observed in children;

(b) subjects had confusion between voiced/voiceless consonants. This observation does not support Jakobson's hypothesis of 'phonemic

regression' as the children acquire this distinction very early in their language acquisition period. The subjects were not aware of the substitutions they had made. The fact that subjects did not even notice most of these errors, points to a genuine error made at the level of phonemic organization of speech where the wrong unit seemed to have been selected. Alternatively there may have been a disturbance in the feedback and monitoring system;

(c) the loss of distinction between nasal/oral consonants was noticed in all the subjects. There was an equal tendency for the nasal consonants to be substituted by oral consonants and vice versa. There was great improvement noticed from the first to the seventh day in all the subjects. This observation again does not support Jakobson's hypothesis as this distinction is one of the first ones to be acquired by children. This confusion shows the selection of the wrong phonemes;

(d) the subjects had a lot of confusion between affricate—fricative, affricate —stop, continuent—stop and continuent—affricate. There was improvement noticed from first to the seventh day.
Similar observations were also made by Ombredane, Alajouanine, Luria (1966), Goldstein K. (1948) and Blumstein (1968);

(e) the distinction between aspirate/non-aspirate phonemes was observed to have been lost in all the subjects. It was noticed that till the fourth session all the subjects omitted almost all the aspirate consonants and later were substituted by their non-aspirate equivalents. During the later sessions a confusion between the two was seen;

(f) subjects also made a great number of errors in the place of articulation. Most often the front consonants substituted the back consonants though occasionally there was a tendency for the opposite direction also. /t/and /d/ were most frequently substituted for other sounds.

This type of error is often made by the children. Ombredane observed that velar sounds were pronounced as /t/ and /d/. Whereas Fry observed that /t/ and /d/ were frequently replaced by velar articulations.

8. Subjects made more errors of one distinctive feature than errors of more than one distinctive feature in the later days.

9. Subjects were unaware of the errors made by them.

These results do not support Jakobson's hypothesis of 'phonemic regression'. However, some similarities have been seen.

Alajouanine (1939) emphasized:

'These errors did not form rules of phonological change but rather demonstrated tendencies. Hence, it is not possible to predict when an error occurs, it will fall within certain specifiable limits. Moreover, sound changes are not consistently unidirectional, i.e. although there are statistical trends in one direction a sound change may occur in other direction e.g.. fricative—stop, stop—fricative'.

This implies then that there is a confusion of phonemic oppositions rather than a loss of phonemic types.

These results support the hypothesis

(a) phonemic loss in aphasia is systematic,

(b) phonemic recovery in aphasia is systematic though it is not same as the child's acquisition of phonologv Sequence in the phonemic recovery was observed. However, it is not possible to give the steps towards recovery from this date,