PARAPHASIAS IN BILINGUAL APHASIA

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CERTIFICATE

This is to certify that this dissertation entitled **"Paraphasias in Bilingual Aphasia"** is a bonafide work in part fulfillment for the degree of Master of Science (Speech – Language Pathology) of the student Register No. 07SLP017. This has been carried out under the guidance of a faculty of this Institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DECLARATION

This dissertation entitled **"Paraphasias in Bilingual Aphasia"** is the result of my own study under the guidance of Dr. K. C. Shyamala, Professor and Head, Department of Material Development All India Institute of Speech and Hearing, Mysore and has not been submitted earlier to any other University for the award of any Diploma or Degree.

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सर्व मंगल मांगल्ये शिवे सर्वार्थ साधके;
शरण्ये त्रियम्बके गौरी नारायणी नमोस्तुते!

Dedicated to Dadi, Mummy, Papa, Rishabh and Ramika

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CHAPTER 1

INTRODUCTION

Bilingualism is a phenomenon which refers to use of two or more languages by individuals in their everyday lives. With increasing globalization, the number of people using two or more languages i.e., bilingual individuals are also increasing. There have been different views of the phenomenon of bilingualism in the literature. Some researchers point out that bilingual individuals are not two monolinguals in one person, but rather speakers using different languages in different domains or situations, for different purposes, and with different interlocutors. Statistics reveal an increase in bilingual population in the world. India being a multilingual country has abundant bilingual/multilingual population with various permutations and combinations of the languages paired.

Since most people in India know more than one language, bi/multilingualism is a very prominent phenomenon in India. On the basis of these considerations, a large population of individuals with aphasia in India would therefore show “bilingual aphasia”. Bilingual aphasics do not necessarily show the same language disorders with the same degree of severity in both languages, so it becomes ethically important to do a detailed evaluation of all the languages known by an aphasic patient.

The characteristic features of the language abilities of aphasia yields deficit in phonological, semantic, syntactic and pragmatic systems. During their attempt to

produce a word, aphasics tend to substitute an incorrect word for the intended or the target word which are termed as paraphasias. Paraphasias can appear in naming, repetition, spontaneous speech, reading or writing tasks. Paraphasias are common in aphasia and can help differentiate fluent from non-fluent subgroups of aphasia.

Paraphasias can be of different kinds and have a good localization value. Different kinds of paraphasias described by Goodglass (1993) are as follows:

Verbal paraphasia: It refers to the unintended use of another word in lieu of the target. Most verbal paraphasias have a clear meaning relationship to the desired word and represent the same part of speech. Hence they are commonly referred to as "semantic paraphasias".

Phonemic paraphasia: These are also called as "literal paraphasia". It is the production of unintended sounds or syllables in the utterance of a partially recognizable word (e.g., "paker" for "paper", "sisperos" for "rhinoceros").

Phonosemantic blends: it is often the case that a phonemic sound substitution results in another real word, related in sound but not the meaning. E.g. 'table' becomes 'cable'; 'telephone' becomes 'television'.

Neologistic paraphasia: it is the production of a non-sense word or words, usually without recognition of error. E.g. 'table' becomes 'tilto'.

Paraphasias have been classified differently by various authors. Lesser (1978) classified based on the word forms, if they belonged to the language used or not. She also identified whether the spoken word is sufficiently similar to the actual word form phonologically, morphologically, or semantically. Li and Williams (1990) gave a checklist to examine the repetition errors made across various aphasic syndromes and divided the errors into seven categories (word substitution errors, addition errors, omission errors, revision errors, jargon, paraphrase error and inadequate response). Paraphasic errors were also divided into lexical where a real word is substituted for another, or sub-lexical when a non-word is produced (Dell, Schwartz, Martin, Saffran & Gagnon, 1997).

Paraphasias in individuals with aphasia has been researched upon extensively, using different tasks like naming (e.g., Goodglass, Kaplan et al., 1976; Goodglass & Stuss, 1979; Goodglass, 1981; Waykland & Taplin 1982; Kohn & Goodglass, 1985; Martin & Saffran 1992; Nickels & Howard 1995; Gagnon et. al, 1997), repetition (e.g., Gardner & Winner, 1978; Goodglass & Kaplan, 1983; Li & Williams, 1990) and picture description (Williams & Canter, 1982, 1987). The naming task helps to find paraphasias in single object confrontation naming; the repetition task taps the deficits in the transfer of information between the input and output pathways and the picture description task is used to find the paraphasias in a narrative context.

Studies on naming task have revealed high frequency of semantic paraphasias in anomics as an index of word-finding difficulty (Kohn & Goodglass, 1985). Li and Williams (1990) reported that aphasics tend to exhibit significantly more indefinite

terms, extended circumlocutions and perseverations in the naming conditions. Nickels and Howard (1995) and Gagnon et. al (1997) reported of presence of formal paraphasias in aphasics in a naming task. Using the repetition task, Gardner and Winner (1978) reported that conduction aphasics make more meaning errors or verbal paraphasias, whereas, Li and Williams (1990) found phonemic attempts and revisions to be more prominent in the repetition of conduction aphasics. Studies on picture description task found that Broca's aphasics performed significantly better when naming objects on confrontation naming task than on picture description task, whereas, a reverse trend was seen in Wernicke's aphasics (Williams & Canter, 1982). Williams and Canter (1987) found that anomics produced more of delayed responses and extended circumlocutions; Wernicke's produced more neologisms and the Broca's produced significantly more phonemic errors and semantic-phonemic errors on picture description task.

However, in the Indian scenario, there have been just a handful of studies to examine the type of paraphasias produced in various subgroups of aphasia. Shantala (1997) studied naming deficits in confrontation naming, responsive naming and generative naming tasks and reported of neologisms and phonemic errors in Broca's aphasics; semantic and phonemic errors in the anomics and conduction aphasics exhibited neologisms and gestural responses. Similar tasks were used by Arpita (1997) to tap the naming deficits in Kannada-English bilingual aphasics. Results revealed parallel deficits in L1 and L2 on responsive naming and generative naming task, however, in confrontation naming task, performance was better in L1. Error

analysis revealed a difference in the performance of the bilingual aphasics in the two languages.

Chengappa, Bhat and Damle (2003) investigated paraphasias on repetition tasks in a multilingual Wernicke's aphasic patient and highlighted the variation of these across the four languages known by the patient. Hegde and Bhat (2007) also highlighted the variation of paraphasias across four languages known by a multilingual conduction aphasic on a repetition section.

However, there has been limited research done to find out the type of paraphasias produced by various bilingual aphasic syndromes and explore as to whether it differs from monolingual aphasics. Also, there is a scarcity of research where a comparison has been made for the types of paraphasias produced by the bilingual aphasics in the different languages known to them.

Need of the study

In spite of a large bilingual population in India, only a limited number of studies have focused on the bilingual aspects in individuals with aphasia. From clinical and ethical perspective, bilingual aphasic patients should receive comparable language tests in all the languages they know. Hence studies relating to bilingual aphasia are crucial and have both clinical and theoretical implications. In the present study, an attempt has been made to explore the nature of paraphasias in Kannada-English bilingual aphasics.

Aims of the study

The present study aimed at investigating:

1. The paraphasias in monolingual and bilingual aphasics.
2. Highlight the variation/correlation of paraphasias across languages in bilingual aphasics.
3. Describe the type of paraphasias in different subgroups of aphasia.
4. Compare the type of paraphasias across naming, repetition and picture description tasks.

CHAPTER 2

REVIEW OF LITERATURE

Bilingualism has been defined variously by different authors. According to Grosjean (1994) the term ‘‘bilingual’’ refers to all those people who use two or more languages or dialects in their everyday lives. As defined in Webster’s dictionary (1961), a bilingual is one having or using two languages especially as spoken with the fluency characteristics of a native speaker; a person using two languages habitually; with control like that of a native speaker and bilingualism as the constant oral use of two languages. Haugen, (1950) feels that bilingualism begins when the speaker of one language can produce complete meaningful utterances in the other languages whereas; the extremist view of Bloomfield (1933) defines bilingualism as “native-like control of two languages”.

Simulataneous exposure from birth to two or more languages may have its contribution and advantages. Fishman (1960) states that, the linguistic structures of two different languages influence the thought processes of bilinguals by enriching their cognitive system. It also makes easier for them to encode their experience in diverse ways. Research over the past twenty years have accounted for positive cognitive gains associated with learning a second language in childhood (Bialystok, 1991). Bialystok and Hakuta (1994) reported that the structures and ideas of the two languages are so different that it forces the person to think in more complicated ways than if they know only one language. Bilingualism has been shown to foster

classification skills, concept formation, analogical reasoning, visual-spatial skills, creativity and other cognitive gains. Baker (1993) states that bilingual individuals by knowing two or more words for one object or idea, may possess an added cognitive flexibility. Cognitive expansion and flexibility in individuals exposed to two or more languages was also reported by Chengappa (2008).

Grosjean, (1989) delineated different ways in which bilingualism has been viewed. Two views of bilingualism are; the monolingual or fractional view which holds that the bilingual is (or should be) two monolinguals in one person, and the bilingual or wholistic view which states that the coexistence of two languages in the bilingual has produced a unique and specific speaker-hearer. The monolingual view sees a person as ideal bilingual, who has good knowledge of both languages and the rest, who in fact represent the vast majority of people, are 'not really' bilinguals or are 'special types' of bilinguals. The fact is that most of the people are not ideal bilinguals so the monolingual view has many demerits. A major consequence of the monolingual view is that the language skills in bilinguals are usually appraised in terms of monolinguals standards. Another consequence is that the contact of the bilinguals' two languages is seen as accidental or anomalous and because of language interference. Thus, bilinguals rarely evaluate their language competencies as adequate, often amplify the monolingual view and hence criticize their own language competence.

A bilingual (or wholistic) view of bilingualism proposes that the bilingual is an integrated whole which cannot be easily decomposed into two separate parts. The

coexistence and constant interaction of two languages in a bilingual has produced different but complete linguistic entity. The bilingual uses the two languages separately or together for different purposes, in different domains of life, with different people. Because the needs and uses of two languages are usually quite different, the bilingual is rarely equally or completely fluent in his two languages. Levels of fluency in a language will depend on the need for that language and will be domain-specific. Thus, bilingual's communicative competence cannot be evaluated through only one language; it must be studied instead through the bilinguals total language repertoire as it is used in his or her everyday life. The rich range of characteristics of bilinguals found in the research literature scales, categories and dichotomies confirm the claim that criteria for bilingual/ multilingual evaluation are far more severe than those for monolinguals.

Aphasia in Bilinguals

Aphasia in a multilingual can lead to different language deficits in the languages known and is called as bi/multilingual aphasia (Chengappa, Bhat & Damle, 2003).

In his study of 1895, Pitres was the first to draw attention to the fact that the dissociation of the languages affected by aphasia was not an exceptional phenomenon, but rather ordinary. Pitres described seven clinical cases of patients exhibiting differential recovery of the two languages they spoke. He thought after a major clinical observation that the patient after his illness would retain the language he had

been employing in daily life immediately before suffering from aphasia even though this may not be his mother tongue. This law came to be known as Pitre's law at a later stage. On the other hand, numerous neurologists compared and contrasted the so-called "Pitres law" (recovery of the most familiar language) with "Ribot's law" (recovery of the mother tongue). Ribot's law claimed that language learned earliest in the life by the patient was last to be lost. These two rules have been quoted in the literature to stress the importance of factors such as automaticity of language learnt and usage of language as contributing to language recovery in aphasics. Thus, "Ribot's law" was cited as "primacy rule" and "Pitres law" came to be known as "familiarity (frequency) principle".

Patterns of recovery in Bilingual Aphasics

Pitres (1895) proposed that the recovery pattern could occur only if the lesion had not destroyed language centres, but had temporarily inhibited them. He stated that the patient generally recovered the most familiar language because the neural elements subserving it were more firmly associated.

Paradis (1995) identified six recovery patterns:

1. Parallel recovery occurs when both languages are impaired and restored at the same rate.
2. Differential recovery occurs when languages recover differential relative to their premorbid levels.
3. Selective recovery occurs when one language is not recovered.

4. Antagonistic type of recovery pattern: One language recovers to a certain extent first and it starts regressing when the other language begins to recover. This pattern of recovery is seen to be the least common.
5. Successive recovery: Rates of recovery vary. Two languages may eventually recover but recovery of the second language may only begin after the first has recovered which is called successive recovery of one language after the other.
6. Mixed recovery: Less often, there are mixed patterns or mutual interference between the languages seen in the process of recovery.

Second-language Recovery in Aphasics

Almost one third of bilingual aphasics exhibit a better recovery of their second language. In the first half of the 20th century, Swiss neurologist Minkowski (1963) investigated the reasons why many bilingual aphasics did not recover their mother tongue, or the language that was most familiar to them. Minkowski (1963) proposed seven factors influencing a better recovery of the second language.

(1) The visual factor, depending on the frequency with which the patient reads and writes in that language.

(2) The affective factor, influencing the recovery on the basis of the number of positive experiences related to the use of that language.

(3) The environmental factor, namely the language spoken in the hospital setting.

(4) The use of a language in order to deal with specific topics which makes it highly automatized for some topics only.

(5) Conscious strategies applied during the acquisition process of a language.

(6) Linguistic factors, such as the degree of linguistic proximity of the two languages, and

(7) Organic factors, e.g., the age of the patient and the type and extent of the lesion.

As it is apparent from the above discussion that bilingual aphasics do not necessarily show the same language disorders with the same degree of severity in both languages, so it becomes important to do a detailed assessment of all the languages known by an aphasic patient (Paradis, 1995). In addition, the clinical assessment of both monolingual and bilingual aphasics should be done in three different phases (Fabbro, 1999a):

(1) The *acute phase*, which generally lasts 4 weeks after onset. During the acute phase a regression of the diaschisis occurs, i.e., a regression of the functional impairment effects in structurally unaffected cerebral regions of the ipsilateral and/or contralateral hemisphere which are functionally connected to the brain area where the damage occurred (Fabbro, 2001). Aglioti and Fabbro, (1993) reported temporary mutism with preserved comprehension in both languages during the acute phase. Severe word-finding difficulties alternately in one language with concurrent relative fluency in the other language; and good comprehension in both was reported by Paradis, Goldblum and Abidi (1982).

(2) The *lesion phase*, which lasts for several weeks and perhaps even up to 4–5 months post onset. Language disorders can be more clearly correlated with the site

and extent of the lesion during this phase. During this time, a complete assessment of the patients' residual language abilities in all the languages he or she knew before the insult should be carried out. Aphasic disorders may vary in type and severity across the languages.

(3) The *late phase* which begins a few months after onset and continues for the rest of the patient's life. In this phase, different patterns of recovery can be observed in multilingual patients. Cappa (1998) reported that during the language recovery, the contralateral hemisphere or undamaged areas within the same hemisphere takes over the linguistic function of the damaged areas. The spontaneous recovery or progress with the intervention during the late phase is generally lesser than during the lesion phase.

Lateralization of language

Studies investigating bilingual speech production in normal speakers have focused on the neural substrates of bilingual language processing using positron emission tomography during repetition tasks in mono- and bilinguals (Klein, Zatorre, Milner, Meyer, & Evans, 1995). All these studies point towards differential production characteristics of second language. Klein et al. (1995) found that the left putamen was activated during second language repetition tasks, but not during repetition tasks in the first language. From this observation they hypothesized that ''activation of the left putamen is a function of the increased articulatory demands imposed by speaking a language learned later in life'' (Klein et al., 1995, p. 31).

Speech production in a second language acquired later in life than the first language, also referred to as late bilingualism (Paradis, 1995), can influence the speech production process.

Differential language impairment in multilingual individuals lead to a belief that their lateralization of language will also differ from that of monolinguals. In multilinguals, languages could be stored in different areas, making one language more vulnerable to a brain insult than another. From one retrospective survey, Albert and Obler (1978) proposed that multilinguals acquire a more bilateral representation of language and thus, the right hemisphere is also involved. This draws support from literature which reports of high incidence of aphasia after right hemisphere damage in bilinguals than in monolinguals and higher incidence of crossed aphasia in bilinguals.

However, there have been contradicting studies to the role of right hemisphere in bilinguals which opine that languages of a bilingual are maintained in the left hemisphere (LH) and thus, the right hemisphere (RH) does not support the use of language in any way that differs from monolinguals (Paradis, 1990). When the Wada test was given to bilinguals prior to neurosurgery, a brief aphasia followed amytal injection to the LH but not the RH (Rapport, Tan & Whiteaker, 1983). However, the languages recover differently during the minutes after injection, indicating that languages may be positioned somewhat differently within the LH.

Language abilities of Aphasics

The characteristic features of the language abilities of aphasia yields deficit in phonological, semantic, syntactic and pragmatic systems.

Deficits at Phonological Level: Nearly all aphasic patients produce phonological errors in their speech output. All types of phonological errors can be found across diagnostic categories of aphasia. Segmental error patterns reflect disruption at different stages of speech production that may be associated with different aphasic syndromes. Wernicke's aphasics' difficulties stem primarily from impaired access to underlying phonological representations (stage – 1); Conduction aphasics on the other hand, have problems primarily in constructing the phonemic representations (stage - 2); whereas the error patterns in Broca's aphasics reflect primarily a phonetic disturbance (stage -3).

Deficits at semantic level: A disruption in the semantic system of an individual leads to word retrieval difficulties which is a common symptom in aphasia. Regardless of the diagnostic classification, nearly all kinds of aphasics exhibit a naming problem which can be seen in their performance on naming tasks. However, retrieval failures take different forms, depending on the stage at which the breakdown occurs. A failure to retrieve the target lemma for a given semantic description may result in selection of another lemma that has a similar semantic description (i.e., such as "camel" – "horse"). On the other hand, a failure to retrieve a word's phonological description is likely to result in a response in which some of the phonemes are correctly generated, but others are mis-selected (i.e., such as "chimney" – "pinnely").

During their attempt to produce a word, aphasics tend to produce unintended syllables, words or phrases which are termed as paraphasias.

Paraphasia

Collectively, the term “paraphasia” is applied to any unintended error of word or sound choice (Goodglass, 1993). Paraphasia is a symptom of commission that it is an incorrect word substituted for an intended or targeted word. It is the product of a breakdown at a stage of the word-retrieval process and, as such, is a dominant symptom within the more general category of anomia and is produced unintentionally.

Paraphasias can appear in spontaneous speech or in a dialogue, on repetition of spoken words or sentences or on reading aloud, in naming tasks and in writing; but they are generally absent in automatic speech (emotional exclamations, series of numbers, calendar sequences) (Sarno, 1998).

Paraphasias are common in aphasia and can help differentiate fluent from non-fluent output. Although phonemic substitutions do occur in non-fluent aphasia (Blumstein, 1973), they appear in a substrate of poorly articulated output and often represent dysarthric misproduction. The poorly articulated substitutions of non-fluent aphasia contrast with the substitutions of well produced but incorrect language components of fluent aphasia. Although some fluent aphasics may be aware of some of their paraphasia, most remain unaware of most of their substitutions. Speech of Wernicke’s aphasia is well articulated but consists of paraphasias like phonemic

paraphasias (sound substitutions), verbal paraphasias (word substitutions), or neologisms (productions that are phonologically possible but have no meaning associated with them). Speech output of conduction aphasics contains many literal paraphasias and some verbal paraphasias (Sarno, 1998).

Alajonanine et.al (1964) suggested that patients with Wernicke's aphasia could be distinguished according to whether they made principally phonemic paraphasias or principally semantic paraphasias, and that in each kind the specific paraphasic disorder in speech would be accompanied by a specific parallel deficit in comprehension. Test material consisted of five pictures, each set illustrating words from a semantic category. Ten categories were included (food, writing material, furniture, toilet material, cutlery, smoking, clothes, sewing materials, farm animals and bicycle parts). Patients had to hear the word and point to choice amongst the five pictures. Results indicated that speech of five patients showed semantic jargon and 19 patients showed phonemic jargon. But those with semantic jargon made three times as many errors on semantic test of comprehension as did the others (18% errors). Alajonanine (1964) therefore proposed that there were two distinct functional systems, an auditory-phonatory system and a system of semantic integration that could be disturbed relatively independently. The breakdown in semantic values which characterizes semantic jargon in speech is therefore a reflection of a disturbance at a central level.

Types of paraphasias

Different kinds of paraphasias as described by Goodglass in 1993 are as follows:

Verbal paraphasia: It refers to the unintended use of another word in lieu of the target. Most verbal paraphasias have a clear meaning relationship to the desired word and represent the same part of speech. Hence they are commonly referred to as "semantic paraphasias". Verbal paraphasias may also be unrelated to the meaning of the target, or occur as perseverations of a previously used word (paraphasic perseverations).

Phonemic paraphasia: These are also called as "literal paraphasia". It is the production of unintended sounds or syllables in the utterance of a partially recognizable word (e.g., "paker" for "paper", "sisperos" for "rhinoceros").

Phonosemantic blends: it is often the case that a phonemic sound substitution results in another real word, related in sound but not the meaning. E.g. 'table' becomes 'cable'; 'telephone' becomes 'television'. The phonemic paraphasias become assimilated to another real word when there is one in the speaker's language that is phonologically close to the target.

Neologistic paraphasia: it is the production of a non-sense word or words, usually without recognition of error. E.g. 'table' becomes 'tilto'. Most instances of neologistic paraphasia occur in the context of severely disorganized speech, in which it is difficult to discern whether any individual neologism took the place of a particular intended word. These are spoken words which cannot be recognized as having come from the patient's language. For example: using *"blogig"* for *"door"*. Neologisms are often

obtained from Wernicke's aphasics during attempts at picture naming. They use these created words confidently, as if they were using the correct words.

These types of paraphasias have been studied extensively by various researchers.

Lecours in 1983 defined verbal paraphasia as the erroneous use of a word belonging to an inventory of the language in place of another word that also belongs to one of the language inventories. Several different forms of verbal paraphasia can be distinguished.

- *Formal verbal paraphasia,* a transformation in which the substituting word and the substituted word are similar in form but not meaning (e.g., dear/dare); formal verbal paraphasia may be interpreted as a type of phonemic paraphasia. (Lecours, 1983).
- *Morphemic verbal paraphasia* refers to the use of an inappropriate word that has been assembled by using morphemes belonging to the language inventory (e.g., "summerly"). The resulting word may be acceptable from the point of view of the language but unacceptable for the context in which it appears. These innovations (creation of a new word by combining existing morphemes in a new way) are particularly observed in Wernicke aphasia (Liederman et al., 1983).
- *Semantic verbal paraphasia* designates an aphasic transformation in which the desired and the substituted words are close in meaning (e.g., table/chair). The desired and substituted word can belong to either same semantic fields (e.g., lion/tiger); they can be antonyms (e.g., big/small); target word replaced by a

super ordinate (e.g., animal/lion); or an environmental proximity between the desired and the substituted words (e.g., matches/cigarette).

- *Unrelated verbal paraphasia:* patients may also introduce a word that, in the given context, is neither phonologically nor semantically related to the word that appears to be required (e.g., “It has been colorful to come to the hospital”).

A deficit at the level of semantic retrieval influences the occurrence of semantic errors in aphasics (Gordon, 2007). There may be a breakdown in the semantic boundaries between meaning-related words that were premorbidly clearly distinguished. For example, the response “its weather” to the picture of an hourglass suggests a blurring of distinctions between measuring devices related to time, weather, and so on.

Semantic paraphasia is distinguishable from the use of one-word circumlocutory comments that patients sometimes use to tell something about the meaning of a word that they cannot retrieve. For example, when asked to name the picture of a cigarette, patient says “Well…smoking”. As a rule of thumb, it may be assumed that a response to an object picture with a word that is not a noun is not intended as a name for the object, but is a one-word circumlocution (Goodglass, 1993).

A high incidence of phonological paraphasias is indicative of an underlying impairment in phonological encoding (Gordon, 2007). In phonological paraphasia, Garrett (1984) proposes that a word meaning is accessed but its phonological form,

the phonological representation of the word, is impaired. As a result a word of the same number of syllables, stress contour and even the same initial phoneme or syllable tends to be uttered, for e.g. ‘canderpillar’ for ‘caterpillar’ or ‘flowman’ for ‘snowman’. Phonemic paraphasias made by non-fluent aphasics is closely related to the actual execution of speech sounds while the phonemic paraphasias produced by fluent aphasics is due to inability to plan the sounds to form words and are thus not controlled by articulatory features. Compared to patients with other aphasia syndromes, patients with conduction aphasia produce a particularly high number of stably anchored phonemic paraphasias.

In contrast, shifting and unstable phonemic paraphasias are more common in Wernicke’s aphasia. The term “unstable” is used in the sense that a partial sound match with the intended word may be detected in one attempt, but disappears in the next. The clinical characteristics of these errors are the following:

1. They occur as one of multiple types of paraphasic errors by the same patient; among these are partial or complete neologisms and verbal paraphasias.
2. Patients who make these paraphasias occasionally make multiple self-corrective attempts, but also let many erroneous utterances go uncorrected.
3. Successive self-corrective attempts, when they occur, are more likely to lose their phonological resemblance to the target word than to maintain it.
4. Patients are often unaware of uttering the correct word in a series of attempts.

Buckinham and Kertesz (1976) defined neologism as a phonological form which it is impossible to recover with any reasonable degree of certainty some single item or

items in the vocabulary of the patient's language as it presumably existed before the onset of disease. It is not possible to identify the target word; however, it is almost possible to identify its grammatical category based on its position and inflection.

Miller and Ellis (1987) proposed that if the target lemma is insufficiently activated, it may have a consequent effect at the phonological level, such that the phonemes of the target word do not become active enough to overcome competition from the other co-activated words. Thus resulting in neologistic responses with a distant or unidentifiable phonological relationship to the target, perhaps occasionally with a blend like quality (e.g., "Penguin" – "pelikwin").

Models pertaining to the production of paraphasias

Two-step model: One of the most detailed models of lexical access is the discrete two-step model of Levelt and co-workers (Levelt, 1989, 1999; Levelt, Roelofs, & Meyer, 1999). The model conceives of lexicalization as consisting of two independent stages. In a first stage, termed lemma access, a cohort of semantically related lemmas is activated by conceptual information. In this model, lemmas are assumed to be word nodes carrying syntactic information. Only one lemma is eventually selected which in turn activates its corresponding phonological word form during the second stage of lexical access. The model assumes a strictly feedforward flow of activation. It further assumes discrete processing, i.e., non-overlapping stages of semantic-syntactic and phonological processing. Crucially, a word's phonological form is only accessed after its respective lemma has been selected.

Interactive model: The discrete two-step model contrasts with interactive model given by Dell (1986) which explains a cascading flow of activation. This model assumes feedback from phonological to lemma nodes. Activation is supposed to spread between lemma and phonological nodes and back to the lemma nodes for some time until lexical selection is carried out. Phonological information can therefore influence the selection process.

Cascading models: Caramazza's model (1997) explains that semantic errors would occur either in the semantic system proper, or alternatively, at the level of lexical access (or between semantic system and output lexicon). Morton and Patterson (1980) proposed that some entries in the lexicon may have temporarily raised thresholds and that, instead of the intended item, another candidate may be selected.

Kohn's model (1984): Although this model was proposed to examine single-word production, it also provides a useful paradigm for naming and repetition, since a variety of stages in the production process are considered. To produce a word, the phonological representations are initially accessed from the lexicon and transmitted to working memory, which retains a trace of the representations while they are programmed for production at later stages. The representations are then converted into a sequence of phonological targets at the prearticultory programming stage. Finally, this output is converted at the articulatory programming stage into a sequence of motor commands. The earliest stage of Kohn's model- access from the lexicon pertains to the word retrieval process; however, the remaining stages are applicable to repetition.

Classification of paraphasias

Lesser (1978) gave a well known classification of paraphasias. Lesser's first distinction is between “dictionary words” and “not dictionary words”, ie., between word forms that belong to the language used and word forms that do not belong to that language. Lesser's second distinction is between “target word identifiable” and “no target word identifiable”. A target word is inferable from an actual word form if it is sufficiently similar to the actual word form phonologically, morphologically, or semantically. If the actual word is not a dictionary word, only phonological similarity is held to be relevant. When we combine Lesser's two distinction, we get four basic types of paraphasias. Dictionary word from which target word can be inferred are instances of *verbal paraphasia*, while dictionary words from which target words cannot be inferred are instances of *semantic jargon*. Words that are not dictionary words, but from which target words can be inferred, are instances of *phonemic paraphasia*, while words that are not dictionary words and from which no target word can be inferred are instances of *neologistic jargon*. Verbal paraphasia is then further subdivided into formal verbal paraphasia and semantic verbal paraphasia, depending on whether inference of a target word is based on formal similarity or semantic similarity.

Li and Williams (1990) gave a checklist to examine the repetition errors made across various aphasic syndromes. The checklist includes 24 parameters grouped under seven categories:

1. Word substitution errors (phonemic error, related & unrelated words, neologism, phonemic attempt, semantic-phonemic error, grammatical error and perseveration.)
2. Addition errors (word & phrase addition and sound, word & phrase interjection)
3. Omission errors (word & phrase omission and word transposition)
4. Revision errors (word & phrase revision and word & phrase repetition)
5. Jargon (real word jargon and neologistic jargon)
6. Paraphrase error (the content is similar to the target but the grammatical structure is drastically altered).
7. Inadequate response (subject refuses to respond).

Paraphasic errors can also be divided into lexical where a real word is substituted for another, or sublexical when a non-word is produced (Dell, Schwartz, Martin, Saffran & Gagnon, 1997). At lexical level, paraphasias can be either semantic (word related to target in meaning); formal (word related to target in sound); mixed (word with sound and meaning relationship) or unrelated (word with no apparent relationship to target). At sublexical level, paraphasias can be either phonemic (non-word related in sound) or neologistic (non-word with a remote relationship to target).

Paraphasias in individuals with aphasia has been investigated in variety of ways. Researchers have employed different tasks like repetition, naming and picture description to tap such deficits. Studies pertaining to the production of paraphasias

have been quoted below separately for the three tasks namely, naming, repetition and picture description.

Studies on Naming

Naming is a complex psychological function that can be disturbed in a variety of ways by cortical and sub-cortical lesions. The task of naming involves naming of common pictures or objects as soon as possible after the stimulus item is exposed. It is a process of identifying the object, that is, deciding that it is a member of a certain class and then finding its appropriate name (Lorwatanapongsa, 2005). For example: if we are thinking of a word “pen”, it denotes an object containing ink, as well as evokes other equivalent objects, within the context of writing, drawing, etc. Furthermore, “pen” can evoke a series of words with morphological similarity, e.g. pencil, or even words with a similar phonetic structure, e.g. ben. Thus, to find a proper name for a proper meaning, we have to make a choice between these connections. In the case of common objects, this process is automatized. In case of unfamiliar objects whose names are not frequently used, however, it becomes more complicated and may be difficult (Lorwatanapongsa, 2005).

Confrontation naming is a complex process involving several stages. In the first stage, following the presentation of an object, the pictorial picture of the object is analyzed for its correct identification. This information is transmitted to the second semantic stage, where its semantic representation is activated and then sent to the third stage, where the phonological representation corresponding to the semantic

representation is retrieved. This is flowed by the motor programming stage, when the articulatory sequence is activated, leading to correct naming.

Naming performance should be assessed for words of both high and low frequency (e.g. ‘shoe’ versus ‘moat’) as subtle deficits may not emerge for confrontational naming of highly familiar items (Warrington, 1975). It should be established whether there is improvement with phonological (first letter) or semantic (associated item) cueing. Different categories of items should be presented (animals, inanimate objects, familiar faces, colors, nouns versus actions, etc.).

Caplan (1992) explains that naming impairment may be due to a range of possible processing deficits. The problem may be in:

- Visual perceptual analysis, causing visual agnosia
- Linking sensory and perceptual information with conceptual and semantic information
- Accessing the semantic representation of an appropriate lexical item
- Eliciting the phonological structure of an appropriate lexical item.

Depending on the underlying difficulty, naming errors can take the form of either semantic paraphasias: incorrect semantic categorizations (which may be from related categories: for example, a camel may be called a horse), or substitution of a generic category for a more specific one (for example, a hippopotamus and a lobster may both be called animals, or all animals may become ‘dog’). There may also be circumlocutory responses (e.g. a picture of a squirrel may elicit ‘they live in the

garden, grey in color'). Deficits involving the process of word retrieval proper lead to a relatively pure anomia: in this situation, knowledge about words and the phonological encoding of words are preserved, but the means for accessing these stores or linking stored word information with the appropriate phonological code is defective (Hillis, 2007). Naming errors in patients with a primary breakdown in the phonological encoding of verbal concepts into speech sounds generally take the form of literal (phonemic) paraphasias (e.g. 'hotapitamus' for 'hippopotamus') that approximate the target item and which are usually also evident in other contexts (for example, speech repetition) (Mendez et al., 2003). Primary deficits of both word retrieval and phonological encoding (in contrast to primary verbal store defects) may benefit from cueing with the initial letter of the target word.

Naming disturbance is probably the most common finding in aphasia. It presents in almost all kinds of aphasic disorders, including Broca's, Wernicke's, trans-cortical motor and Conduction aphasia. It may be the residual following recovery from any kind of aphasia, and most recovered aphasics still suffer difficulty in word finding to some degree (Lorwatanapongsa, 2005).

The anterior type of patients with non-fluent speech appears to perform well on semantic tasks. Mostly, the patient knows the meaning of words he desires, and is able to recognize his errors. When making an error, he keeps on trying to select the correct word but has limited inability to retrieve phonological information about a word or cannot articulate it, or when offering cues supports the patient, he is capable of producing a target word. Also his deficits in naming involve the struggling to

retrieve target words or often not being able to retrieve the target at all (Lorwatanapongsa, 2005).

The posterior type of patients with fluent speech, exhibit naming difficulties due to a disrupted semantic system. They usually try to produce a desired word and fails by substituting it with “empty speech”. Some give up after one unsuccessful effort, or may try again to retrieve the word and then gives up, questioning the clinician as to its correctness. The patient’s speech output is infrequently aided by prompting. Furthermore, they often refuse cues and sometimes even refuse the correct word (Lorwatanapongsa, 2005). Caramazza and Berndt (1978) said that naming depends upon the intact functioning of a number of processing elements including encoding, central processing, and motor production, any of which could be disturbed in anomia.

Goodglass, Kaplan et al. (1976) examined naming abilities in aphasics and found that conduction aphasics and Broca’s aphasics produce initial sound and correct number of syllables in words they cannot retrieve whereas, Wernicke’s and anomic patients word finding appears to be an “all or none” process. Goodglass and Stuss (1979) showed that Broca’s and Wernicke’s aphasics performed significantly better on naming to picture task than naming to oral description. Goodglass (1981) reported phonemic paraphasias to be associated with conduction aphasia, neologisms and unrelated errors to be predominant in Wernicke’s aphasia and circumlocutions to be associated more with anomic aphasia. In a study done by Wayland and Taplin (1982)

the non-fluent aphasics performed better than fluent aphasics on an object naming task.

Kohn and Goodglass (1985) explained picture naming errors for Broca's aphasics, Wernicke's aphasics, conduction aphasics, frontal and posterior anomics. Negated responses were associated with Broca's aphasics, whole part errors with frontal anomia and poor phonemic cueing with Wernicke's aphasia. Anomic aphasics produced fewer phonemic errors and the most multiword circumlocutions. Predominance of phonemic errors was seen in Broca's, Wernicke's and conduction aphasics. However, the aphasic subgroups did not differ significantly in the frequency of semantic errors which indicates that all the aphasic subtypes produce semantically related words in response to picture naming. This result was also supported by Williams and Canter (1982) who reported semantic paraphasias to be prevalent in all the aphasic subgroups.

Martin and Saffran (1992) have reported cases of fluent aphasia in which confrontation naming was characterized by a high proportion of formal paraphasias (word utterances that are phonologically similar to the intended targets). Martin and Saffran (1992) explained this phenomenon as resulting from a faster than a normal rate of activation decay: activated lemma nodes pass activation to constituent phonemes but then too quickly decay back to a resting level of activation. So phonologically related lexical items are activated by feedback from the phoneme level and are produced instead. Thus formal paraphasias arise as a result of substitution at the lemma level. Nickels (1995) have reported of presence of formal paraphasias in 15

aphasics in a naming task. Gagnon et. al (1997) collected formal paraphasias in 9 fluent aphasics in the context of a confrontation picture naming task. Results indicated that formal paraphasias arise via word substitutions and are constrained by grammatical class and word frequency.

Shantala (1997) studied naming deficits in three aphasic groups (Broca's, anomic and conduction) for three different naming tasks namely- confrontation naming, responsive naming and generative naming and reported a significant difference in all the three aphasic groups on all the tasks. Error analysis in confrontation naming task indicated presence of neologisms and phonemic errors to be maximum in Broca's aphasics; a high percentage of correct responses followed by a few semantic and phonemic errors were obtained by the anomics and conduction aphasics showed more of neologisms and gestural responses.

In bilingual context, a study was done by Arpita (1997) on naming deficits in Kannada-English bilingual aphasics. Three aphasic groups (Broca's, anomic and conduction) participated for three different naming tasks namely- confrontation naming, responsive naming and generative naming. Results revealed parallel deficits in L1 and L2 on responsive naming and generative naming task, however, in confrontation naming task, performance was better in L1 which was the native language and more frequently used premorbidly. Error analysis in L1 indicated that Broca's aphasics had maximum phonemic errors followed by neologisms and semantic errors. Anomics made maximum phonemic errors and semantic errors while conduction aphasics made maximum of neologisms. In L2 most common errors

observed among aphasics were no responses, neologisms and interferences. Since the subjects taken for the study were not very fluent speakers of L2 premorbidly, the no response in L2 explains reduced activation of L2 lexicon and more interference errors seen in L2 could be due to reduced ability to deactivate L1.

Studies on Repetition

Repetition of heard speech depends on intact input and output pathways and the ability to transfer information between these pathways. Accordingly, difficulties with speech repetition occur in patients with impaired processing of incoming speech signals (such as word deafness) and in those with impaired speech output. Like speech comprehension, repetition can be assessed at the level of words and sentences. Patients with word deafness or primary speech production problems may have difficulties even with single word repetition (especially for polysyllabic words) (Westbury and Bub, 1997). A failure to repeat words or sentences is a hallmark of aphasia. The ability to repeat may be entirely lost, or may be marked by phonemic paraphasias or omissions of sounds and words. Repetition is impaired in most aphasics, and actually dominates the clinical presentation of conduction aphasia largely because other prominent errors are lacking.

Patients with agrammatism may show a selective deficit in the repetition of phrases, particularly if these contain novel word combinations. Sentence repetition is also influenced by the level of comprehension. Where comprehension of individual words is lost, there may be ‘migration’ of phonemes between words (e.g. ‘the flag

was coloured bright red' may become 'the blag was fullered with a right breg'), suggesting that the utterance is encoded as an extended sequence of phonemes (and therefore susceptible to re-ordering) rather than a series of meaningful units (McCarthy and Warrington, 1987).

The impairment of repetition has major localization value. Geschwind (1965) attributed the repetition deficits to an anatomical disconnection between the Wernicke's and Broca's area. Warrington and colleagues (1971, 1972) propose that the repetition problem arises from a disruption in the auditory short-term memory. Dubois et al. (1973) reported that a general deficit in phonemic or motor encoding results in repetition difficulties. According to Sarno, (1998) the lesion for repetition deficit resides firmly in the perisylvian region of the dominant hemisphere. Repetition defects are notably absent in the transcortical aphasias and in anomic aphasias, whose correlated lesion is located outside the perisylvian ring.

Ohyama et.al. (1996) used the repetition task to investigate language processing in aphasic patients with positron emission tomography (PET). Results indicated that in the resting state, the resting regional cerebral blood flow (rCBF) in the left posteroinferofrontal area (PIF) and the left posterotemporal area was reduced in both fluent and nonfluent aphasics. However, the magnitude of activation in the right PIF and posterosuperotemporal area (PST) was greater than in normal subjects. Contrastively, in normal subjects, the posteroinferofrontal area (PIF) including Broca's area, the posterosuperotemporal area (PST) including Wernicke's area, the rolandic areas, and a few other areas were activated with left side dominance by the

repetition task. This study shows the importance of the mirror regions of the left PIF and PST in the nondominant (right) hemisphere in aphasic patients while performing the word repetition task.

Several studies have been done with regard to the paraphasic responses seen on repetition task. Gardner and Winner (1978) reported repetition profiles in a group of 17 anterior (Broca's, transcortical motor and mixed), 14 posterior (Wernicke's, anomic and transcortical sensory) and 12 conduction aphasics. Test material consisted of a single-word repetition task under immediate and delayed recall conditions. Incorrect responses were coded as sound errors, meaning errors and other errors. Results demonstrated significant difference among the aphasic groups with regard to the error type. Sound errors were made more by Broca's and mixed anterior aphasics whereas, meaning errors were more prominent in conduction aphasics.

Li and Williams (1990) conducted a study to determine whether the conduction, Broca's and Wernicke's aphasic groups could be differentiated on the basis on their repetition behaviors. Test material consisted of phrases and sentences from the Repeating Phrases Subtest of the Boston Diagnostic Aphasic Examination (BDAE, Goodglass & Kaplan, 1972). Results revealed that conduction aphasics exhibited a greater number of phonemic attempts, word revisions, and word and phrase repetitions. Broca's aphasics demonstrated more phonemic errors and omissions whereas, Wernicke's aphasics exhibited more unrelated words and jargon. Goodglass and Kaplan (1983) explained the deficient repetition skills of Wernicke's aphasics on the basis of their poor comprehension ability. The Wernicke's patient

experiences a partial or complete distortion of auditory image. The predominance of jargon and unrelated paraphasias seen in the study of Li and Williams (1990) supports the interpretation of Goodglass and Kaplan (1983).

In bilingual context, a study done by Chengappa, Bhat and Damle (2003) investigated paraphasias on selected repetition tasks from Western Aphasia battery (WAB) and Boston Diagnostic Aphasic Examination (BDAE, Goodglass & Kaplan, 1972) in a multilingual Wernicke's aphasic patient and highlighted the variation of these across the four languages known by the patient i.e. English, Tamil, Kannada and Hindi. Results depicted a better performance in English which was the most familiar/frequently used language. Repetitions in English included semantic and phonemic paraphasias that were totally absent in other languages where only neologisms were present. As English was used more frequently before the brain insult, it was inferred that the lexical activation of that language was strong and less disrupted compared to other languages which were not frequently used premorbidly.

Hegde and Bhat (2007) investigated the effect of multilingual exposure in a conduction aphasic with respect to the paraphasias on the repetition section of WAB, across the four languages used by the patient i.e. English, Hindi, Kannada and Tulu. Results stated that the most frequently used Kannada language showed more phonemic errors, semantic paraphasias and unrelated words; neologisms were seen only in English and Tulu; phonemic attempts in English and Hindi; semantic-phonemic errors only in English; real word jargon, neologistic jargon and inadequate response were highest in Hindi; and word revisions and phonemic errors were

observed in Tulu. Results indicated better lexical and semantic access in Kannada followed by Tulu language. These latter studies on bilingual aphasia are in accordance with the “Pitre’s law” which states a better recovery of the most familiar language.

Studies on Picture description

Efficient way to analyze the spontaneous speech of aphasic patients can be done by asking them to describe a picture or drawing. Clinically, this gives a good picture of their narrative abilities. This is preferable to asking the patient to narrate an event in their daily routine, as it allows speech to be evaluated independently of episodic memory and provides a target with which the response of the patients can be compared.

Naming errors can be correctly assessed in a picture description task and has been researched upon by several authors. Williams and Canter (1982) compared performance of aphasics on confrontation naming task and picture description task and found that Broca’s aphasics performed significantly better when naming objects on confrontation naming task than on picture description task. A reverse trend was seen in Wernicke’s aphasics for the two tasks. Correlations between scores on confrontation naming and picture description were high for the conduction and Broca’s aphasics, moderately high for the Wernicke’s aphasics, and the lowest for anomics. When absolute differences between scores on the two tasks were calculated, the greatest difference was found for the anomic patients followed by the Wernicke’s, Broca’s and conduction aphasics.

Williams and Canter (1987) also compared the performance of Broca's, Wernicke's , conduction and anomic aphasics on confrontation naming task and picture description task for action verbs. eighteen target action verbs and nine composite pictures representing two of the same verbs within a pictorial context were taken as the test stimulus. On correlating the performance of the aphasics on the two tasks, a high correlation was obtained for the Wernicke's aphasics; moderate correlation for Broca's and the lowest correlation was obtained for the anomic subjects. Analyzing the pattern of errors in aphasics, it was found that anomics produced more of delayed responses and extended circumlocutions; Wernicke's produced more neologisms and the Broca's produced significantly more phonemic errors and semantic-phonemic errors on picture description task.

The review of literature reveals that in the Indian context, very few studies have been conducted wherein, a comparison of presence of paraphasias among monolingual and bilingual individuals with aphasia was made; hence the present study was undertaken.

CHAPTER 3

METHOD

The present study was conducted to compare the type of paraphasias present in monolingual and bilingual aphasics (anomics, conduction and Wernicke's under fluent category and trans-cortical motor, Broca's and global under non-fluent category) on naming, repetition and picture description tasks. The variation of paraphasias across Kannada and English languages in bilingual aphasics has also been highlighted. Performances of different types of aphasias on the kinds of paraphasias produced on the three tasks were also examined.

Participants

Twenty four individuals with aphasia in the age range of 30-80 years (mean age of 55 years), identified through various sources like institutes, hospital records were taken for the study. These participants were divided into two groups: twelve monolinguals and twelve bilinguals. The demographic details of all the participants are displayed in table-3.1.

The following criteria were considered in the selection of the participants in the study.

- All participants were diagnosed as having aphasia by a Speech Language Pathologist and/or neurologist.

- All monolingual individuals with aphasia were native Kannada speakers. The bilingual individuals with aphasia had Kannada as their mother tongue and had learnt English as second language before the age of 15 years. The bilingual individuals were identified using Australian Second Language Proficiency Rating (ASLPR, Ingram, 1985). On the basis of self report and information from significant others, the individuals who passed fourth level (Vocational Proficiency) in the ASLPR (Appendix) in the second language i.e English in atleast speaking and listening domains of the rating scale premorbidly were considered as bilinguals.
- Different aphasic syndromes were considered. This was determined on the basis of clinical observation and Western Aphasia Battery (WAB, Kertesz & Poole, 1974) findings. The participants were grouped into fluent and non-fluent aphasia types as per the classification system of Goodglass and Kaplan (1972). The various types of aphasic syndromes identified were anomia (5), conduction (3), Wernicke's (2), trans-cortical motor (TCM) (1), Broca's (8) and global (5). Classification of the participants on the type of aphasia is shown in table-3.2.
- Both male and female aphasics were considered for the study. Participants included five females and nineteen males.
- The participants suffered a left hemisphere stroke revealed by MRI/CT scan reports. The time from the onset of stroke varied from two to twenty four months.
- All participants were right handed. This was determined using self-report and information from significant others.
- None of the participants had any auditory or visual deficit as assessed informally.
- Ethical considerations were met.

Table 3.1: Demographic details of the participants

Sl. no.	Age (in years)	Gender	Languages known	Education	Diagnosis	Etiology	Post-Onset duration of stroke
1.	46	M	K	VII Std	Anomia	CVA	6 months
2.	48	M	K	VII Std	Conduction	CVA	2 months
3.	55	M	K	IV Std	Conduction	CVA	20 months
4.	70	F	K	III Std	Wernicke's	CVA	3 months
5.	50	F	K	VII Std	Broca's	CVA	2 months
6.	41	M	K	III Std	Broca's	CVA	7 months
7.	58	M	K	IV Std	Broca's	CVA	20 months
8.	58	M	K	SSLC	Broca's	CVA	2 months
9.	52	F	K	VIII Std	Global	CVA	2 months
10.	75	M	K	VII Std	Global	CVA	2 months
11.	43	M	K	SSLC	Global	CVA	2 months
12.	44	M	K	VII Std	Global	CVA	4 months
13.	59	M	K/E	Graduate	Anomia	CVA	4 months
14.	70	M	K/E	Graduate	Anomia	CVA	7 months
15.	56	M	K/E	Graduate	Anomia	CVA	5 months
16.	53	F	K/E	Graduate	Anomia	CVA	3 months
17.	55	M	K/E	PUC	Conduction	CVA	22 months
18.	66	M	K/E	MBBS	Wernicke's	CVA	24 months
19.	73	M	K/E	Graduate	TCM	CVA	3 months
20.	46	F	K/E	PUC	Broca's	CVA	3 months
21.	47	M	K/E	Post-graduate	Broca's	CVA	8 months
22.	30	M	K/E	Graduate	Broca's	CVA	24 months
23.	46	M	K/E	Graduate	Broca's	CVA	4 months
24.	80	M	K/E	PUC	Global	CVA	5 months

M- male, F- female, K- Kannada, E- English, CVA- Cerebral vascular accident

Table3.2: Classification of the participants according to the type of aphasia

Aphasia type	FLUENT			NON-FLUENT			Total
	Anomia	Conduction	Wernicke's	TCM	Broca's	Global	
Monolinguals	1	2	1	0	4	4	12
Bilinguals	4	1	1	1	4	1	12

Procedure

Subjects were seated comfortably. Before starting the evaluation and recording, the subjects were informed about the entire procedure and an informed consent was taken. The environment was made as distraction free as possible by carrying out the procedure in a quiet room and by removal of any potential visual distracters.

Tests Administered

- Western Aphasia Battery (WAB, Kertesz & Poole, 1974) was administered for all the participants for diagnosing and identification of the type of aphasia.
- The following three sections of the WAB test were audio recorded, transcribed and analyzed for the presence of paraphasias:
    - **Repetition**- It comprises of 20 stimulus items consisting of words, phrases and sentences. The subjects were instructed to repeat after the examiner.
    - **Naming-** This section consists of 20 common objects. The objects were presented to the subjects in their visual field one after the other and they were instructed to name the objects in a single word as soon as possible. If the subjects were unable to name the object in 30 sec, it was considered as a no response.
    - **Picture description:** The “picnic” picture served as the test stimuli to look for paraphasias in narrative context. The subjects were instructed to describe

the picture in their own words. No time limit or word limit was given for this task.

All the three sections of the WAB were administered in Kannada for the monolingual individuals with aphasia and both in Kannada (L1) and English (L2) for the bilingual individuals with aphasia for comparing the type of paraphasias between monolinguals and bilinguals and also between the two languages (L1 & L2) for bilingual individuals with aphasia.

Scoring

The subjects' first response was evaluated in terms of absolute correctness for all the three sections; repetition, naming and picture description. Any deviation from the target was analyzed for the presence of paraphasias.

Analysis

- The repetition, naming and picture description sections of the WAB test were audio recorded, transcribed and the responses which were not appropriate to the target word were analyzed for the presence of paraphasias and comparison was made across:
  - Monolinguals and bilinguals
  - Kannada (L1) and English (L2) in bilingual individuals with aphasia
  - Qualitative analysis of the different kinds of paraphasias

- A list was prepared to classify the type of responses shown by the participants based on Li and Williams (1990) checklist and Dell's classification system of errors (1997). The responses were broadly classified as either paraphasias or other responses which were sub-classified as follows:

1. **Paraphasias:** These were divided into two broad categories, lexical and sublexical. A lexical paraphasia is a real word substituted for another whereas; a non-word produced falls into sublexical category.

a) At ***lexical level***, paraphasias can be:

(i) Semantic- word related to target in meaning.

(ii) Formal- word related to target in sound.

(iii) Mixed- word with sound and meaning relationship.

(iv) Unrelated- word with no apparent relation to target.

b) At ***sublexical level***, paraphasias can be:

i) Phonemic- non-word related in sound.

ii) Neologistic- non-word with a remote relationship to target.

2. **Other responses:** The non-paraphasic responses were further classified as:

a) Perseveration- the persistence of an abnormal or incorrect response made by a brain-damaged or dysfluent person even when the stimulus which induced the initial response has been removed. It may take the form of continuous

repetition or blocking where the person makes repeated efforts to make a sound (Eisenson, 1984).

b) **Circumlocution-** Substitution of object description (e.g., snow/soft, white/cold) and instrumental function (e.g., watch/knowing the hour) for the target word (Benson & Ardila, 1996).

c) **Code mixing-** It refers to the mixing of various linguistic units (morphemes, words, modifiers, phrases, clauses and sentences) primarily from two participating grammatical systems within a sentence. In other words, code mixing is intrasentential, constrained by grammatical principles and may be motivated by socio-psychological motivations. (Bhatia & Ritchie, 1996).

d) **Jargon-** gibberish or babbling speech associated with aphasia, extreme mental retardation, or a severe mental disorder (Merriam-Webster's Medical Dictionary, 2002).

e) **No response-** when a person refuses to respond.

Statistical Analysis

Following statistical measures were used for the analysis of the data using SPSS software (Version-16).

a) *Mann Whitney U test* was done to observe whether there exists a difference between monolingual and bilingual individuals with aphasia on the various kinds of responses (paraphasias and other responses) given on the three tasks namely naming, repetition and picture description.

b) *Wilcoxon Signed Rank* test was done for the bilingual group to see variation of the kinds of paraphasias and other responses across the two languages, Kannada and English on all the three tasks.

CHAPTER 4

RESULTS

The primary aim of the study was to observe the type of paraphasias in monolingual and bilingual individuals with aphasia. A total of 24 individuals with aphasia were evaluated on naming, repetition and picture description task. The results of the study have been presented with reference to the performance of the participants on:

4.1 Naming task

4.2 Repetition task

4.3 Picture description task

The performance of the individuals with aphasia has been first presented separately for the three above mentioned tasks i.e., intra task comparison. Secondly, inter task comparison has been carried out to observe if the performance of the participants differed across the three tasks. In the third section, the type of paraphasias collective of the three tasks has been presented for all the participants in both monolingual and bilingual group.

Intra task comparison

The results of all the three tasks i.e., naming, repetition, and picture description in this section are presented under following headings:

- Comparison of monolingual group and bilingual group
- Across language comparison for the bilinguals participants
- Qualitative analysis of all the paraphasias

4.1 Naming task

The performance of the monolinguals versus bilinguals and across languages in bilingual participants has been compared for the naming task. Qualitative analysis of different types of paraphasias present across different varieties of individuals with aphasia has been done.

4.1.1 Monolinguals and bilinguals

The naming task consisted of 20 stimuli which were scored by the investigator as either correct or incorrect response. The total mean percentages for the correct and incorrect responses for both the fluent and non-fluent groups in monolinguals and bilinguals are shown in table-4.1.

Table 4.1: The total mean percentages for the correct and incorrect responses for both monolinguals and bilinguals in the naming task

	Monolinguals (%)			**Bilinguals (%)**		
	Fluent	**Non-fluent**	**Total**	**Fluent**	**Non-fluent**	**Total**
Total correct	22.50 (15.00)	2.50 (5.34)	9.16 (13.28)	28.33 (9.83)	0.83 (2.04)	14.58 (15.87)
Total incorrect	77.50 (15.00)	97.50 (5.34)	90.83 (13.28)	71.66 (9.83)	99.16 (2.04)	85.41 (15.87)

As seen from the Table-4.1, in the overall scores, both fluent and non-fluent bilinguals performed better (14.58%) than the fluent and non-fluent monolinguals (9.16%). The incorrect responses of all the participants were subjected to further analysis. Based on the results of the analysis, the responses of the participants were classified as either paraphasias or other responses. The paraphasias were further classified under six categories namely:

- Semantic
- Formal
- Mixed
- Unrelated
- Phonemic
- Neologism

The responses of individuals with aphasia which were not typically placed in above categories of paraphasias were listed as:

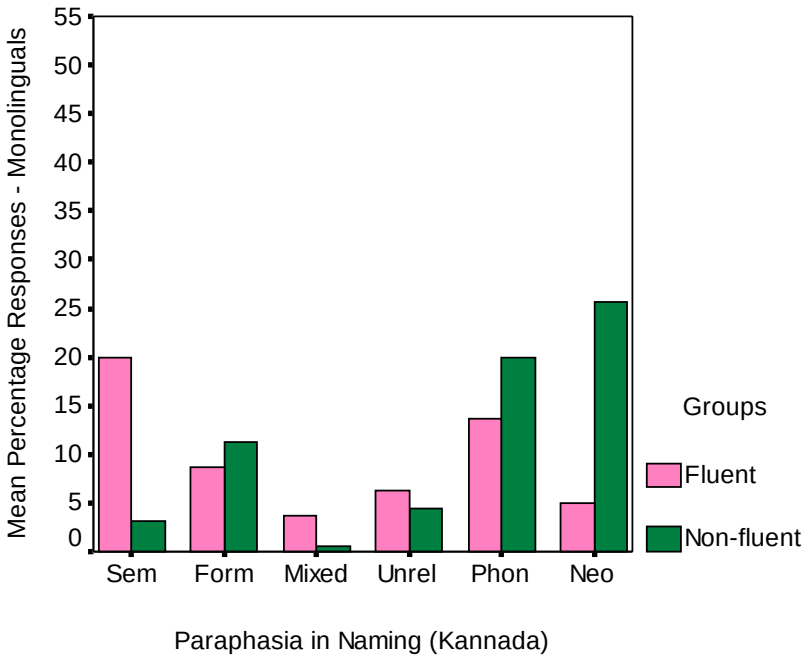
- Perseverations
- Circumlocutions
- Code mixing errors
- Jargon
- No responses

The means and standard deviations (SD) of all the types of responses for all the groups are tabulated in table-4.2. Figures 4.1 and 4.2 graphically represents the percentage occurrence of the six types of paraphasias in both monolingual and bilingual group of aphasics.

Table 4.2: Mean and SD for the different responses across fluent and non-fluent monolinguals and bilinguals in the naming task

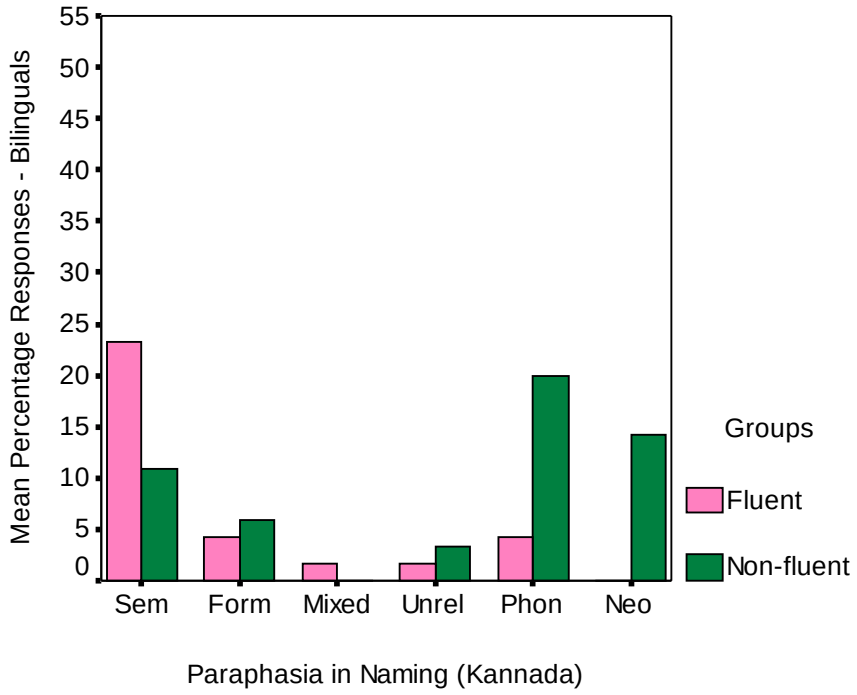
Type of responses	Monolinguals				Bilinguals			
	Fluent		Non-fluent		Fluent		Non-fluent	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
a. Semantic	20.00	4.08	3.12	7.03	23.33	7.52	10.83	12.00
b. Formal	8.75	6.29	11.25	7.90	4.16	4.91	5.83	10.20
c. Mixed	3.75	2.50	0.62	1.76	1.66	2.58	0	0
d. Unrelated	6.25	7.50	4.37	4.95	1.66	2.58	3.33	6.05
e. Phonemic	13.75	6.29	20.00	13.62	4.16	10.20	20.00	14.14
f. Neologism	5.00	7.07	25.62	15.22	0	0	14.16	11.58
g. Perseveration	6.25	7.50	0	0	0	0	12.50	14.74
h. Circumlocution	8.75	7.50	3.12	7.03	0.83	2.04	4.16	8.01
i. Code mixing	5.00	7.07	0	0	33.33	16.63	6.66	7.52
j. Jargon	0	0	10.00	11.64	0	0	10.83	12.00
k. No response	0	0	19.37	14.74	2.50	4.18	10.83	15.30

Figure 4.1: Percentage occurrence of the six kinds of paraphasias in the monolingual group in the naming task



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Figure 4.2: Percentage occurrence of the six kinds of paraphasias in the bilingual group in the naming task: Kannada



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

It is evident from table-4.2 and figure-4.1 that the fluent monolingual group exhibited more of semantic paraphasias (20%) followed by phonemic paraphasias (13.75%). The less prominent paraphasias seen were formal (8.75%), unrelated (6.25%), neologism (5%) and mixed (3.75%) in the decreasing order. A similar trend was seen in the bilingual group (as seen from figure-4.2) where percentage of semantic paraphasias was the highest (23.33%) followed by phonemic (4.16%) and formal paraphasias (4.16%). The mixed (1.66%) and unrelated (1.66%) paraphasias formed the tail end of the paraphasias. However, neologisms were not observed for the naming task in fluent bilingual group.

On the other hand, non-fluent group in monolinguals exhibited more of neologisms (25.62%) followed by phonemic (20%) and formal paraphasias (11.25%). Limited number of semantic (3.12%) and unrelated (4.37%) paraphasias were also seen in patches in this group. Presence of paraphasias in the bilingual group in the descending order were phonemic (20.00%), neologism (14.16%), semantic (10.83%), formal (5.83%), unrelated (3.33%). However, the mixed paraphasias were totally absent in this group.

Further, Mann Whitney U test was carried out to check the difference in the performance of fluent and non-fluent monolinguals and bilinguals on the six types of paraphasias. The result of the Mann Whitney U test revealed no significant difference between fluent and non-fluent monolinguals and bilinguals on any of the paraphasias. However, in the other responses, code mixing errors in fluent group were significantly more in the bilinguals than in the monolinguals ($z=2.160$ at $p<0.05$). Code mixing errors and perseverations in the non-fluent group were also significantly high ($z=2.160$ for both at $p<0.05$) in bilinguals than in monolinguals.

As seen from the above results, in the naming task, the bilinguals performed better than the monolinguals in both fluent and non-fluent groups. The most prominent paraphasias seen were semantic paraphasias followed by phonemic paraphasias in the fluent group whereas neologisms and phonemic paraphasias were more common in the non-fluent group in both monolingual and bilingual aphasics.

4.1.2 Across language comparison

The bilingual individuals with aphasia were compared for their performance in naming task across both Kannada and English language. The total mean percentage for the correct and incorrect responses for both the fluent and non-fluent groups of bilinguals in both the languages is displayed in the table-4.3.

Table 4.3: The total mean percentage for the correct and incorrect responses for bilinguals across L1 and L2 in the naming task

	Kannada (L1)				**English (L2)**			
	Fluent		**Non fluent**		**Fluent**		**Non fluent**	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
Total correct	28.33	9.83	0.83	2.04	53.33	20.65	5.00	10.00
Total incorrect	71.66	9.83	99.16	2.04	46.66	20.65	95.00	10.00

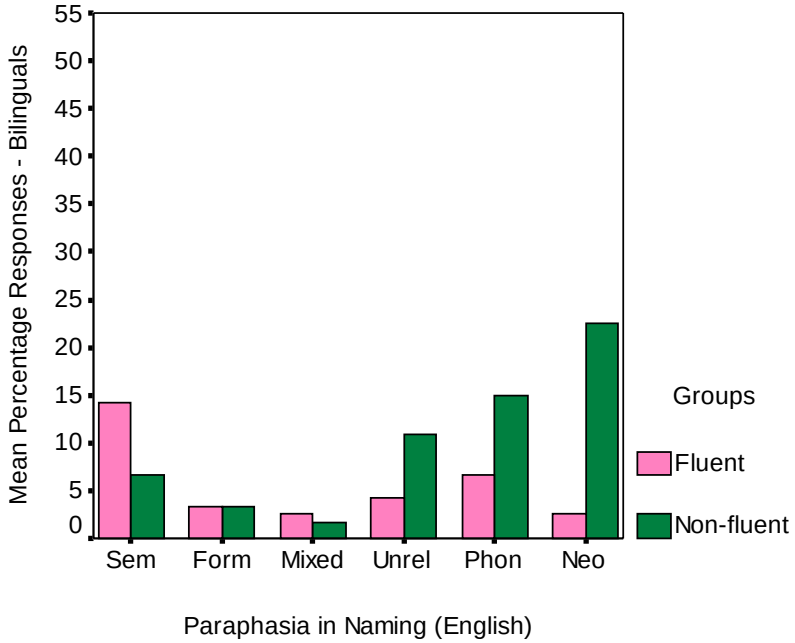
Table-4.3 clearly shows that the performance of both fluent and non-fluent bilinguals is much superior in English (L2) than in Kannada (L1). Wilcoxon signed rank test was carried to find out if there was any significant difference in the performance of fluent and non-fluent bilinguals. The results of the test also revealed that L2 is significantly better than L1 ($z=2.371$ at $p<0.05$).

The incorrect responses for the bilingual aphasics were classified into six paraphasias and five other responses whose means and standard deviations are presented in table-4.4. Figure-4.3 depicts graphical representation of the percentage occurrence of the various paraphasias for the bilingual group in English language.

Table 4.4: Mean and SD of types of responses of bilinguals in both Kannada and English in the naming task

Type of responses	Kannada				English			
	Fluent		Non fluent		Fluent		Non fluent	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
a. Semantic	23.33	7.52	10.83	12.00	14.16	5.84	6.66	11.69
b. Formal	4.16	4.91	5.83	10.20	3.33	4.08	3.33	4.08
c. Mixed	1.66	2.58	0	0	2.50	4.18	1.66	2.58
d. Unrelated	1.66	2.58	3.33	6.05	4.16	4.91	10.83	9.70
e. Phonemic	4.16	10.20	20.00	14.14	6.66	16.32	15.00	12.64
f. Neologism	0	0	14.16	11.58	2.50	6.12	22.50	21.62
g. Perseveration	0	0	12.50	14.74	0.83	2.04	0.83	2.04
h. Circumlocution	0.83	2.04	4.16	8.01	4.16	5.84	5.83	6.64
i. Code mixing	33.33	16.63	6.66	7.52	6.66	5.16	5.00	7.74
j. Jargon	0	0	10.83	12.00	0	0	10.83	12.41
k. No response	2.50	4.18	10.83	15.30	1.66	4.08	12.50	17.81

Figure 4.3: Percentage occurrence of the six kinds of paraphasias in the bilingual group in the naming task: English



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

As illustrated in table-4.4, and on comparing figures 4.2 and 4.3, it is evident that the fluent group followed a similar track in both the languages with respect to the type of paraphasias that were found in both the groups. Semantic paraphasias were found to be occurring maximally in both L1 and L2 but it was observed that the percentage of occurrence of semantic paraphasias was more in L1 than in L2 (23.33% in L1 & 14.16% in L2). The other paraphasias in the hierarchy included phonemic (4.16% in L1 & 6.66% in L2), formal (4.16% in L1 & 3.33% in L2), unrelated (1.66% in L1 & 4.16% in L2) and mixed (1.66% in L1 & 2.5% in L2) paraphasias. Neologisms were found to be present only in L2, though in a less percentage (2.5%); and were found to be totally absent in L1.

In the non-fluent group, phonemic paraphasias were found to be greatest in L1 (20%) followed by neologisms (14.16%) and semantic (10.83%) paraphasias. Other less occurring paraphasias included formal paraphasias (5.83%) and unrelated paraphasias (3.33%) which were found to be occurring meagerly in L1. In L2, neologisms (22.5%) were found to be present maximally followed by phonemic (15%) and unrelated (10.83%) paraphasias. The other less prominent paraphasias in L2 were semantic (6.66%), formal (3.33%) and mixed (1.66%) paraphasias.

Wilcoxon Signed Rank test was conducted to find out if the performance of the aphasics in the two languages differed in various types of paraphasias. The semantic paraphasias and code mixing errors were found to be significantly more in L1 than in L2 ($z=2.032$ and $z=2.201$ respectively, $p<0.05$) in the fluent group of aphasia. However, the other types of responses did not differ significantly. In contrast,

it was noted that no significant difference was obtained for the non-fluent bilingual group across the two languages in either of the six paraphasias (six types) or in the other responses.

The results in across language comparison state that the performance of the participants in L2 was better than in the mother tongue (L1). The fluent aphasic group showed more semantic paraphasias in L1 and the non-fluent group showed more of neologisms and phonemic paraphasias in both L1 and L2.

4.1.3 Qualitative analysis

The six types of paraphasias were described in all the types of individuals with aphasia considered for the study namely anomic (one monolingual & four bilinguals), conduction (two monolinguals & one bilingual), Wernicke's (one monolingual & one bilingual), trans-cortical motor (no monolinguals & one bilingual), Broca's (four monolinguals & four bilinguals) and global aphasia (four monolinguals & one bilingual).

a. Semantic paraphasia

Monolinguals: The individuals with anomia exhibited a higher percentage of semantic paraphasias followed by individuals with conduction and Wernicke's aphasia. Amongst the non-fluent aphasic group, Broca's aphasics showed semantic

paraphasias, however, with a lesser frequency of occurrence. Example for semantic paraphasia in monolingual is /paTTi/ (wrist-band) for /kai:gaDija:ra/ (watch).

Bilinguals: In Kannada language, high and comparable number of semantic paraphasias were reported in anomics, conduction and trans-cortical motor aphasics. Slightly reduced number of semantic paraphasias were observed in individual with Wernicke's aphasia. Example of semantic paraphasia in Kannada is /baTTe/ (clothes) for /su:dzi/ (needle). However, in the English language, the trans-cortical motor individual with aphasia showed the maximum number of semantic paraphasias followed by anomics, conduction and Wernicke's aphasics. The Broca's participants showed less number of semantic paraphasias consistently in both the languages (L1 & L2). Example of semantic paraphasia in English is "chalk" for "pen". No semantic paraphasias in individuals with global aphasia on naming task were noticed in both monolingual and bilingual groups as they showed a very limited verbal output in both the languages.

b. Formal paraphasia

Monolinguals: Broca's aphasics showed elevated number of formal paraphasias followed by the fluent aphasics including anomics, conduction and Wernicke's and the global aphasics forming the tapering end.

Bilinguals: A similar trend was seen in the bilinguals with maximum number of formal paraphasias in Broca's followed by anomics, conduction and trans-cortical

motor. However, Wernicke's and global aphasics did not show any formal paraphasias in this task. It was also noticed that the percentage occurrence of formal paraphasias was parallel in both the languages. Example of formal paraphasia in Kannada is /katte/ (donkey) for /kattri/ (scissors) and in English is "nice" for "knife".

c. Mixed paraphasia

This type of paraphasia rarely occurred in all the types of aphasics in both monolinguals and bilinguals. This rare occurrence was seen only in the fluent group. Example for mixed paraphasia is "pen' for "pencil".

d. Unrelated paraphasia

The unrelated paraphasias were noted more for the non-fluent group in both monolinguals and bilinguals followed by conduction and Wernicke's aphasics who showed a less frequency of occurrence of this type of paraphasia. Across languages it was obvious that in English language more number of unrelated paraphasias were noticed. Example of unrelated paraphasia in Kannada is /ba:tʃanige/ (comb) for "pen" and in English is "white" for "plate".

e. Phonemic paraphasia

In monolinguals, phonemic paraphasias were found to be occurring maximally in Broca's aphasia followed by global, conduction, Wernicke's and anomic aphasia in

the descending order. In bilinguals, a similar descending order was seen in both languages with Broca's and global on one end and conduction on the other. Individuals with anomia and Wernicke's aphasia did not show any phonemic paraphasias in the bilingual group across both Kannada and English. Example of phonemic paraphasia in Kannada is /ttakri/ for /kattri/ (scissors), /hu:o:/ for /hu:vu:/ (flower) and in English is /gai:f/ for "knife".

f. Neologistic paraphasia

Overall presence of neologisms was found to be more prominent in the monolingual group than in the bilingual group. Within monolinguals, neologisms were majorly present in Broca's aphasia followed by global aphasia. In the fluent group, Wernicke's aphasia also showed neologisms but to a lesser extent. In the bilingual group, occurrence of neologisms was found to be highest in global aphasia followed by Broca's and trans-cortical motor aphasia in Kannada language. However, neologisms were not observed in the fluent bilingual group. In the English language, the incidence of occurrence of neologisms was more in Broca's and global aphasia and less frequent in anomic aphasia. Example of neologisms in Kannada is /rakabi:/ for /taTTe/ (plate) and in English is /kufu:l/ for "lock".

To summarize, the performance of the monolingual and bilingual individuals with aphasia significantly differed from each other in the naming task. The bilinguals at large scored higher, as their total numbers of correct responses were more than the monolinguals.

With reference to the paraphasias present in the various types of aphasias, semantic paraphasias were maximally present in anomics followed by conduction aphasia. The non-fluent individuals with aphasia in both monolingual and bilingual group exhibited phonemic and neologistic paraphasias predominantly. Formal paraphasias (real word related to target in sound) were also commonly seen in Broca's aphasia.

4.2 Repetition task

The repetition task consisted of 50 target words presented in isolated words, phrases and sentence forms to monolingual and bilingual aphasics. The participants were instructed to repeat after the examiner. The responses of the participants were scored as either correct or incorrect. The incorrect responses were classified into the six paraphasias i.e., semantic, formal, mixed, unrelated, phonemic and neologism and five other responses namely perseverations, circumlocutions, code mixing errors, jargon and no response.

4.2.1 Monolinguals and bilinguals

The total mean percentage of correct and incorrect responses obtained in repetition task for both the fluent and non-fluent monolingual and bilingual aphasics are displayed in table-4.5.

Table 4.5: The total mean percentage and SD for the correct and incorrect responses for both monolinguals and bilinguals in the repetition task

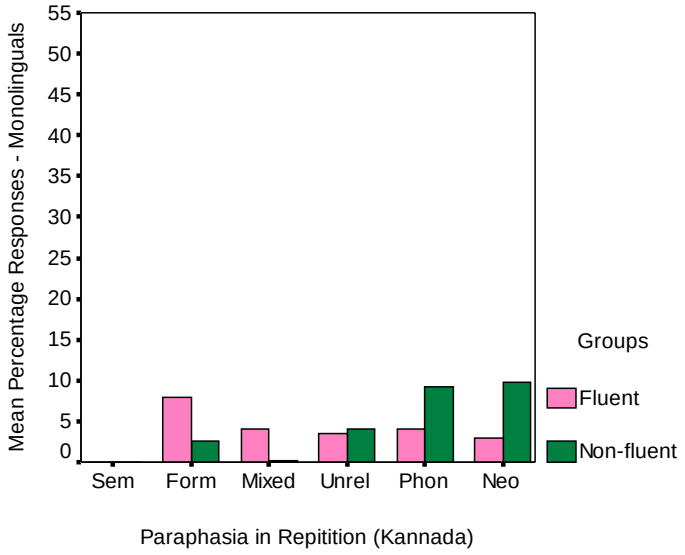
	Monolinguals (%)			**Bilinguals (%)**		
	Fluent	**Non-fluent**	**Total**	**Fluent**	**Non-fluent**	**Total**
Total correct	35.50 (23.79)	2.75 (3.69)	13.66 (20.57)	52.00 (21.46)	16.00 (32.44)	34.00 (32.27)
Total incorrect	64.50 (23.79)	97.25 (3.69)	86.33 (20.57)	48.00 (21.46)	84.00 (32.44)	66.00 (32.27)

As shown in table-4.5, the overall scores of both fluent and non-fluent bilinguals (34%) were better than the fluent and non-fluent monolinguals (13.66 %). The incorrect responses were divided into six paraphasias and other five responses whose mean and standard deviation for monolinguals and bilingual aphasics are presented in table-4.6. Figures 4.4 and 4.5 show the graphical representation of the percentage occurrence of the six types of paraphasias in monolingual and bilingual participants in the repetition task.

Table 4.6: Mean and SD for the different responses across fluent and non-fluent monolinguals and bilinguals in repetition task

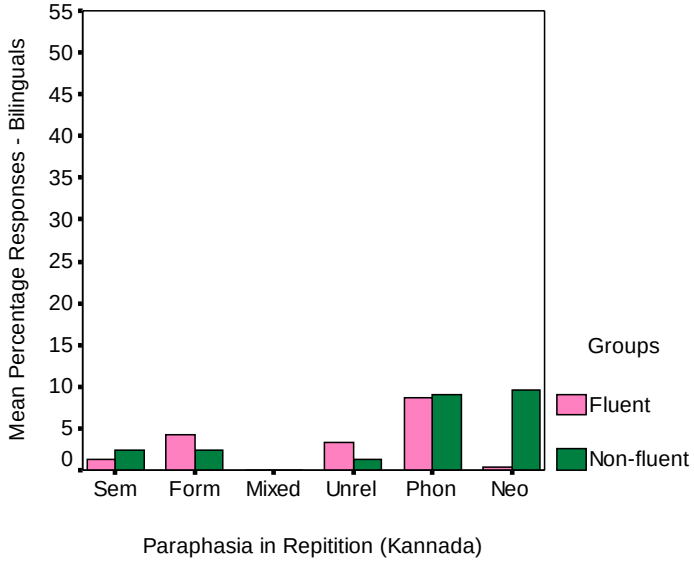
Type of responses	**Monolinguals**				**Bilinguals**			
	Fluent		**Non-fluent**		**Fluent**		**Non-fluent**	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
a. Semantic	0	0	0	0	1.33	1.63	2.33	4.08
b. Formal	8.00	10.95	2.50	3.33	4.33	6.25	2.33	2.94
c. Mixed	4.00	2.82	0.25	0.70	0	0	0	0
d. Unrelated	3.50	1.91	4.00	1.85	3.33	4.13	1.33	1.63
e. Phonemic	4.00	2.82	9.25	7.00	8.66	4.50	9.00	6.03
f. Neologism	3.00	6.00	9.75	4.20	0.33	0.81	9.66	6.37
g. Perseveration	0	0	0	0	0.66	1.63	0	0
h. Circumlocution	0	0	0	0	0	0	0	0
i. Code mixing	0	0	0	0	0	0	0	0
j. Jargon	0	0	8.00	8.00	0	0	5.66	8.80
k. No response	42.00	23.26	63.50	12.81	29.33	15.62	53.66	24.89

Figure 4.4: Percentage occurrence of the six kinds of paraphasias in the monolingual group in the repetition task



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Figure 4.5: Percentage occurrence of the six kinds of paraphasias in the bilingual group in the repetition task: Kannada



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Table-4.6 and figures 4.4 and 4.5 show that overall, the aphasics showed very few paraphasias in the repetition task as compared to the naming task. No response was the utmost type of response obtained by all the participants. Amongst the paraphasias seen, the fluent monolingual group exhibited more of formal paraphasias (8%) followed by mixed (4%), phonemic (4%), unrelated (3.50%), neologistic paraphasias (3%) which were present in a comparable number. The descending order of occurrence of paraphasias in fluent bilinguals was phonemic (8.66%), formal (4.33%) and unrelated (3.33%). The neologisms were very scanty (0.33%).

In the non-fluent group, the monolinguals and bilinguals did not demonstrate much difference in the type of paraphasias. Both monolinguals and bilinguals showed more of neologisms (9.75% and 9.66% respectively) and phonemic paraphasias (9.25% and 9% respectively); and less of unrelated (4% and 1.33%) and formal (2.5% and 2.33%) paraphasias. 2.33% of semantic paraphasias were also present in non-fluent bilinguals.

In the repetition task, monolinguals did not exhibit any semantic paraphasia, the bilinguals showed very scanty forms of semantic paraphasias.

Mann Whitney U test was done to check whether there exists a difference between fluent and non-fluent monolinguals and bilinguals on the six types of paraphasias in the repetition task. As per the result of the Mann Whitney U test, monolinguals showed significantly more mixed paraphasias in the fluent group

(z=2.372 at p<0.05) and, unrelated paraphasias in the non-fluent group (z=2.318 at p<0.05) than the bilinguals.

As depicted in the above results, the bilinguals performed better than the monolinguals in the repetition task. It was also noted that less number of paraphasias and more number of no responses were obtained from all the individuals with aphasia who participated in the study. Amongst the type of paraphasias present, formal paraphasias were most prominent in the fluent group whereas neologisms and phonemic paraphasias were more often seen in the non-fluent group.

4.2.2 Across language comparison

The bilingual individuals with aphasia were also examined whether their performance on repetition task differed across languages. The total mean percentage for correct and incorrect responses for both fluent and non-fluent bilinguals in both Kannada and English language are presented in table-4.7.

Table 4.7: The total mean percentage for the correct and incorrect responses for bilinguals across L1 and L2 in the repetition task

	Kannada				**English**			
	Fluent		**Non fluent**		**Fluent**		**Non fluent**	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
Total correct	52.00	21.46	16.00	32.44	70.33	24.89	17.33	31.79
Total incorrect	48.00	21.46	84.00	32.44	29.66	24.89	82.66	31.79

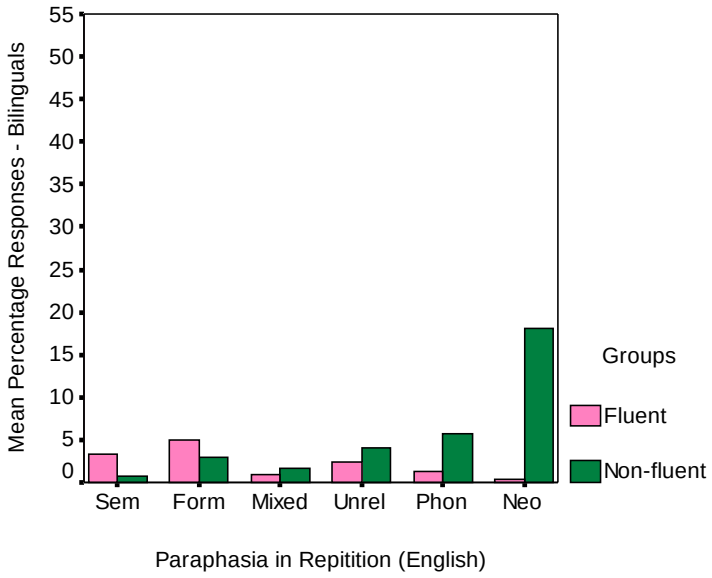
Table-4.7 depicts that the performance of fluent bilinguals is much superior in English (L2) than in Kannada (L1). Wilcoxon signed rank test also revealed L2 to be significantly better than L1 ($z=1.992$ at $p<0.05$) in the fluent group. However, in the non-fluent group, the performance of the participants was not significantly different in the two languages which was also confirmed by Wilcoxon signed rank test ($z= 1.069$ at $p>0.05$).

The incorrect responses for the aphasics were again classified into six paraphasias (graphically shown in figure-4.6) and five other responses whose mean and standard deviation are obtained in table-4.8.

Table 4.8: Mean and SD of types of responses of bilinguals in both Kannada and English in the repetition task

Type of responses	**Kannada**				**English**			
	Fluent		**Non fluent**		**Fluent**		**Non fluent**	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
a. Semantic	1.33	1.63	2.33	4.08	3.33	3.72	0.66	1.03
b. Formal	4.33	6.25	2.33	2.94	5.00	4.14	3.00	3.03
c. Mixed	0	0	0	0	1.00	1.67	1.66	2.65
d. Unrelated	3.33	4.13	1.33	1.63	2.33	1.96	4.00	3.34
e. Phonemic	8.66	4.50	9.00	6.03	1.33	3.26	5.66	5.85
f. Neologism	0.33	0.81	9.66	6.37	0.33	0.81	18.00	10.43
g. Perseveration	0.66	1.63	0	0	0	0	0	0
h. Circumlocution	0	0	0	0	0	0	0	0
i. Code mixing	0	0	0	0	0	0	0	0
j. Jargon	0	0	5.66	8.80	0	0	3.00	5.01
k. No response	29.33	15.62	53.66	24.89	16.33	12.80	46.66	21.56

Figure 4.6: Percentage occurrence of the six kinds of paraphasias in the bilingual group in the repetition task: English



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

As seen from table-4.8 and figure-4.5, the fluent group in Kannada language exhibited a large number of phonemic paraphasias (8.66%) followed by formal (4.33%), unrelated (3.33%) and semantic (1.33%) paraphasias. In English language (shown in figure 6), the fluent group had very few paraphasias present, amongst which the formal paraphasias were relatively more in number followed by semantic (3.33%), unrelated (2.33%) and phonemic (1.33%) paraphasias. Neologisms and mixed paraphasias were found to be negligible in both the languages.

On comparing figures 4.5 and 4.6, the non-fluent group showed a similar trend in both the languages with respect to the type of paraphasias. Neologisms and phonemic paraphasias occurred maximally in both the languages, however,

neologisms were notably more in L2 (18%) and phonemic paraphasia were a little more in L1 (9%). The less occurring paraphasias included formal (2.33% in L1 & 3% in L2), unrelated (1.33% in L1 & 4% in L2) and semantic (2.33% in L1 & 0.66% in L2). Mixed paraphasias were present only in L2 (1.66%) though very few; and totally absent in L1.

Amongst the other responses, both the groups showed markedly more number of no responses in both L1 and L2. Also, the non-fluent group showed jargon responses in both L1 (5.66%) and L2 (3%).

Wilcoxon Signed Rank test was done for the fluent and non-fluent bilingual aphasics to see variation across the two languages, Kannada and English and the results of the Wilcoxon Signed Rank revealed significantly more phonemic paraphasias in L1 in the fluent group ($z=2.220$ at $p<0.05$) while, significantly more neologisms in L2 in the non-fluent group ($z=2.023$ at $p<0.05$).

To sum up, the repetition ability of the bilingual individuals with aphasia was better in L2 than in L1. The fluent group produced significantly more phonemic paraphasias in L1 and more formal paraphasias in L2. On the other hand, the non-fluent group produced more neologisms in both L1 and L2.

4.2.3 Qualitative analysis

The six types of paraphasias were qualitatively analyzed in all the types of aphasics who participated in the study namely anomic, conduction, Wernicke's, trans-cortical motor, Broca's and global.

a. Semantic paraphasia

Very few semantic paraphasias were noticed in the repetition task. Monolinguals did not show any evidence of semantic paraphasias. Amongst the bilinguals, Broca's aphasiacs showed a little more number of semantic paraphasias whereas, the anomics, conduction aphasics and Wernicke's aphasics exhibited a very meager number. Example of semantic paraphasia in English is "house" for "cart".

b. Formal paraphasia

Overall monolinguals showed more number of formal paraphasias than the bilinguals. However, a similar trend was observed in the type of aphasics and the frequency of occurrence of formal paraphasias. In both monolinguals and bilinguals, the incidence of formal paraphasias was highest in the conduction aphasics. Next in the hierarchy were Broca's aphasics and trans-cortical motor aphasic who showed elevated presence of these paraphasias followed by the fluent aphasics including anomics, and Wernicke's; and the global aphasics towards the diminishing end. The pattern of presence of these paraphasias was analogous in both L1 and L2 for the

bilingual group. Example of formal paraphasia in Kannada is /ha:di/ (path) for /ha:sige/ (bed) and in English is “bell” for “bed”.

c. Mixed paraphasia

At large it was seen that this type of paraphasia was seldom present in all the types of aphasics. Example of mixed paraphasias in Kannada are /banni/ (come) for /bandare/ (coming) and /mu:k^{h}a/ (face) for /mu:gu/ (nose). The infrequent occurrence was seen only in the fluent bilingual group where, the anomics and conduction aphasics showed few mixed paraphasias in patches in English language.

d. Unrelated paraphasia

Monolinguals: A comparable number of unrelated paraphasias were noted in both fluent and non-fluent aphasic varieties. The Broca’s aphasics were ahead than all the other varieties of aphasics in showing unrelated paraphasias.

Bilinguals: The performance of bilingual aphasics differed considerably in L1 and L2. In L1, the fluent group produced more unrelated paraphasias whereas; contrastively in L2 the non-fluent group showed more number of these paraphasias. In L1, the Wernicke’s aphasics produced plentiful unrelated paraphasias followed by conduction and anomic types and the non-fluent group formed the tail end. In L2, the Broca’s aphasics took over the global and other fluent varieties that produced these paraphasias in an equivalent number. Example of unrelated paraphasias in Kannada

are /dzana/ (people) for /Dadzan/ (weight), /tata/ (grandfather) for /kittale/ (orange) and in English is “heat” for “Indian”.

e. Phonemic paraphasia

Monolinguals: A very high incidence of phonemic paraphasias was seen in Broca’s aphasics followed by global, conduction and Wernicke’s aphasics. Anomics however, produced scanty phonemic errors. Example of phonemic paraphasia in Kannada is /kikaki / for /kiTaki / (window).

Bilinguals: A high occurrence of phonemic paraphasias in Broca’s and then followed by global was common to both L1 and L2. The two languages differed slightly for the fluent bilingual group where the anomics demonstrated more number of phonemic paraphasia in L1 and the conduction produced more of these errors in L2. Example of phonemic paraphasias in English are /gliDDar/ for “glitter” and /wino:/ for “window”. Individual with Wernicke’s aphasia showed reasonable number of phonemic errors in L1 but nonexistence of these errors in L2.

f. Neologistic paraphasia

The presence of neologisms in the repetition of aphasics followed a similar pattern across monolinguals and bilinguals. In both the groups, the Broca’s aphasics produced exceedingly high number of neologisms followed by global aphasics. Amongst the fluent group, neologisms were measly present in the conduction aphasics in both

monolingual and bilingual group. Interestingly, all the anomics and Wernicke's showed a total lack of neologisms. This pattern of occurrence of neologisms was parallel in both L1 and L2. Example of neologism in Kannada is /kikika / for /kittale / (orange) and in English is /shishuba/for "sixty two".

To sum up, results of the study revealed that in the repetition task, conduction aphasics exhibited a greater number of phonemic paraphasias; Broca's aphasics demonstrated more phonemic errors and neologisms; and Wernicke's aphasics exhibited more unrelated paraphasias and jargon.

Across language comparison revealed a significant difference in the performance of the fluent group. The fluent bilingual group produced more number of formal paraphasias in L2. Contrastively, phonemic paraphasias (non words related to the target in sound) were prominent in L1. Extensive number of neologisms were also seen in the repetition task by the non-fluent group in both monolingual and bilingual group. It was also noted that the semantic and mixed paraphasias were scantily present in the repetition task.

4.3 Picture description task

The 'picnic' picture from the Western Aphasia Battery (WAB) was used to elicit spontaneous speech sample of the 24 aphasics who participated in the study. This task was chosen to examine paraphasias in the narrative context. The performance of the

monolinguals versus bilinguals and across languages in bilingual participants has been compared for this task.

4.3.1 Monolinguals and bilinguals

The picture description task was an open ended task where the participants were given a picture and asked to describe it in their own words. There was no word or time limit given to them. The total number of words uttered and the number of correct words in that were calculated from the speech sample elicited by them. Table-4.9 below depicts the total mean percentage for the total words, correct and incorrect responses for both the fluent and non-fluent groups in monolinguals and bilinguals.

Table 4.9: The total mean percentage for the total words, correct and incorrect responses for both monolinguals and bilinguals in the picture description task

	Monolinguals (%)			**Bilinguals (%)**		
	Fluent	**Non-fluent**	**Total**	**Fluent**	**Non-fluent**	**Total**
Total words	27.75 (2.87)	13.25 (5.39)	18.08 (8.46)	32.00 (7.04)	21.00 (8.04)	26.50 (9.21)
Total correct	45.65 (7.73)	5.37 (8.12)	18.79 (21.25)	33.06 (16.33)	7.51 (6.87)	20.29 (17.91)
Total incorrect	54.34 (7.73)	94.62 (8.12)	81.20 (21.25)	66.93 (16.33)	92.48 (6.87)	79.70 (17.91)

At a glance, table-4.9 shows that, both the fluent and non-fluent bilinguals uttered more words (32% & 21% respectively); and their mean percentage of the correct responses was also slightly higher than the monolinguals. This finding was confirmed by Mann Whitney U test which also revealed that the bilinguals at large uttered significantly more number of words than the monolinguals (z=2.170 at

p<0.05). However, the total number of correct words was not significantly different in the two groups as per the results of the test (z=0.322 at p>0.05).

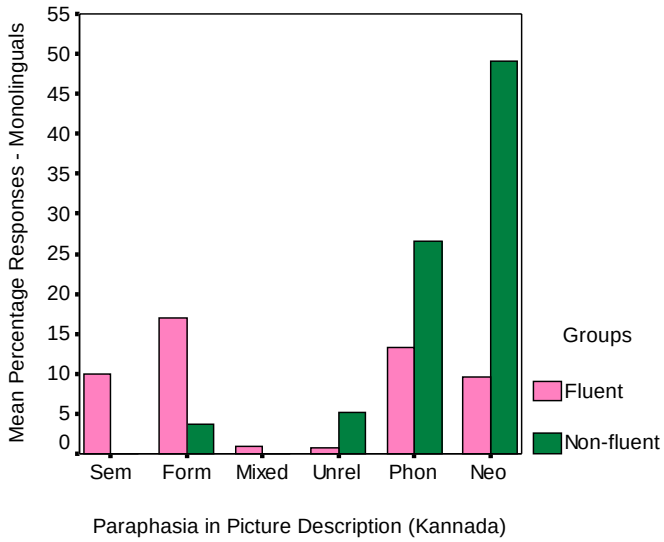
The incorrect responses of all the participants were classified as either paraphasias including semantic, formal, mixed, unrelated, phonemic and neologism or other responses including perseverations, circumlocutions, code mixing errors, jargon and no responses.

The mean and standard deviation of all the types of responses for all the groups are presented in table-4.10. Figures 4.7 and 4.8 graphically represent the percentage occurrence of the six types of paraphasias in both monolingual and bilingual group of aphasics in the picture description task.

Table 4.10: Mean and SD for the different responses across fluent and non-fluent monolinguals and bilinguals in picture description

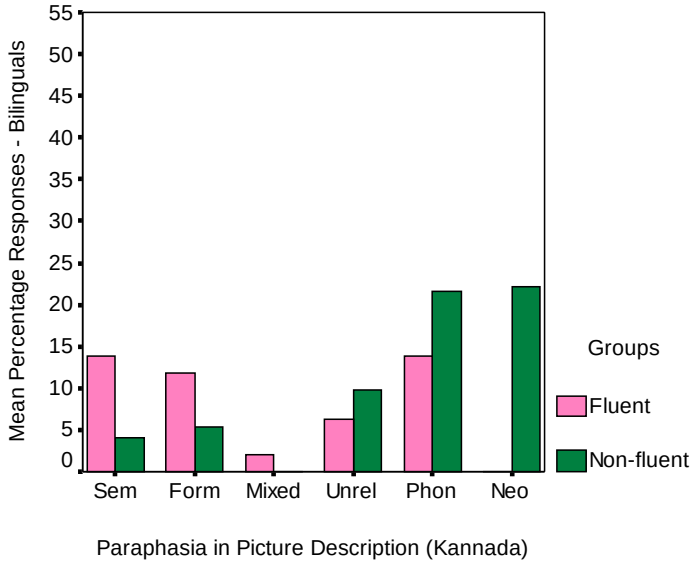
Type of responses	**Monolinguals**				**Bilinguals**			
	Fluent		**Non-fluent**		**Fluent**		**Non-fluent**	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
a. Semantic	9.96	6.58	0	0	13.92	5.74	4.09	5.46
b. Formal	17.04	8.01	3.71	5.59	11.75	7.76	5.39	6.42
c. Mixed	0.92	1.85	0	0	2.00	3.15	0	0
d. Unrelated	0.78	1.56	5.24	8.32	6.20	15.18	9.73	11.10
e. Phonemic	13.23	4.83	26.59	15.31	13.77	7.56	21.67	15.00
f. Neologism	9.61	12.75	49.18	11.49	0	0	22.16	20.24
g. Perseveration	0	0	3.57	10.10	0	0	0	0
h. Circumlocution	2.77	5.55	0	0	0	0	3.75	6.43
i. Code mixing	0	0	0	0	19.27	17.85	17.64	13.34
j. Jargon	0	0	6.32	9.83	0	0	8.01	12.42
k. No response	0	0	0	0	0	0	0	0

Figure 4.7: Percentage occurrence of the six kinds of paraphasias in the monolingual group in the picture description task



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Figure 4.8: Percentage occurrence of the six kinds of paraphasias in the bilingual group in the picture description task: Kannada



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

As observed from table-4.10 and figure-4.7, the fluent monolingual group exhibited a high percentage of formal paraphasias (17.04%) followed by phonemic paraphasias (13.23%). The less prominent paraphasias seen were semantic (9.96%) and neologisms (9.61%). Mixed (0.92%) and unrelated (0.78%) paraphasias were found to be insignificant. On the other hand, the fluent bilingual group produced a comparable and an elevated number of semantic (13.92%), phonemic (13.77%) and formal (11.75%) paraphasias. This was followed by unrelated (6.20%) and mixed (2%) paraphasias which were present in a lesser number. This has been depicted in figure-4.8.

In the non-fluent group, neologisms were extensive in number in the monolinguals (49.18%). The phonemic paraphasias were also present in a huge number (26.59%) followed by unrelated (5.24%) and formal (3.71%) paraphasias which were scantily present. In the bilingual group, the non-fluent aphasics showed analogous number of neologisms (22.16%) and phonemic (21.67%) paraphasias followed by unrelated (9.73%), formal (5.39%) and semantic (4.09%) paraphasias. It can also be observed from table-4.10 that semantic paraphasias were present only in the bilingual group and totally absent in the monolingual group. While, the mixed paraphasias were absent in both monolinguals and bilinguals in the non-fluent category.

Mann Whitney U test was done to support the above findings. The test results showed that in the non-fluent group, monolinguals showed significantly more

neologistic paraphasias ($z=2.588$ at $p<0.05$) and the bilinguals showed significantly more semantic paraphasias ($z=2.156$ at $p<0.05$).

It was also noted that the frequency of code mixing errors were reasonably high for both fluent (19.27%) and non-fluent (17.64%) bilinguals in the picture description task. This finding was confirmed by Mann Whitney U test which revealed a significant difference in the presence of code mixing errors in fluent and non-fluent bilinguals ($z=2.640$ and $z=3.009$ at $p<0.05$ respectively).

As depicted in the results of monolingual and bilingual comparison for the picture description task, bilinguals elicited more number of words than the monolinguals. Also, the total number of correct responses were more in the bilingual group. With reference to the type of paraphasias present, in the fluent aphasic group, both monolinguals and bilinguals illustrated more number of formal and phonemic paraphasias. However, semantic paraphasias were more commonly seen only in the fluent bilingual group. The non-fluent aphasics on the other hand produced neologisms and phonemic paraphasias maximally.

4.3.2 Across language comparison

The bilingual individuals with aphasia were studied further to see if their performance in picture description task differed across Kannada (L1) and English (L2) language. The total mean percentage for the total words, correct and incorrect responses for both the fluent and non-fluent groups of bilinguals in both the languages

is demonstrated in table-4.11. Figure-4.9 illustrates the graphical representation of the percentage of occurrence of the various paraphasias for the bilingual group in English language in the picture description task.

Table 4.11: The total mean percentage for the total words, correct and incorrect responses for bilinguals across L1 and L2 in the picture description task

	Kannada				**English**			
	Fluent		**Non fluent**		**Fluent**		**Non fluent**	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
Total words	32.00	7.04	21.00	8.04	31.83	7.83	22.66	13.41
Total correct	33.06	16.33	7.51	6.87	39.80	17.92	15.58	20.99
Total incorrect	66.93	16.33	92.48	6.87	60.19	17.92	84.41	20.99

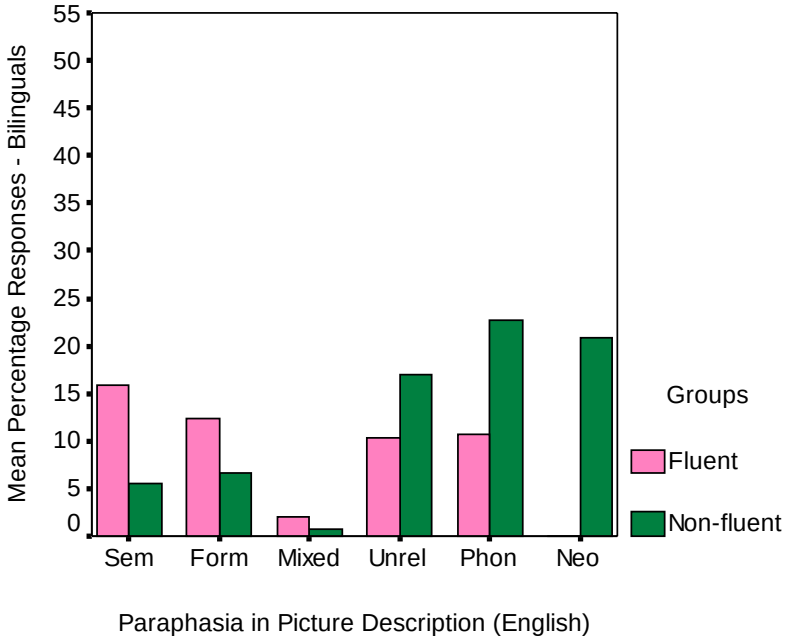
Table-4.11 evidently shows that the mean percentage of total words for both fluent and non-fluent bilinguals is almost equivalent in both L1 and L2. However, the mean percentage of total correct responses is slightly greater for L2 than L1 in both fluent and non-fluent groups. This difference of performance of bilinguals in L1 and L2 was not significantly different as shown by Wilcoxon signed rank test ($z=1.735$ at $p<0.05$).

The incorrect responses for the bilingual aphasics were classified into six paraphasias and five other responses whose mean and standard deviation are displayed in table-4.12.

Table 4.12: Mean and SD of types of responses of bilinguals in both Kannada and English in the picture description task

Type of responses	Kannada				English			
	Fluent		Non fluent		Fluent		Non fluent	
	Mean%	SD	Mean%	SD	Mean%	SD	Mean%	SD
a. Semantic	13.92	5.74	4.09	5.46	15.88	6.62	5.62	7.91
b. Formal	11.75	7.76	5.39	6.42	12.37	6.65	6.71	8.30
c. Mixed	2.00	3.15	0	0	1.97	3.87	0.77	1.89
d. Unrelated	6.20	15.18	9.73	11.10	10.27	17.52	17.06	15.34
e. Phonemic	13.77	7.56	21.67	15.00	10.67	7.46	22.72	16.01
f. Neologism	0	0	22.16	20.24	0	0	20.85	20.83
g. Perseveration	0	0	0	0	0	0	0	0
h. Circumlocution	0	0	3.75	6.43	0	0	1.16	2.84
i. Code mixing	19.27	17.85	17.64	13.34	8.99	8.92	2.32	5.69
j. Jargon	0	0	8.01	12.42	0	0	7.17	8.91
k. No response	0	0	0	0	0	0	0	0

Figure 4.9: Percentage occurrence of the six kinds of paraphasias in the bilingual group in the picture description task: English



Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Figures 4.8 and 4.9 were compared to observe the differences in kinds of paraphasias present in the bilingual group in L1 and L2. As observed from table-4.12, in L1 the fluent group exhibited a high number of semantic (13.92%) and phonemic (13.77%) paraphasias followed by formal paraphasias (11.75%). Paraphasias present in less number included unrelated (6.20%) and mixed (2%). The pattern of paraphasias faintly differed in L2 for the fluent group where the descending order of occurrence of paraphasias was semantic (15.88%), formal (12.37%), phonemic (10.67%), unrelated (10.27%) and mixed (1.97%). It can be noticed from table-4.12 that neologisms were totally absent in both the languages for the fluent group.

In the non-fluent group, high incidence of neologisms and phonemic paraphasias and a low incidence of formal and semantic paraphasias were common to both L1 and L2. Insignificant presence of mixed paraphasia was also common to both languages. Difference was noticed in unrelated paraphasias which was greater in L2 (17.06%) than in L1 (9.73%).

Wilcoxon Signed Rank test was conducted to know if the two languages were significantly different in the type of paraphasias exhibited. Results revealed no significant difference between the languages in the fluent group for all kinds of responses. In the non-fluent group, no significant difference was seen for six types of paraphasias. Though, the number of code mixing errors were significantly higher in L1 than in L2 ($z=2.023$ at $p<0.05$).

The results of across language comparison show that the performance of the bilinguals did not differ much across the two languages. The type of paraphasias seen in the two languages were also not very different. The fluent group exhibited more of semantic, formal and phonemic paraphasias whereas, the non-fluent group showed more evidence of neologisms and phonemic paraphasias.

4.3.3 Qualitative analysis

All the types of aphasics who were considered for the study were examined for the types of paraphasias which were prominently observed in their picture description task

a. Semantic paraphasia

Monolinguals: Semantic paraphasias were maximally prevalent in individual with Wernicke's aphasia followed by anomics and conduction aphasics. In contrast, these paraphasias were totally absent in all the eight non-fluent aphasics.

Bilinguals: In L1, semantic paraphasias were more for the anomic aphasics followed by Wernicke's and conduction aphasics. Quite contrary to the performance of monolinguals, the non-fluent bilinguals (Broca's and trans-cortical motor) did produce a reasonable number of semantic paraphasias. In L2, both anomics and Wernicke's aphasics produced high and comparable number of semantic paraphasias followed by the conduction aphasics. The Broca's aphasics also produced these

paraphasias as good as the fluent group in L2. Example of semantic paraphasia in Kannada is “phone” for “radio” and in English is “sheep” for “dog”. Global aphasics with their limited verbal output did not produce any semantic errors in the narrative context in both the languages.

b. Formal paraphasia

Monolinguals: Maximal number of formal paraphasias were found in Wernicke’s aphasic followed by conduction aphasics. The anomics and Broca’s aphasics also showed high and comparable number of these paraphasias.

Bilinguals: All the aphasics with the exception of Wernicke’s aphasic showed a similar trend of formal paraphasias in both L1 and L2. Anomics showed maximum number of formal paraphasias followed by conduction, Broca’s and trans-cortical motor in the descending order. Wernicke’s aphasic, on the two extremes, exhibited a reasonable number of these paraphasias in L2 whereas complete absence of formal paraphasias in L1. Example of formal paraphasia in Kannada is /a:lu/ (potato) for /ha:lu/ (milk) and in English is “bat” for “mat”. Global aphasics were consistent in their performance with the total absence of formal paraphasias in their speech.

c. Mixed paraphasia

Mixed paraphasia was seldom present in all the tasks taken for the study. In picture description, only anomics exhibited few mixed paraphasias in both

monolingual and bilingual group. Contrary to all other tasks, the bilingual trans-cortical motor aphasic showed few mixed paraphasias in L2.

d. Unrelated paraphasia

Monolinguals: the unrelated paraphasias were profusely present in the global aphasics; meagerly present in the conduction aphasic group and entirely missing in other aphasics.

Bilinguals: Bilinguals differed sufficiently from the monolingual group and also differed across the languages. In L1 Wernicke's aphasic produced extremely large number of unrelated paraphasias followed by Broca's and trans-cortical motor who also showed a high and comparable number of these paraphasias. A complete absence of these paraphasias was seen in anomics and global aphasics. In L2, these paraphasias were produced by almost all varieties of aphasics namely, Wernicke's, Broca's, anomics, global and trans-cortical motor in the descending order of occurrence. Example of unrelated paraphasia in Kannada is /hu:vu/ (flower) for /buku:/ (book) and in English is "walking" for "reading".

e. Phonemic paraphasia

Phonemic paraphasias were present in all the types of aphasics though the frequency of occurrence varied among the fluent and non-fluent groups.

Monolinguals: A very high incidence of phonemic paraphasias was seen in Broca's followed by global aphasics. The fluent aphasics produced considerably fewer phonemic paraphasias than the non-fluent group. Amongst the fluent aphasics, maximal number of phonemic paraphasias were seen in the conduction group followed by anomics and Wernicke's in the decreasing order.

Bilinguals: A similar pattern of occurrence of phonemic paraphasias was seen in the bilinguals with Broca's aphasics being at the upper continuum followed by the global aphasics. The fluent aphasics followed the non-fluent aphasics as in the monolingual variety. However, a slight difference of performance was noted in the fluent group across L1 and L2. In L1, the conduction and Wernicke's aphasics showed more and comparable number of these paraphasias followed by the anomics. However, in L2 the anomic group illustrated more of these paraphasias than showed by conduction and Wernicke's group. Example of phonemic paraphasia in Kannada is /huru:ga/ for /huDu:ga/ (boy) and in English is /e:Dio/ for "radio".

f. Neologistic paraphasia

Monolinguals: Extremely large and equivalent number of neologisms were seen in speech of Broca's and global aphasics. Wernicke's and conduction aphasics also showed a small percentage of neologisms in picture description task.

Bilinguals: Neologisms were observed only for the non-fluent group in bilingual aphasics with a similar performance in both the languages. Amongst the non-fluent

aphasics, the global aphasics presented with highest number of neologisms followed by Broca's aphasics. Example of neologism in Kannada is /Du:Da/ for /huDu:ga/ (boy) and in English is /no:ka/ for "car".

To sum up, the results of the picture description task also revealed a better performance of the bilingual group. However the two languages (L1 & L2) did not differ much in this task. Amongst the type of paraphasias present, the semantic paraphasias were most commonly seen in the fluent aphasic group. The monolingual and bilingual aphasic group differed slightly in their performance. Individual with Wernicke's aphasia presented with most number of semantic and unrelated paraphasias in a narrative context. Anomics also exhibited a high number of semantic paraphasias in the bilingual group.

In the non-fluent group, the Broca's and global aphasics produced more of non words with either sound relation to the target word (phonemic paraphasias) or with no apparent relation to the target word (neologism) in the picture description task.

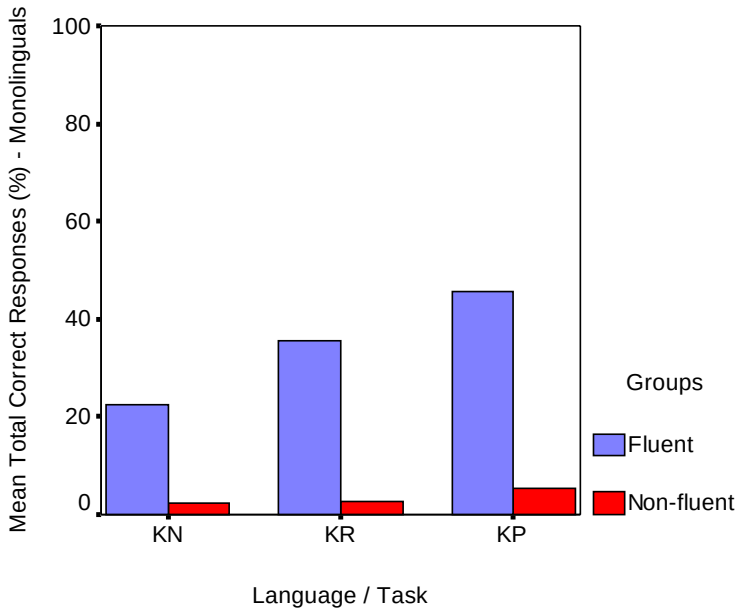
With reference to the other responses obtained from the participants, it was observed that the trans-cortical motor participant exhibited a high number of circumlocutory responses, both in L1 and L2 when given the picture to describe. The anomics also showed circumlocutory behaviors, however, in a lesser amount than the trans-cortical motor aphasia. Jargon responses were attained mostly by the global aphasics in both monolingual and bilingual group.

Code mixing errors, however not studied in detail, were also prominent in the bilingual group. It was evident that code mixing responses were more in L1 than in L2. In L1, anomics showed maximum of these responses followed by trans-cortical motor and Broca's aphasia. Wernicke's and conduction aphasics also showed a considerable number of code mixing responses in picture description task. In L2, mostly fluent aphasics including conduction and anomic aphasics; and only trans-cortical motor in the non-fluent exhibited code mixing responses.

Inter task comparison

This section compares the performance of all the individuals with aphasia on the three tasks i.e., naming, repetition and picture description. This would determine the difference, if any, in the total scores obtained by the participants in the three tasks.

Figure 4.10: Performance of the monolingual aphasia group in all the three tasks

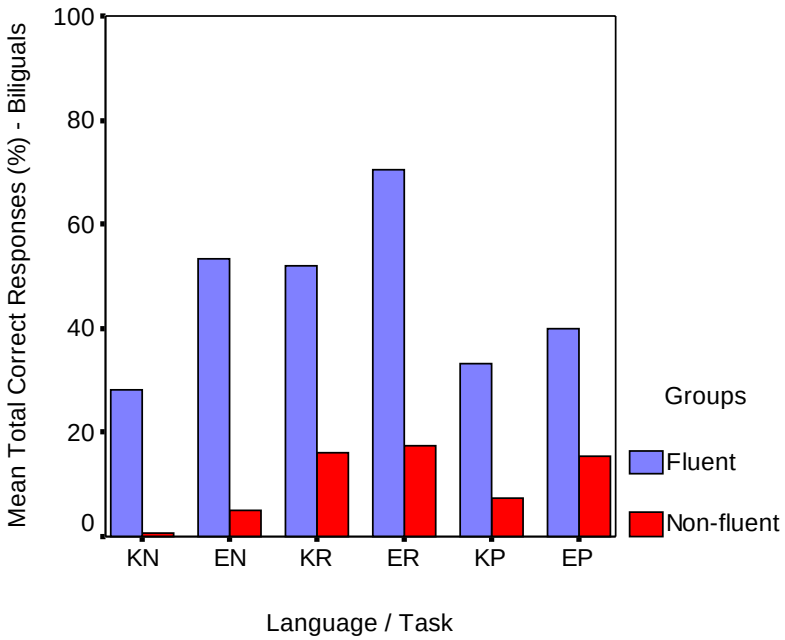


KN- naming in Kannada, KR- repetition in Kannada, KP- picture description in Kannada

A clear pattern of performance of the monolingual group in all the three tasks is evident in figure-4.10. The fluent monolingual group obtained highest correct responses in picture description task followed by repetition and naming task in the descending order. However, the non-fluent monolingual group performed equivalent in both naming and repetition tasks. The correct responses in picture description task were found to be slightly higher than the other two tasks (naming & repetition).

The performance of the bilingual group differed from that of the monolingual group with reference to inter task comparison. The figure-4.11, graphically illustrates the performance of the bilingual aphasia group in all the three tasks in both the languages (L1 & L2).

Figure 4.11: Performance of the bilingual aphasia group in all the three tasks in both Kannada and English language



KN- naming in Kannada, EN- naming in English, KR- repetition in Kannada, ER- repletion in English, KP- picture description in Kannada and EP- picture description in English.

Figure-4.11 reveals that the performance of the fluent group is consistently higher than the non-fluent group in all the three tasks and across both the languages. It is also evident that the correct responses in L2 were also consistently higher than in L1 for all the tasks in both fluent and non-fluent aphasics.

In the fluent bilingual group, the correct responses were highest in the repetition task followed by picture description and naming tasks in the descending order in L1. In L2, highest were the scores for the repetition task again. However, the correct scores in the naming task were more than the scores of the picture description task. Thus, the fluent bilingual group was better in retrieving names in confrontation naming task than in a narrative context in the second language (L2).

The performance of the non-fluent group was similar across both the languages. The total percentage of correct responses was highest in the repetition task followed by the picture description task and naming task in the decreasing order.

Collective performance of the three tasks

The different types of paraphasias produced by the monolingual and bilingual individuals with aphasia were pooled from the three tasks of naming, repetition and picture description. Results of the collective performance of the three tasks for all the participants are stated below.

Monolinguals

Table 4.13 depicts the number of different paraphasias produced by the monolingual individuals with aphasia in all the three tasks of naming, repetition and picture description.

Table 4.13: Total number of different paraphasias in Monolinguals: Kannada

S. No	Type of Aphasia	Type of paraphasias						Total
		Sem	Form	Mixed	Unrel	Phon	Neo	
M 1	Anomia	7	7	5	1	5	0	25
M 2	Conduction	7	21	3	6	11	0	48
M 3	Conduction	5	2	1	1	9	14	32
M 4	Wernicke's	8	12	3	5	9	6	43
M 5	Broca's	1	8	0	4	9	15	37
M 6	Broca's	4	10	0	3	19	22	58
M 7	Broca's	0	2	0	2	11	20	35
M 8	Broca's	0	3	2	3	22	11	41
M 9	Global	0	2	0	5	12	10	29
M10	Global	0	3	0	6	4	16	29
M11	Global	0	1	0	4	8	19	32
M12	Global	0	4	0	0	9	17	30

Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Table-4.13 depicts that in the monolingual group, the Broca's and Wernicke's aphasics produced maximum number of paraphasias followed by conduction, global and anomics in the decreasing order of occurrence. Broca's aphasics produced maximum of neologisms and phonemic paraphasias followed by formal, unrelated and semantic paraphasias in the decreasing order of occurrence. Wernicke's aphasics produced more of formal paraphasias followed by phonemic, semantic, neologistic, unrelated and mixed paraphasias. The conduction aphasics exhibited formal

paraphasias the most followed by neologisms, phonemic, semantic, unrelated and mixed paraphasias in the decreasing hierarchy. Global aphasics showed more of neologisms followed by phonemic, unrelated and formal paraphasias in the decreasing order. The anomics performed better than all the other aphasic groups and showed maximum of semantic paraphasias followed by formal, mixed, phonemic paraphasias and least number of unrelated paraphasias.

Bilinguals

Table 4.14 shows the number of different paraphasias produced by the bilingual individuals with aphasia in all the three tasks of naming, repetition and picture description in Kannada language.

Table 4.14 : Total number of different paraphasias in Bilinguals: Kannada

Sl. No	Type of Aphasia	Type of paraphasias						Total
		Sem	Form	Mixed	Unrel	Phon	Neo	
B 1	Anomia	7	10	3	3	7	0	30
B 2	Anomia	7	2	0	0	9	0	18
B 3	Anomia	10	8	3	0	8	0	29
B 4	Anomia	15	5	0	0	4	0	24
B 5	Conduction	9	14	0	4	17	1	45
B 6	Wernicke’s	11	0	0	21	12	0	44
B 7	TCM	10	7	0	8	2	2	29
B 8	Broca’s	8	6	0	10	17	11	52
B 9	Broca’s	8	0	0	5	10	10	33
B10	Broca’s	0	0	0	0	17	12	29
B11	Broca’s	1	8	0	0	16	11	35
B12	Global	0	0	0	1	12	20	33

Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Table-4.14 illustrates the type of paraphasias produced by the bilingual group of aphasia. It was found that the conduction and Wernicke's aphasics produced maximum number of paraphasias followed by Broca's, global, trans-cortical motor and anomics in the lessening order. The conduction aphasics exhibited phonemic and formal paraphasias the most followed by semantic, unrelated paraphasias and neologisms in the descending hierarchy. Wernicke's aphasics produced more of unrelated paraphasias followed by phonemic and semantic paraphasias. Broca's aphasics produced maximum of neologisms and phonemic paraphasias followed by semantic, formal and unrelated paraphasias in the decreasing order of occurrence. Global aphasics showed more of neologisms followed by phonemic and unrelated paraphasias in the decreasing order. The trans-cortical motor aphasia exhibited more semantic paraphasias followed by unrelated and formal paraphasias and lowest number of phonemic paraphasias and neologisms. The anomics showed more of semantic paraphasias followed by phonemic, formal, mixed paraphasias and less number of unrelated paraphasias.

The performance of the bilingual aphasics differed in the two languages (L1 and L2). Table 4.14 shows the number of different paraphasias produced by the bilingual individuals with aphasia in all the three tasks of naming, repetition and picture description in English language (L2).

Table 4.15: Total number of different paraphasias in Bilinguals: English

S. No	Type of Aphasia	Type of paraphasias						Total
		Sem	Form	Mixed	Unrel	Phon	Neo	
B 1	Anomia	10	4	5	2	7	0	28
B 2	Anomia	8	7	0	6	0	0	21
B 3	Anomia	8	9	2	0	3	0	22
B 4	Anomia	9	4	1	4	3	3	24
B 5	Conduction	8	9	0	2	15	1	35
B 6	Wernicke's	13	10	2	17	4	0	46
B 7	TCM	8	3	5	4	3	0	23
B 8	Broca's	4	9	1	14	7	20	55
B 9	Broca's	7	8	0	19	8	21	63
B10	Broca's	0	3	3	2	17	22	47
B11	Broca's	1	2	0	9	11	15	38
B12	Global	0	0	0	2	12	16	30

Sem- semantic paraphasia, Form- formal paraphasia, Mixed- mixed paraphasia, Unrel- unrelated paraphasia, Phon- phonological paraphasia, Neo- neologisms

Table-4.15 depicts the type of paraphasias produced by the bilingual group of aphasia in L2. It was found that the Broca's and Wernicke's aphasics produced the highest number of paraphasias followed by conduction, global, trans-cortical motor and anomics in the decreasing order. Broca's aphasics produced maximum of neologisms and phonemic paraphasias followed by unrelated, formal, semantic and mixed paraphasias in the decreasing order of occurrence. Wernicke's aphasics produced more of unrelated paraphasias followed by semantic, formal, phonemic and mixed paraphasias. The conduction aphasics exhibited phonemic and formal paraphasias the most followed by semantic, unrelated paraphasias and neologisms in the descending hierarchy. Global aphasics showed more of neologisms followed by phonemic and unrelated paraphasias in the decreasing order. The trans-cortical motor aphasia exhibited more semantic paraphasias followed by mixed, unrelated and formal paraphasias and lowest number of phonemic paraphasias. The anomics showed

more of semantic paraphasias followed by formal, phonemic, mixed paraphasias and less number of unrelated paraphasias.

Thus, the results of the present study establish the fact that paraphasias exist in all the types of aphasia and across all the languages. The paraphasias can be similar or may vary in the different languages of a bilingual individual with aphasia. The types of paraphasias also varies across different language tasks namely, naming, repetition and picture description task among the various subtypes of aphasia. However, the generalization of the results would be difficult unless variables like severity of language impairment, large and equal sample size of all the subtypes of aphasia, the literacy level and the pre-morbid language proficiency of the different languages known by the bilingual aphasics etc are controlled and studied.

CHAPTER 5

DISCUSSION

The present study was conducted to compare the type of paraphasias in monolingual and bilingual individuals with aphasia. The types of paraphasias exhibited by the subgroups of aphasics have also been described. A comparison was also made across the two languages known by the bilingual aphasia group.

Comparison of monolingual and bilingual group

The results of the study revealed a better performance of the bilingual individuals with aphasia on all the three tasks studied namely, naming, repetition and picture description. Higher scores obtained by the bilingual participants throw light on the fact that the word retrieval ability required for naming and picture description task, and repetition abilities for the repetition task after stroke are better retained in individuals knowing two languages rather than one. This can be explained by the presence of two lexicons, one for each language i.e., dual representation of language in bilinguals which results in a better vocabulary. Baker (1993) stated that bilingual individuals, by knowing two or more words for one object, may possess an added cognitive flexibility. The present study also agrees with Bialystok (1991) who reported of enhanced metalinguistic abilities in bilinguals. Chengappa (2008) explained cognitive enhancement and flexibility in bilinguals which can also be related to their better performance on naming and repetition tasks in the current study.

Other factors which result in better spontaneous recovery shown by better performance of the bilinguals could be better occupation and high literacy levels of bilinguals which probably act as precipitating factors in the spontaneous recovery.

With reference to the paraphasias present in the various types of aphasias, semantic paraphasias were produced frequently by the anomics followed by conduction aphasics. The high frequency of semantic paraphasias in anomics is an index of word-finding difficulty (Kohn & Goodglass, 1985). This can be due to a breakdown in the semantic boundaries between meaning-related words that were pre-morbidly undoubtedly well-known by the anomics. The presence of semantic errors represents the deficit at the level of semantic retrieval (Gordon, 2007). Semantic paraphasias were also seen in trans-cortical motor and Broca's aphasics but less frequently than the fluent group.

Comparison across tasks

Across tasks, it was observed that the semantic paraphasias were more common in the naming and picture description task while being meagerly present in the repetition task. The current study supports the views of Li and Williams (1990) who explain that aphasics tend to exhibit significantly more indefinite terms, extended circumlocutions and perseverations in the naming conditions. These behaviors are verbal strategies to compensate for inability to produce the specific target word. These strategies are less employed during the repetition task which is more target bound.

In the repetition task, the participants of the study did not perform well as majority of the aphasics included in the study were either conduction or Wernicke's aphasics in the fluent group; Broca's or global aphasics in the non-fluent group. These varieties of aphasics have reported to have poor repetition abilities as their site of lesion resides in the perisylvian region of the dominant hemisphere which is the lesion for repetition deficits (Sarno, 1998). Geschwind (1965) attributed the repetition deficits of conduction aphasia to the anatomical disconnection between the Wernicke's and Broca's area.

Results of the study for the repetition task differed from the results stated by Gardner and Winner (1978) who reported that conduction aphasics make more meaning errors or verbal paraphasias. In the current study, the conduction aphasics in both monolingual and bilingual groups exhibited a large number of formal and phonemic paraphasias. The current study however supports the findings of Li and Williams (1990) who found phonemic attempts and revisions to be the most prominent in the repetition of conduction aphasics. The differences in findings across the two studies and the current study may be related to the type of repetition task used. Gardner and Winner (1978) used a single-word repetition task, Li and Williams (1990) used phrases and sentences, and the current study utilized single words, phrase and sentences for the task of repetition. Dubois et al. (1973) explained that the repetition deficits are within the realm of motor encoding or production processes. Repeating the sentences of increasing complexity tends to reveal the disorganized execution of the encoding program in the conduction aphasics. On the other hand, a

task requiring only a single-word response might not be sufficiently taxing to reveal this disorganization.

Kohn (1984) explained the errors made by the conduction aphasics in naming and repetition task to be the result of a deficit at the prearticulatory programming stage. This stage involved the selection and sequencing of phoneme targets into a form necessary for articulatory realization. The high prevalence of phonemic paraphasias in conduction aphasics seen in the current study supports Kohn's interpretation.

Predominance of phonemic paraphasias in conduction aphasia was also seen in the picture description task which is in accordance with the results of Kohn and Goodglass (1985). The anomic aphasics in both monolingual and bilingual groups produced more of formal paraphasias followed by phonemic, semantic paraphasias and circumlocutions in the picture description task. The monolingual person with Wernicke's aphasia showed predominantly formal, semantic and neologistic paraphasias in the decreasing order. However, in the bilingual person with Wernicke's aphasia, unrelated paraphasias were maximally present followed by phonemic and semantic paraphasias in the picture description task.

The results of the picture description task for the anomics is in accordance with Williams and Canter (1987) who reported delayed responses and extended circumlocutions in anomics. Williams and Canter (1987) also reported more neologisms in Wernicke's aphasia which supports the finding of the current study with reference to the monolingual individual with Wernicke's aphasia. However, the

paraphasias seen in the bilingual individual with Wernicke's aphasia disputes the results of William and Canter (1985).

Earlier findings by Gardner and Winner (1978) reported more meaning errors whereas, Li and Williams (1990) reported of more linguistic errors (unrelated words and jargon) in Wernicke's aphasics. However, in the current study, monolingual individuals with Wernicke's aphasia produced unrelated, formal and phonemic paraphasias in the repetition task. In contrast, the bilingual person with Wernicke's aphasia did show a reasonable percentage of semantic and mixed paraphasias along with unrelated, formal and phonemic paraphasias. These findings draw support from the interpretation of Goodglass and Kaplan (1983) who explained the deficient repetition skills of Wernicke's aphasics on the basis of their poor comprehension ability, resulting in a partial or complete distortion of auditory image. The disparity in the results of Wernicke's aphasics can be attributed to the small sample size in the present study and thus, the results of the present study cannot be generalized to the entire Wernicke's aphasic population.

The non-fluent individuals with aphasia in both monolingual and bilingual group exhibited phonemic paraphasias and neologisms predominantly in all the three tasks. A high incidence of phonological paraphasias is indicative of an underlying impairment in phonological encoding (Gordon, 2007). Formal paraphasias (real word related to target in sound) were also commonly seen in Broca's aphasia. This is in accordance with views of Lorwatanapongsa (2005). It is well known that the anterior type of patients with non-fluent speech appear to perform well on semantic tasks.

Mostly, anterior aphasics are able to retrieve the meaning of words they desire to name, but lack the ability to retrieve the phonological information of the word. So the deficits seen on a naming task are mostly errors in articulation which produces phonemic paraphasias. In comparing the present study with Gardner and Winner's 1978 study, similarities appear in the Broca's aphasic group. Gardner and Winner (1978) found a majority of sound errors, consisting of literal paraphasias, elaborations, simplifications and articulation errors, in their Broca's and mixed anterior aphasics. Li and Williams (1990) also reported of phonemic errors and omissions in Broca's aphasic group. The current study is in accordance with the findings of Gardner and Winner (1978) and Li and Williams (1990). Results of the current study revealed fewer phonemic errors in anomic aphasia which is in accordance with the findings of Williams and Canter (1982).

Another characteristic feature that was observed for non-fluent aphasics in the naming task was self correcting behaviors, as they were able to recognize their errors and struggled to retrieve the correct word. When offered with phonemic cues, they were most capable of producing the target word as compared to the fluent aphasic group. This finding is in accordance with the findings of Goodglass and Stuss (1979) who also reported that when cued phonemically after failure to name a picture, Broca's aphasics responded significantly more often than the other aphasic groups. Contrastively, the Wernicke's aphasics performed poorly on receiving phonemic cues. This could be attributed to the fact that the Wernicke's aphasics are poor at accessing the phonological information (Kohn & Goodglass, 1985).

With reference to the other responses obtained from the participants, it was observed that the individuals with trans-cortical motor and anomic aphasia exhibited a high number of circumlocutory responses, both in L1 and L2 for the picture description task. This finding draws support from a study by Kohn and Goodglass (1985) who also reported more multi-word circumlocutions in the subgroup of anomic aphasia. Jargon responses attained by the global aphasics in both monolingual and bilingual group could be due to severe impairment of both comprehension and expression of language.

It was also noted that the fluent monolinguals did produce a few code mixing errors as there is an increasing trend to borrow English words and use them in Kannada language by native Kannada speakers. The categorization of code mixing words particularly for bilinguals requires a caution and awareness from the clinician. This is because in the Indian scenario especially due to globalization, the number and frequency of usage of English words is becoming more common and is considered a matter of prestige also (Chengappa, 2008). However, these need to be studied further, in depth.

Across language comparison

Across language comparison revealed a significant difference in the performance of the fluent group. The fluent bilingual group produced more number of formal paraphasias in L2 which are real words related to the target in sound which suggests that the lexical activation was good and less disrupted in English. Contrastively,

phonemic paraphasias (non-words related to the target in sound) were prominent in L1 which implies that lexical activation was poorer in L1. These results are in accordance with Minkowski (1963) who explained various factors which contribute to better recovery of the second language in bilingual aphasics. Hegde and Bhat (2007) studied paraphasias in a multilingual conduction aphasia person. They reported phonemic errors in Kannada language which was more familiar to the conduction aphasic subject and neologisms and real word jargon in the less familiar languages (i.e., Hindi and English). In the current study, since the second language (i.e., English) was more familiar to the participants than their mother tongue, the findings of Hegde and Bhat (2007) get supported.

Inter task comparison revealed better performance of the fluent monolingual group in picture description task followed by repetition and naming task in the descending order. This clearly depicts that monolingual individuals with fluent aphasia retrieve names better in narrative context than in confrontation naming task. This pattern of performance draws support from the results of Williams and Canter (1982). In their study, the Wernicke's aphasics performed superior on naming in the context of picture description than in the confrontation naming task. The syntactical and semantic cues provided during the course of connected speech during picture description task and abstractness of the confrontation naming task were explained as the possible reasons for the performance of the Wernicke's aphasics. It was also seen that the fluent aphasics performed better on the repetition task than in the naming task. This throws light on the fact that that both visual and acoustic cue given in the

repetition task decreases the chance of an incorrect response as it is more target bound (Li & Williams, 1990).

However, the non-fluent monolingual group, unlike the fluent group, did not differ much in their performance on different kinds of tasks as their overall verbal output is less, leaving less room for various kinds of responses to occur. This finding is not in accordance with the findings of Williams and Canter (1982) who reported that the Broca's aphasics perform significantly better on confrontation naming task than in the picture description task as the context of connected speech is more taxing for the anterior aphasics. This is probably due to the fact that the subjects in the present study were quite severe while Williams and Canter (1982) could have studied moderate/mild category of Broca's aphasics. This needs to be further explored, however. With regard to syntactic and motor speech programming demands, a breakdown occurs in the retrieval or production of specific target words. The performance of the bilingual group was better in the repetition task followed by picture description and naming tasks. The high performance of the participants in the repetition task could be due to high semanticity and better familiarity.

Overall, the results of the current study draw support from literature in the type of paraphasias produced predominantly by the different subgroups of aphasia in both monolingual and bilingual population. The generalization of the results is however guarded as the number of subjects under each subgroup of aphasia was limited.

CHAPTER 6

SUMMARY AND CONCLUSIONS

The present study was undertaken to investigate and compare the type of paraphasias in monolingual and bilingual individuals with aphasia. Within the bilingual aphasia group, a comparison of the type of paraphasias present across the two languages i.e., the mother tongue (L1) and the second language (L2) was also studied.

A total of 24 individuals with aphasia (twelve monolinguals and twelve bilinguals) participated in the study. The participants were categorized according to the type of aphasia diagnosed using Western Aphasia Battery (WAB). The test material used to study the paraphasias in individuals with aphasia included naming, repetition and picture description task taken from the WAB. The responses obtained on all the three tasks from all the participants were audio recorded, transcribed and analyzed both statistically and descriptively to find out the difference in performance of both monolingual and bilingual individuals with aphasia. The responses of the participants were scored as either correct or incorrect. The incorrect responses were classified into the six paraphasias i.e., semantic, formal, mixed, unrelated, phonemic and neologism and five other responses namely perseverations, circumlocutions, code mixing errors, jargon and no response.

Results of the study revealed a difference in the type of paraphasias exhibited by the monolingual and bilingual individuals with aphasia. The key results of the study are summarized as follows:

- The bilingual individuals with aphasia performed better than the monolinguals across all the three tasks i.e., naming, repetition and picture description as the total percentage of correct responses were found to be greater in the bilingual participants. The results signify that the bilingual individuals tend to recover language abilities better after a brain insult than the monolingual individuals.
- In the naming and repetition task, the performance of the bilingual individuals with aphasia was found to be better in the second language (L2) than in their mother tongue (L1) indicative of a better recovery of the second language suggesting that latter was more familiar premorbidly. However, parallel deficits were observed in Kannada (L1) and English (L2) for bilingual individuals with aphasia in the picture description task.
- The type of paraphasias present in the participants differed across the three tasks for the fluent group. In the naming task, semantic and phonemic paraphasias were found to be predominant whereas, the repetition task elicited formal paraphasias maximally in both monolingual and bilingual participants.
- However, in the picture description task, the monolinguals and bilinguals found to differ in the kinds of paraphasias produced. In the monolingual group, formal and phonemic paraphasias were the most occurring paraphasias. Contrastively, a high incidence of semantic paraphasias occurred in the fluent bilingual group.

- Unlike the fluent aphasia group, the non-fluent individuals with aphasia in both monolingual and bilingual group exhibited phonemic paraphasias and neologisms maximally.
- The type of paraphasias produced by the participants differed across the languages in the bilingual group. The fluent aphasic group in the naming task showed more semantic paraphasias in both Kannada and English language; whereas, significantly more phonemic paraphasias in L1 and more formal paraphasias in L2 in the repetition task. The type of paraphasias found in the two languages did not differ much in the picture description task where the fluent group exhibited more of semantic, formal and phonemic paraphasias in both languages. The non-fluent group showed more evidence of neologisms and phonemic paraphasias in both the languages in all the three tasks.
- With reference to the paraphasias present in the various types of aphasias, semantic paraphasias were maximally present in anomics followed by conduction aphasia in the naming task. In the repetition task, a large number of phonemic paraphasias were obtained in the conduction aphasics. In the picture description task, anomics exhibited a high percentage of semantic paraphasias and Wernicke's aphasia presented with most number of semantic and unrelated paraphasias. Individuals with Broca's and global aphasia produced phonemic paraphasias and neologisms in all the three tasks.

To conclude, the influence of bilingualism was observed in the better performance of individuals with aphasia knowing two languages over monolingual individuals with aphasia. The type of paraphasias did not differ significantly between

the monolingual and bilingual individuals with aphasia in naming and repetition tasks. However, in the picture description task, monolinguals produced more formal and phonemic paraphasias and the bilinguals produced more of semantic paraphasias. Amongst the aphasic subgroups, anomic aphasics were found to produce more semantic paraphasias; conduction aphasics produced abundant phonemic paraphasias; Wernicke's aphasia presented with more number of semantic and unrelated paraphasias and Broca's and global aphasics exhibited a high incidence of phonemic and neologistic paraphasias. The bilingual individuals with aphasia performed better in L2 than in their mother tongue. Different types of paraphasias were observed in the two languages in the bilingual aphasics.

Thus, the results of the study show a lot of variation indicating that there could be several parameters interacting differently in each case. Specific pattern of paraphasias is precluded from emerging. The small number of sample may be accounting for this wide variation.

Implications of the study

The results of the study give an insight into the lexical storage of bilinguals, nature and differences in the type of paraphasias across monolingual and bilingual individuals with aphasia, and comparison of paraphasias across languages in bilingual individuals with aphasia. Several of these need to be further studied in depth. The present study however, would add on to the knowledge of language deficits in bilingual aphasics and would help the speech-language pathologists to design new

assessment and intervention techniques to cater to the language deficits in each of the bilingual aphasics more precisely.

Limitations of the study

- Limited number of aphasics under each subgroup of aphasia were studied.
- The age range (i.e., 30 to 80 years) of the participants considered for the present study was very wide. The participants divided into different age groups would have provided insight to study age related changes.
- Comparison of male and female participants have not been carried out due to unequal and small sample size.
- Factors like literacy level, socio-economic status were not controlled in the present study.
- The responses like code mixing, circumlocutions, perseverations were not studied in depth.

Suggestions for further research

- In order to study the variations in occurrence of paraphasias across different types of aphasia, larger samples under each subtype of aphasia in both monolingual and bilingual group may be taken up.
- Comparison of male and female gender for the type of paraphasias exhibited may be studied.

- Systematic study of bilingual individuals with aphasia knowing other Indian language pairs may be compared.
- Study of variables affecting production of paraphasias like severity of aphasia, the literacy level of the participants and pre-morbid language proficiency may be taken up.
- Study of variables affecting naming, repetition and picture description (such as word frequency, familiarity of objects) may be taken up.
- Comparison of performance of coordinate versus compound bilingual individuals with aphasia on different language tasks may be studied.
- Comparison between specific types of aphasia with normal healthy elderly individuals may be carried out to study age related language impairments.

Considering the Indian scenario where the majority of the urban population is either bi/multilingual, future research on the language aspects of bilingual individuals with aphasia would add to both theoretical and clinical implications.

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APPENDIX

Australian Second Language Proficiency Rating (ASLPR, Ingram, 1985)

S: 0 Zero Proficiency Unable to function in the language	L : 0 Zero Proficiency Unable to comprehend the spoken language	W: 0 Zero Proficiency Unable to function in the written language	R: 0 Zero Proficiency Unable to comprehend the written language
S: 0 + Initial Proficiency Able to operate only in a limited capacity within very predictable areas of need	L:0 + Initial Proficiency Able to comprehend only a very restricted range of simple utterances within the most predictable areas of need and only in face-to-face situation with people used to dealing with non-native speakers	W: 0 + Initial Proficiency Able to write clearly a limited number of words or short formulae pertinent to the most predictable areas of everyday needs	R: 0 + Initial Proficiency Able to read only a limited range of essential sight words and short simple sentences whose forms have been memorized in response to immediate needs
S:1-Elimentary Proficiency Able to satisfy basic survival needs and minimum courtesy requirements	L: 1-Elimentary Proficiency Able to comprehend readily only utterances which are thoroughly familiar or/are predictable within the areas of immediate survival needs	W: 1-Elimentary Proficiency Able to write with reasonable accuracy short words and brief familiar utterances	R: 1-Elimentary Proficiency Able to read short simple sentences and short instructions
S: 1- Minimum Survival Proficiency Able to satisfy basic survival needs and minimum courtesy requirements	L: 1- Minimum Survival Proficiency Able to comprehend enough to meet basic survival needs	W: 1- Minimum Survival Proficiency Able to satisfy basic survival needs	R: 1- Minimum Survival Proficiency Able to read personal and place names, street signs, office or shop designations, numbers, isolated words and phrases, and short sentences

S: 2- Minimum Social Proficiency Able to satisfy routine social demands and limited work requirements	L: 2- Minimum Social Proficiency Able to understand in routine social situations and limited work situations	W: 2- Minimum Social Proficiency Able to satisfy routine social demands and limited work requirements	R: 2- Minimum Social Proficiency Able to read simple prose, in a form equivalent to typescript or printing, on subjects within a familiar context
S: 3- Minimum Vocational Proficiency Able to speak language with sufficient structural accuracy and vocabulary to participate effectively in most formal and informal conversations on practical, social and vocational topics	L: 3- Minimum Vocational Proficiency Able to comprehend sufficiently readily to be able to participate effectively in most formal and informal conversations with native speakers on social topics and on those vocational topics relevant to own interests and experience	W: 3- Minimum Vocational Proficiency Able to write with sufficient accuracy in structures and spellings to meet all social needs and basic work needs	R: 3- Minimum Vocational Proficiency Able to read standard newspaper items addressed to the general reader, routine correspondence, reports and technical material in his special field, and other every day materials (e.g. best selling novels and similar recreational literature)
S: 4 Vocational Proficiency Able to use the language fluently and accurately on all levels normally pertinent to personal, social, academic or vocational needs	L: 4 Vocational Proficiency Can comprehend easily and accurately in all personal and social contexts and in all academic or vocational context relevant to own experience	W: 4 Vocational Proficiency Able to write fluently and accurately on all levels normally pertinent to personal, social, academic or vocational needs	R: 4 Vocational Proficiency Able to read all styles and forms of the language pertinent to personal, social, academic or vocational needs
S: 5 Native-like Proficiency Speaking proficiency equivalent to that of a native speaker of the same socio-cultural variety	L: 5 Native-like Proficiency Listening proficiency equivalent to that of a native speaker of the same socio-cultural variety	W: 5 Native-like Proficiency Written proficiency equivalent to that of a native speaker of the same socio-cultural variety	R: 5 Native-like Proficiency Reading proficiency equivalent to that of a native speaker of the same socio-cultural variety