Chapter 2: Methodology

There are two basic and established assumptions behind all neuropsychological and neurolinguistic investigations — Fractionation Assumption, according to which brain damage damages a system in a predictable manner, basically in the way it is organized, and Transparency Assumption, according to which one can hypothesize about the underlying process by observing an individual's performance. Here the question of the approach that should be adopted for case studies becomes relevant. This study relies on the single-case method. Primarily, in cases of aphasia, it is assumed that the subjects have normal cognitive capacities, including normal language abilities. Ideally the subject should be selectively impaired for linguistic abilities only while the rest of the cognition is intact. Such cases save an investigator the complexities of the other interacting factors but unfortunately brain damage usually affects more than one function.

About the Place of Work

The place of work was Govind Ballabh Pant Hospital, New Delhi. Patients of aphasia, my subjects, were made available by the Outpatient Department (OPD) of the Department of Neurology in the hospital. The meetings with the relevant patients and the data elicitation were done in the Neurobehaviour Clinic & Neurolinguistics Laboratory, G. B. Pant Hospital.

Criteria for Selection of Cases

1. There was an exclusion of neuropathology involving non-brain portions of CNS (Central Nervous System) and non-neurological lesions.

2. Patients of the pathologies — trauma (dozed or penetrated head injury), neoplasm (tumour like growth of intracranial sites — intracerebral or extracerebral) and infection (intracranial) — and degenerative diseases such as Alzheimer's disease (degenerative dementia where the functions of temporal, parietal and occipital lobes are affected) and
Pick's disease (cortical dementia, frontal and temporal lobes are affected) were not selected. Though all these clinical situations lead to some language disturbances, almost invariably the prominence of aphasia is buried among other serious behavioral disabilities like those associated with movement, epilepsy, sleep, metabolism, general degeneration of neurological activities.

3. The subjects with cerebro-vascular or vascular disease/pathology (occlusion or closure of the cerebral blood vessels due to which multiple infarcts occur in the brain in the absence of regular blood supply; the infarcts may be temporary also) were considered for the study as in them language pathology is the most visible disability or one of the most prominent ones which include hemiplegia (paralysis of one side of the body) too.

4. Severe aphasics whose language was heavily impaired were avoided for there was hardly any language output and along with that auditory comprehension was also impaired which did not allow conversation or data elicitation from the subject, neither phonologically nor orthographically.

It was absolutely imperative for the subject to have at least a minimum level of auditory comprehension to follow the commands or the directions for the elicitation of language data.

**Points to Consider During Data Elicitation**

Proper care was taken during the data elicitation as there were external factors which controlled the nature of the data significantly. Test anxiety was alleviated and minimized and it was insured that the elicitation process took place in a conducive environment.

For creating a conducive environment for successful communication it was kept in mind that one had to

a) treat the aphasic patient as a respected adult,

b) keep the distractions [e.g. background noise or the presence of the other persons in the elicitation room] to a minimum,

c) appreciate and seek humor to lighten the communication interaction,
d) give one’s undivided and individual attention,
e) ignore poor articulation,
f) remember that successful communication is the goal regardless of the quality of the response &
g) not let the conversation with the patient turn into a therapy-like session by correcting or requesting repetitions unnecessarily.

To increase the subject’s auditory comprehension, one –

a) always maintained eye-contact with the patient while speaking,
b) spoke slowly and clearly and with natural intonation and loudness while making most of the facial expressions,
c) repeated and rephrased as needed,
d) asked simple questions and supplemented one’s speech with natural gestures and pointing,
e) gave one direction at a time and simplified long and complex directions &
f) changed topics slowly, with warning.

To understand the patient better the investigator –

a) was always attentive and an active listener,
b) was patient and allowed the patient to complete his or her statements,
c) did not routinely anticipate and fill in the end of the statements but was sensitive to the abilities and desires of the patient and let them finish themselves,
d) gave the patient enough time to respond in addition to other basic needs for an investigating interaction.

After selecting the subject, primary diagnosis was done for the state of language modalities and for this Benson (1979)’s traditional bedside approach was used, which is a widely used non-standardized but more authentic and reliable method. The use of the Western Aphasia Battery (WAB) [Kertesz & Poole (1974)] helped in finding out the

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Four language modalities were tested – reading aloud, repetition, writing to dictation, and copying the written or the printed text, after testing the auditory comprehension.
status of the modalities and thereby concluding the nature of the syndrome. However, such findings are only of peripheral importance and trivial for the issues that needed to be addressed in the study. Therefore, the Benson’s bedside approach for the determination of aphasia is always preferred and this has been followed in this work too.

Aims and Objectives

The study of the impaired language is important for two basic goals - understanding the nature of the pathology and learning the normal cognitive linguistic processes. Although the concerns for these two goals and their perspectives will be overlapping but it was necessary to understand the difference of their need.

So, after deciding the status of the linguistic abilities along different language modalities, the next step was to locate the impaired modality. Again there could have been completely impaired modality and that would not have served the purpose as no data would have been available for the analysis, so the modality with proper output was needed. Therefore after initial testing according to Benson’s bedside approach, the subject was put to further extended data elicitation for the purpose of the linguistic investigations, particularly for the morphological representations.

The area of investigation was morphology, inflectional morphology in particular, so the errors were checked for their morphological nature. It has been considered that a study of inflectional morphology necessarily entails a study of syntactic aspects [Marantz (1997)] as inflections are syntactic features too [Luzzati & Blesser (1996), Freidmann & Grodzinsky (1997)]. However, the present work limited its scope to the mental representation at morphological (lexical) level and did not intend to interpret data obtainable at a post-lexical level. Since inflectional morphology was being studied, number, gender, person, tense and aspect inflections were the focus – how these are accessed and represented in the mental lexicon?
Analysing Procedure

The errors were tabulated and analyzed. Any systematic error pattern could lead to the understanding of the organizational design of language in the brain. Therefore the systematic patterns of errors were found with the help of the tabulated errors, and then they were discussed in details. This is how an aphasic’s language helps a linguist in predicting the architecture of the linguistic representation in the human brain. The study of morphological patterns helped in validating the hypothesis regarding dissociations (i.e. of inflectional morphology & derivational morphology, (Miceli & Caramazza 1988) and double dissociations (Teuber 1955, 1959) of the cognitive functions. The issues and debates regarding the conflict between autonomous morpheme representation, i.e. decompositional model of word production and full-word listing hypothesis were also looked into. The analysis of the language breakdown was compared to the existing theories in the area. The procedure of the research was more of an inductive type as there was no predictability of the nature of the data.

Then there are other important issues also which could have led to wrong conclusions and so were given serious consideration. One tried to maintain a minimum time interval between two sessions of elicitation to avoid the recovery (and the rehabilitation) factor. The problems came when the patient was not able to come for a scheduled second session and on his next visit the data changed its nature, sometimes very radically. Then one was left with small amount of data to work upon and a lot of times one just had to abandon the data because of the amount. Many times the subjects came from other states and it became very difficult to coordinate with them. The subjects could not be forced to come as they had their own problems ranging from economic to that of transport and neither

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18 Brain plasticity refers to the capacity of the brain to diminish and recover from the effects of the lesions through structural functional changes (Bach (1990)), although this has often been used in the context of maturational theory of the brain lateralization and the equipotentiality of brain hemispheres for language (Lenneberg (1967)) but theoretically this notion is independent of the issue of the origin and timing of brain lateralization for language, as even after maturation of the lateralization the brain does have the capacity to re-lateralize again in case the dominant hemisphere gets damaged. This is the only way the recovery could be explained.
could one visit their place as in most cases the subjects are not happy and generally dissatisfied with their surroundings and therefore they feel better\(^\text{19}\) when they are out of their regular setup. This is a major and a genuine obstacle in the way of this kind of research. There is no way to avoid this situation.

**Questionnaire**

The questionnaire used in the elicitation of the main body of the data consisted of words and simple sentences. Commands and questions were prepared keeping in mind the fact that the subjects may be illiterate or minimally educated and therefore very high frequency words and kernel and basic sentence structures were used. Words were of two grammatical classes, namely noun class and adjective class. There were derived and inflected varieties of nouns and adjectives. The sentences, which included all the basic types, were simple, keeping in mind the subject's state of comprehension. The modalities used were – reading aloud; writing to dictation; copying the written or printed texts; and repetition.

The breakup in both the categories of the questionnaire is as followed-

**No. of words: 1012**

**Inflected Words: 729**

**Nouns: 537**

Plural - 211

Singular - 326

Masculine - 223

Feminine - 314

**Adjectives: 192**

\(^{19}\) As the hospital is the only place where they are made to feel important over their family and are dealt with individually by the investigator.
<table>
<thead>
<tr>
<th>Case</th>
<th>Number</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plural</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Singular</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>Masculine</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>Feminine</td>
<td></td>
<td>64</td>
</tr>
</tbody>
</table>

**Derived Words:** 283

<table>
<thead>
<tr>
<th>Nouns:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Masculine singular</td>
<td>101</td>
</tr>
<tr>
<td>Masculine Plural</td>
<td>27</td>
</tr>
<tr>
<td>Feminine Singular</td>
<td>49</td>
</tr>
<tr>
<td>Feminine plural</td>
<td>24</td>
</tr>
</tbody>
</table>

**Adjectives:** 82

| No specified number or gender | 43     |
| Masculine Singular            | 17     |
| Masculine Plural              | 6      |
| Feminine singular/Plural      | 16     |

**287 sentences**

**Words in the sentences and their distributions**

<table>
<thead>
<tr>
<th>Nouns: 406</th>
<th>75 pronouns, 130 subject-nouns, 85 object-nouns, 21 subject-noun-obl, 95 object-noun-obl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjectives: 78</td>
<td>10 f-pronominal, 6 m-pronominal, 4 mas sg, 15 mas pl., 20 fem, 2 ordinals, 8 cardinals, 13 indeclinable.</td>
</tr>
<tr>
<td>Adverbs:</td>
<td>14</td>
</tr>
<tr>
<td>Verbs: 337</td>
<td>173 main v., 129 aux, 35 v2.</td>
</tr>
<tr>
<td>Postpositions:</td>
<td>116</td>
</tr>
</tbody>
</table>

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20 No overt marking for the plurals in feminine adjectives.
Different inflections on Verbs\textsuperscript{21}

Aspects:
Indefinite – 56 present, 30 past, & 20 future
Progressive -22 present, 22 past, & 21 future &
Perfective – 31 present, 18 past, & 18 future.

Tense:
109 present tense, 70 past tense, and 59 future tense.

Types of the sentences:
Indicative, Declarative – present 37, past 7, future 5. Imperative and Subjunctive

\textsuperscript{21} Gender, number and person inflections are not given as they are not verb-internal, part of the agreement with the noun phrase in the sentence, which either can be subject or the object of the sentence.