PARAPHASIAS IN APHASIA: A REVIEW

Mandira Bhattacharjee

Register No: 10DCL001

An Independent Project Submitted in Part Fulfillment of

PG Diploma in Clinical Linguistics – SLP

University of Mysore,

Mysore.

ALL INDIA INSTITUTE OF SPEECH AND HEARING

MANASAGANGOTHRI

MYSORE – 570 006

MAY, 2011

CERTIFICATE

This is to certify that this independent project entitled ***"Paraphasias in Aphasia- A Review"*** is the bonafide work submitted in part fulfillment for the Post Graduate Diploma in Clinical Linguistics – SLP and of the student (Registration No. 10DCL001). 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.

Mysore

May, 2011

Prof. S.R Savithri

Director

All India Institute of Speech & Hearing

Manasagangothri, Mysore – 57006

CERTIFICATE

This is to certify that this independent project entitled "Paraphasias in Aphasia- A Review" has been prepared under my supervision and guidance. It is also certified that that this has not been submitted earlier in any other University for award of any Diploma or Degree.

Mysore

May, 2011

Dr. S.P. Goswami

Guide

Reader and Head

Department of Clinical Services

All India Institute of Speech & Hearing

Manasagangothri, Mysore – 570 006

DECLARATION

This is to certify that this Independent Project entitled ***"Paraphasias in Aphasia- A Review"*** is the result of my own study under the guidance of Dr. S.P. Goswami, Reader and Head, Department of Clinical Services, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier in any other University for the award of any Diploma or Degree.

Mysore, **Register No. 10DCL001**

May, 2011

An Acknowledgement

Firstly, would like to thank my maa, dad and my little brother for all their support, blessings and unconditional love.

My sincere gratitude to my guide, Dr.S.P.Goswami, Sir, thank you so much sir, for your invaluable guidance and patient support throughout the project.

I would like to remember Vijaylakshmi maam, under whose supervision we started our course and project. May you soul rest in peace maam….

I would like to thank Prof. S.R. Savithri, Director, AIISH, Mysore, for permitting me to carry out this independent project.

I acknowledge our course coordinator, Prof. Shyamala Chengappa for all her good wishes and the time she permitted us to help complete this project.

Archana maam, for her kind help and guidance…thank you so much maam.

Prashasti and Varsha (Gundu) for always had been there for me, through the thick and thin. Don't know what I would do without you…

Pooja, Shailaja and Natasha for making my stay in AIISH memorable and for the constant cups of tea and coffee, whenever asked for…

Rinni and Thulasi for being such amazing "classmates"…have enjoyed so much. Thulasi for your innocent weird questions!! and Rinni for being so patient with both of us...

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Definitions

The characteristic features of language abilities of aphasia are deficits in phonological, semantic, syntactic & pragmatic systems. During their attempt to produce a word, aphasics tend to substitute incorrect word for the intended or target words which are termed as paraphasia. (Davis, 1992)

Paraphasias are errors in speech consisting of unintended word or sound substitutions. (Hegde, 1994). Many experts consider paraphasia a central sign of aphasia.

Paraphasia was documented as early in 1800 where all the clinical forms of aphasia were recognized- complete motor aphasia, paraphasia, jargon aphasia, agraphia and alexia. (Benton & Joynt, 1960)

One of the earliest definitions of paraphasia was proposed by linguists, where they compared 'slip-of-tongue' act in normals; with paraphasic errors in persons with aphasia. Freud (1953) quoted, "The paraphasia observed in aphasic patients does not differ from the incorrect use and the distortion of words which can be observed in healthy person in state of fatigue or divided attention, or under the influence of disturbing effects" he also added "this does not exclude that they may occur in the most typical form as organic focal symptoms". He claimed that the sound errors in aphasia were to be characterized at the psychological or linguistic level rather than at the level of neuro anatomy or neurophysiology. Thus, providing the link between the study of 'slips-of-the-tongue' and phonemic paraphasia-that there is an intriguing similarity between neuro typical errors and the errors exhibited by persons with aphasia.

Goodglass and Kaplan (1983) defined paraphasia as “the production of unintended syllables, words, or phrases during the effort to speak”. Davis (1983, 1992) explained paraphasias as word substitution errors which are produced unintentionally, and persons with aphasia or brain damaged may be surprised upon hearing these mistakes themselves.

Boyle (1989) reported that the possibility of a person with aphasia saying “clock” when thinking about a “watch”, these word substitution errors are called as paraphasia. They are produced involuntarily and differ according to the linguistic relationship between the intended and the targeted word.

Collectively, the term “paraphasia” is applied to any unintended error of word or sound choice (Goodglass, 1993). Paraphasia is believed to be the product of a breakdown at a stage of the word retrieval process and is a dominant symptom within the category of anomia, where the substitutions are produced unintentionally.

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

As per the National Aphasia Association's report (2010), Paraphasia is one particular form of aphasia where the person suffering from the problem would start mixing up words. The result would be a jumbled incoherent speech which the listener would fail to understand.

On a summarizing note, paraphasia was believed to a manifestation seen in person with aphasia which was very similar to slip of tongue phenomenon in neuro-typical population. The linguistic and diagnostic significance was only understood by late 1980`s when the actual phenomenon of paraphasia was regarded as a very important diagnostic criteria in recognizing and rehabilitating persons with aphasia.

CHAPTER 2

Classification of Paraphasia

Paraphasia differ according to their relationships to the intended word, but identifying the target can be difficult in discourse. Context may help, but types of paraphasia are revealed best when a clinician already knows the required word, such as when the person with aphasia is naming objects or reading aloud. A tendency to produce one type of error in these restricted conditions may be basis for judgments about paraphasias in conversation.

Paraphasia 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 words 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, and paraphrase error and inadequate response). Paraphasic errors were also divided into lexical where a real word is substituted for another, or sub lexical where a non word is produced. (Dell, Schwartz, Martin, Saffron & Gagnon, 1997)

Paraphasia can be of different kinds and have specific site of lesion. Thus, there can be different types of paraphasias in different types of aphasia which can be considered as one of the differentiating features for differential diagnosis of aphasia. Goodglass (1993) described different kinds of paraphasia as:

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

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

Phonemic paraphasias (also literal paraphasia) sound like the correct word, sounds are substituted, added or rearranged. Goodglass and Kaplan`s (1983) criterion to recognize phonemic paraphasia is, more than half of correct word is preserved. The error may be a "dictionary word" from the persons with aphasia`s language (e.g., "pike" for "pipe") or a non word (e.g., "kipe" for "pipe") (Lecours & Vanier-Clement, 1976).

In phonemic paraphasia, Garrett (1984) proposed that a word meaning is accessed but in 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. 'canderpiller' for 'caterpillar' or 'flow man' for 'snow man'.

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

The paraphasia becomes assimilated to another real word when there is a word in the speaker`s language that is phonologically close to the target.

Neologistic paraphasia: It is the production of 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 discriminate whether any neologism took place for a particular intended word. These are spoken words which cannot be recognized as having come from the brain damaged language. E.g. “blogig” for “door”.

Neologism is most easily recognized when it does not bear a phonemic similarity to the correct word. A person with aphasia asks for “pinwad” or a “furbish”, someone may even call a comb a “planker” and even insist by spelling “p-l-a-n-k-e-r!” A neologism may strike as invention, but it is not produced with the intentionality of invention.

Lecours and Lhermitte (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 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 interpreted as a type of phonemic paraphasia. (Lecours and Lhermitte, 1983)

Martin and Saffran (1992) reported persons with fluent aphasia, in which confrontation naming was characterized by a majority of formal paraphasias (word utterances that are phonologically similar to the intended word). Martin and Saffran (1992) elucidated this phenomenon as resulting from a faster than 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 persons with aphasia in naming task. Gagnon, Schwartz, Martin, Dell, and Saffran (1997) collected formal paraphasias in nine fluent persons with aphasia in the context of a confrontation picture naming task. Results indicated that formal paraphasias arise through word substitution and are controlled by grammatical class and word frequency.

Morphemic verbal paraphasia:

It refers to the use of an appropriate word that has been assembled by using morphemes belonging to the language inventory (e.g., "writer" or "written" for "write"). 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's aphasia. (Liederman, Kohn, Wolf & Goodglass, 1983)

Semantic verbal paraphasia:

Designates a transformation seen in speech of persons with aphasia in which the desired and 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 anonyms (e.g. big/small); target word replaced by a super ordinate (e.g.; animal/lion), or an environmental proximity between the desired and substituted words (e.g. matches/cigarette).

Semantic paraphasia are real words but are similar to target in meaning, such as “chair” for “sofa”, “sister” for “wife”, or “see the odor” instead of “smell the odor”. A deficit at the level of semantic retrieval influences the occurrence of semantic error in aphasia (Gordon, 2007). There may be a breakdown in the semantic boundaries between meaning related words that were premorbidly clearly distinguished. For example, the response “it`s 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 distinguished from the use of one word circumlocutory comments that sometimes use to tell something about the meaning of a word that they cannot retrieve. For example, when asked to name picture of a cigarette, person with aphasia 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).

Unrelated verbal paraphasia:

Person with aphasia 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).

Where there is no apparent semantic relationship to correct word, the errors are called unrelated paraphasia (or random paraphasia). E.g., when a person with aphasia says “turnip” in a laundry room. (Davis, 1993)

Another kind of classification was provided by Dell, Martin, Saffran and Gagnon, 1997. They classified the error in a naming task and explained in two levels, lexical and sub-lexical.

Table 1. Classification of paraphasia. (Source: Dell, Martin, Saffran and Gagnon, 1997)

Levels	Paraphasia	Definition	Errors
Lexical	Semantic	Word related to target in meaning (not sound)	"Dog" for "cat"
	Formal	Word related to target in sound (not meaning)	"mat" for "cat"
	Mixed	Word with sound and meaning relationship	"rat" for "cat"
	Unrelated	Word with no apparent relation to the target	"log" for "cat"
Sub lexical	Phonemic	Non word related in sound	"lat" for "cat"
	Neologistic	Non word with a remote relation to target	"soth" for "cat"

Such labeling is important because it carries implication for whether the disorder is identified with phonological or semantic processes. One of Goodglass and Kaplan`s person with aphasia said "hike" and then "pike" on the way to saying "pipe", which seemed to be resolving phonological process. It will be difficult to label the error as phonemic or neologistic kind. (Davis, 1993). Some persons with aphasia might say "spork" for "fork" and "spoon", an error Eisenson (1973) called a neologism but one that Lecours and Vanier-Clement (1976) would have called a "phonemic telescoping". So, the ambiguity is perplexing, but clinician should rarely rely on single instances for making generalization about expression in person with aphasia. A paraphasia usually occurs with others and a tendency to produce one type of error may lead to a decision about the ambiguous ones.

CHAPTER 3

Paraphasias in aphasia

Paraphasias are common in aphasia and can help differentiate fluent from non-fluent subgroups of aphasia. Although phonemic substitutions do occur in non fluent aphasia (Blumstien, 1973), they appear in substrate of poorly articulated output and often represent dysarthric mis-production. 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.

Phonological errors occur very common in person with aphasia. Studies endorsing traditional, clinical classifications of aphasia have reported that it occurs in all major types of aphasia, Broca's, Wernicke's, and conduction, and with similar characteristics (Blumstein, 1973). Abnormalities of phonological processing are seen exclusively with the perisylvian disorders: Broca's aphasia, Conduction aphasia, Wernicke's aphasia and rare syndrome of pure word deafness.

Garrett (1982) suggested that the phonemic paraphasias arise due to deficits in the stage of processing of phonological representation at which the link between word meaning and word sound is utilized.

The hallmarks of phonological impairment in these disorders are impaired repetition and the presence of phoneme errors in spoken output (paraphasias) and written output (paragraphias) (Davis, 1992)

Speech in 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).

Phonemic paraphasic errors shown by non-fluent aphasia is closely related to the actual execution of speech sounds while phonemic paraphasias produced by fluent aphasia is due to inability to plan the sounds to form words and is thus not controlled by articulatory features. Compared to persons with other aphasia syndrome, persons with conduction aphasia produce a particularly high number of stably anchored phonemic paraphasia. High incidence of phonemic paraphasia is indicative of an underlying impairment in phonological encoding (Gordon, 2007).

In contrast, shifting and unstable phonemic paraphasia are more common in Wernicke's aphasia. The term "unstable" is used in the sense that partial sound match with the intended word may be detected in attempt, but disappears in the next. The clinical characteristics of these errors are as follows;

1. Multiple types of paraphasic errors can be observed in the same person with aphasia and can be classified either as partial or complete neologisms and verbal paraphasias.
2. Persons with aphasia who makes these paraphasic errors occasionally make multiple self-corrective attempts, with a possibility of presence of many erroneous utterances.
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. Person with aphasia are often unaware of uttering the correct word in a series of attempts.

In phonemic paraphasia, Garrett (1984) proposes that a word meaning is accessed through its phonological form. If 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. 'canderpiller' for 'caterpillar' or 'flow man' for 'snow man'.

Alajouanine and Lhermitte (1964) suggested that persons with Wernicke's type aphasia could be distinguished according to whether they produced principally phonemic paraphasia or semantic paraphasia, and that in each kind the specific paraphasic disorder in speech would be accompanied by a specific parallel deficit in comprehension.

In a study conducted by Alajouanine and Lhermitte (1964) there were only five persons with aphasia whose speech was characterized by semantic jargon, as opposed to 19 whose speech was characterized by phonemic jargon; but those with semantic jargon made proportionately three times as many errors on this semantic list of comprehension as did the others (18 percent error). Therefore it was proposed that there were two distinct functional systems, an auditory- phonatory system and a semantic integration system, which could be disturbed independently. The breakdown in semantic value which is characterized with semantic jargon in speech is therefore a reflection of a disturbance at a central level.

Buckinham & Kertesz (1976) defined neologism as a phonological form which is impossible to recover with any reasonable degree of certainty. It is not possible to identify the

target word which would explain the formation of the neologistic utterance but, it is almost possible to identify it`s grammatical category based on its position and inflections.

Neologisms are often obtained from Wernicke's aphasics during attempts at picture naming. They use these created words confidently, as if they were using correct words. (Lecours,Lhermitte & Bryan, 1983)

Gardner and Winner (1978) reported that person with conduction aphasia make more meaning errors or verbal paraphasias. Li and William (1990) found phonemic attempts and revisions to be more prominent in the repetition of conduction aphasias.

William 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 tasks. Studies on naming tasks have revealed high frequency of semantic paraphasia in anomics as an index of word finding difficulty (Kohn & Goodglass, 1985)

Shantala (1997) studied naming deficits in confrontational naming, responsive naming and generative naming task 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.

Table 2. Paraphasic features in different types of aphasias.

Aphasia	Paraphasic feature
Broca`s aphasia	Not a major diagnostic feature, but literature has reported of neologism and phonemic paraphasia (Shantala,1997) Semantic paraphasia observed in picture description task (William& Canter,1987)
Wernicke`s aphasia	Semantic and neologistic paraphasias are dominant (Alajouanine,1964;William & Canter,1987; Hegde,1994)
Transcortical motor aphasia	Few reports of paraphasia observed, mostly phonemic and semantic paraphasia (Benson &Ardila, 1996; Cimino-Knight,Hollingworth & Rothi,2005.
Transcortical sensory aphasia	Neologistic and semantic paraphasia are prevalent (Hegde,1994)
Conduction aphasia	Literal paraphasia are dominant (Hegde,1994; Sarno,1998) Some reports of semantic paraphasia are also found in their speech (Garder & Winner, 1978)
Anomic aphasia	Occasional paraphasias or word substitution, mainly formal paraphasias and semantic paraphasias were observed (Kohn & Goodglass, 1985,Nickels &Howard, 1995; Dell, Martin, Saffran & Gagnon, 1997).

CHAPTER 4

Models of paraphasia

Primarily, Paraphasic errors can be explained in two major levels, deficits at phonological and semantic level:

Deficits at phonological level: Nearly all individuals with aphasia produce phonological errors in their output. All types of phonological errors can be found across diagnostic categories of aphasia. The error patterns reflect disruption at different stages of speech production that may be associated with different aphasic syndromes. Person with Wernicke`s aphasia 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 person with Broca`s aphasia reflect primarily a phonetic disturbances (stage-3) (Li, 1996)

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 task. 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 similar semantic description (i.e., such as ‘camel’-‘horse’). (Li, 1996)

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 and back to lemma nodes for sometime until lexical selection is carried out. Phonological information can therefore influence the selection process

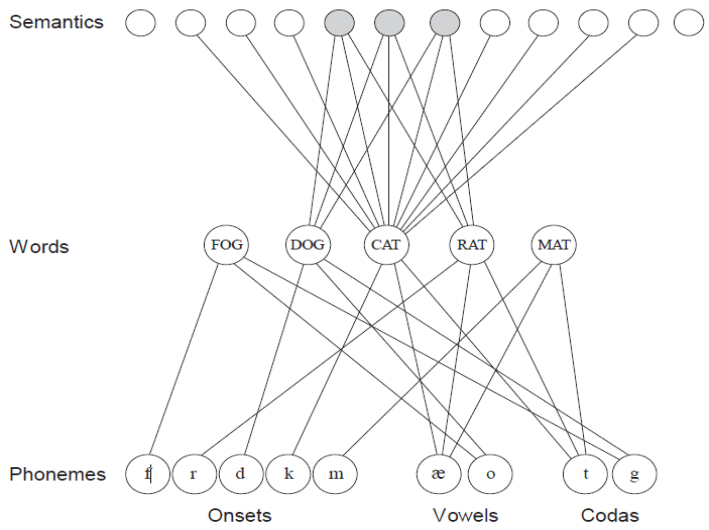

Fig. 1. Interactive Activation Model (Source: Dell, 1986)

Two step model:

One of the most detailed models of lexical access is discrete two step model of Levelt and co workers. (Levelt, 1989, 1999; Levelt, Roclofs & Meyers, 1999). The model conceives of lexicalization as consisting of two independent stages.

First stage as lemma access, a cohort of semantically related lemma is activated by conceptual information. In this model, lemmas are understood to be word nodes carrying syntactic information. Only one lemma is eventually selected which in turn activates it`s corresponding phonological word form.

During the second stage of lexical access the node assumes a strictly feed forward 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 it`s respective lemma has been selected.

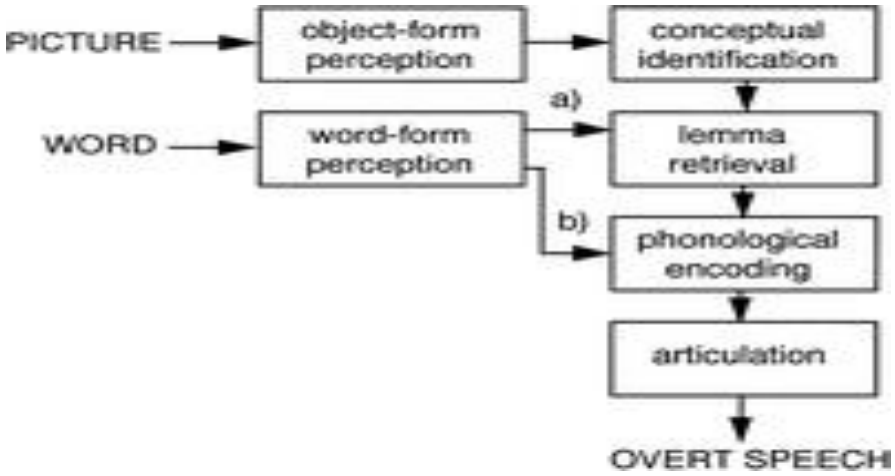

Fig. 2. Two step Model (Source: Levelt, 1989)

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 get selected.

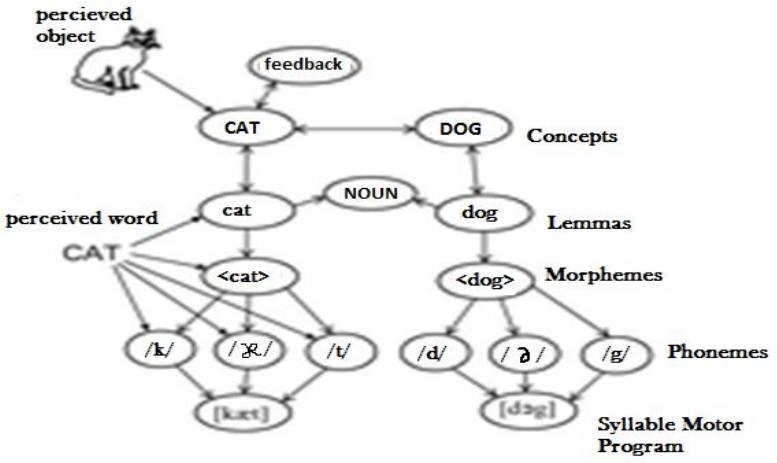

Fig. 3. Process of Cascading Model (Source: Morton & Patterson, 1980)

Kohn`s model:

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 words the phonological representations are initially accessed from lexicon and transmitted to working memory, which retains a trace of the representation while they are programmed for production at later stages. The representations are then converted into a sequence of phonological targets at the pre-articulatory programming stages. 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 word retrieval process; however, the remaining stages are applicable to repetition

CHAPTER 5

Paraphasia across tasks

Paraphasia in individual with aphasia has been researched upon extensively using different tasks and these tasks hold a very vital role in the assessment and identification of paraphasic utterances.

1. Naming (Goodglass & Kaplan,1976; Goodglass & Stress,1979; Goodglass,1981; Waykland &Taplin,1982; Kohn &Goodglass,1985; Martin &Saffran, 1992; Gagnon et. al, 1997),
2. Repetition (Gardner &Winner, 1978, Goodglass & Kaplan, 1983; Li & William, 1990) and
3. Picture description (Williams & Carter, 1982, 1987)

The naming tasks helps in finding 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 narrative context.

Studies on naming task:

The task of naming involves naming of common pictures or objects as soon as possible after the stimulus item is provided. It is a process of identifying the object i.e, deciding that it is a member of certain class and then finding it`s appropriate name (Lorwantanapongsa, 2005). For example: if 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, choices between these connections have to be made. In 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 (Lorwantanapongse, 2005)

Naming disturbances are probably seen the most in aphasia. It is present in almost all kind of aphasic disorders, including Broca's, Wernicke's, and trans-cortical motor and conduction aphasia. Goodglass and Kaplan (1976) examined naming abilities in person with aphasia and found that person with conduction aphasia and Broca's aphasia produce initial sound and correct number of syllables in words they cannot retrieve whereas, person with Wernicke's and anomic aphasia exhibit word finding difficulties which appears to be an "all or none process".

Goodglass (1981) reported phonemic paraphasias to be associated with persons with conduction aphasia, neologisms and unrelated errors to be predominant in persons with Wernicke's aphasia and circumlocutions to be associated more with anomic aphasia.

The anterior type of aphasia with non fluent speech appears to perform well on semantic tasks. Mostly, the person with aphasia knows the meaning of the desired word, and is able to recognize the errors. When making an error, the individual with aphasia tries to select the correct word but has inability to retrieve phonological information about the word or cannot articulate it. (Lorwatanapongsa, 2005).

The posterior type of persons with fluent aphasia who have fluent speech, exhibit naming difficulties due to interrupted semantic system, they usually try to produce a desired word but eventually fail, as a result of which "empty speech" is produced. Speech output of the person

with aphasia requires prompting, during which they often refuse cues and sometimes even refuse the correct word provided by the clinician (Lorwatanapongsa, 2005).

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 persons with Anomic aphasia (Caramazza & Berndt, 1978)

Confrontational naming is a complex process which involves several stages. In the first stage, the picture of the object is analyzed for its correct identification. This information is transmitted to the second semantic stage, where semantic representation is activated and then sent to the third stage, where the phonological representation corresponding to the semantic representation is retrieved, this is followed by motor programming stage, when the articulatory sequence activated is, 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 an 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) believed that naming impairment may be due to a range of possible processing deficits. The problem may be in:

1. Visual perceptual analysis, causing verbal agnosia.
2. Linking sensory and perceptual information with conceptual and semantic information.
3. Accessing the semantic representation of an appropriate lexical item.
4. Eliciting the phonological structure of an appropriate lexical item.

Depending on the underlying difficulty, naming errors can take the form of either semantic paraphasia, incorrect semantic categorization (which may be from related categories: for e.g. a camel may be called a horse) or substitution of a generic category more specific one (for example, a hippopotamus and a lobster may both be called animal, or all animal 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 leads to relatively pure anomia, in this situation, knowledge about words and phonological encoding of words are preserved, but the means for accessing these stores or connecting stored word information with the appropriate phonological code is defective (Hillis,2007).

Naming errors in persons with primary breakdown in phonological encoding of verbal concepts into speech sounds generally take the form of literal paraphasias (e.g. 'hotapitamus' for 'hippopotatmus') that nears the target item (Mendez, Clark, Shapiro & Cumming, 2003).

In Indian context:

Shantala (1997) studied naming deficits in three aphasic subgroups (Broca`s, Anomic and Conduction) and reported confrontation naming task indicated presence of neologisms and phonemic errors to be maximum in person with Broca`s aphasia; a high percentage of correct responses followed by a few semantic and phonemic errors were obtained by the persons with anomic and with conduction aphasia showed more of neologisms and gestural responses.

In bilingual context, Arpita (1997) studied on naming deficits in persons with Kannada-English bilingual aphasia (Broca`s, anomic and conduction) was evaluated in three different naming tasks (confrontation naming, responsive naming and generative naming). Results revealed

a) Similar 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).
b) Error analysis in L1 indicated that persons with Broca`s aphasia had maximum phonemic errors followed by neologisms and semantic errors.
c) Person with Anomic aphasia made maximum phonemic errors and semantic errors while persons with conduction aphasia made maximum of neologisms.
d) In L2 most common errors observed across the subgroup were no responses, neologisms and interferences

Ridhima (2009) studied the difference in the phenomenon of paraphasia in bilingual and monolingual group across three tasks (naming, repetitions and picture description task). She reported that bilingual individuals with aphasia (fluent group) in naming task showed more paraphasias (semantic and phonemic type) in comparison to other tasks.

On a summarizing note, with reference to paraphasia in various types of aphasics, semantic paraphasia was maximally present in individual with anomic aphasia followed by conduction aphasia in naming task. In repetition task, large number of phonemic paraphasias was obtained in persons with conduction aphasia. In picture description task, individual with anomia exhibited a high percentage of semantic paraphasia and persons with Wernicke’s aphasia

presented of semantic paraphasia. Individuals with Broca`s and Global aphasia produced phonemic paraphasias and neologisms in all three tasks.

Studies on repetition task:

Repetition of heard speech depends on intact input and output pathways and the ability to transfer information between these pathways. Difficulties in speech repetition occur due to impaired processing of incoming speech signals (such as word deafness) and impaired speech output.

A failure to repeat words or sentences is the 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 individual with aphasia, which actually dominates the clinical presentation of conduction aphasia largely because other prominent errors are lacking.

Geschwind (1965) recognized the repetition deficits as an anatomical disconnection between the Wernicke's and Broca's area. Warrington (1971, 1972) proposed that, the repetition problem arises due to a disruption in the auditory short term memory. Dubios, Haecan, Angetergue, Chatelier, and Marrie (1973) reported that a general deficits in phonemic or motor encoding results in repetition difficulties. According to Sarno, (1998) the lesion for repetition resides firmly in the perisylvian region of dominant hemisphere. Repetition defects are notably absent in the Transcortical aphasias and in anomic aphasias, whose correlated lesion is located outside the perisylvian ring.

In repetition task, sound errors are more by person with Broca's and mixed anterior aphasia whereas, meaning errors are more prominent in person with conduction aphasia.(Gardner and Winner ,1978)

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 of their repetition behaviors. Results revealed

a) Greater number of phonemic attempt and word revisions, word and phrase repetitions in conduction aphasia
b) More phonemic errors and omission errors in individual with Broca's aphasia, and
c) Unrelated words and jargon in Wernicke's aphasia

In Indian context:

In bilingual context, a study done by Chengappa, Bhatt and Damle (2003) investigated paraphasias on selected repetition in a multilingual individual with Wernicke's aphasia (English, Tamil, Kannada and Hindi). Results depicted a better performance in English which was the most familiar, frequently used language which included limited semantic and phonemic paraphasias compared to other languages.

Other languages only neologisms were present. As English was used more frequently before the brain insult, it was inferred that lexical activation of that language was strong and less disrupted compared to other languages which were not frequently used premorbidly.

Hegde and Bhatt (2007) investigated the effect of multilingual exposure in a person with conduction (English, Hindi, Kannada and Tulu). Results showed that the

a) Most frequently used language i.e. Kannada showed more phonemic errors, semantic paraphasias and unrelated words
b) Neologisms were seen only in English

c) Real word jargon, neologistic jargon and inadequate response were highest in Hindi;

d) Word revision and phonemic errors were observed in Tulu.

Results indicated better lexical and semantic access in Kannada followed by Tulu language. These studies on bilingual aphasia are in concurrence with "Pitre`s law" which states a better recovery of the most familiar language.

Studies on picture description task:

Naming errors can be correctly assessed in a picture description task and has been researched upon by several authors. William and Canter (1982) compared performance of person with aphasia on confrontation naming and picture description task. Correlation between scores on confrontation naming and picture description task were high on individuals with conduction and Broca`s aphasia, moderately high for the individual with Wernicke`s aphasia, and lowest for anomics. When absolute difference between scores on the two tasks were calculated, the greatest difference was found for persons with anomic aphasia followed by Wernicke's, Broca`s and conduction aphasia.

William and Canter (1987) also compared the performance of person with Wernicke's, conduction and anomic aphasia on confrontational naming task and picture description task for action verbs. On correlating the performance of the person with aphasia on the two tasks, a high correlation was obtained for the individuals with Wernicke`s aphasia; moderate correlation for Broca's and the lowest correlation was obtained for anomic individuals. Analyzing the pattern of errors in person with aphasia, it was found that:

a) Anomic produced more neologisms and

b) The Broca's produced significantly more phonemic errors and semantic- phonemic errors on picture description task.

Ridhima (2009) reported formal and phonemic paraphasias were the most occurring in monolingual individuals with aphasia whereas high incidence of semantic paraphasias occurred in the fluent bilingual group. The non fluent individuals with aphasia in both monolingual and bilingual group exhibited phonemic paraphasias and neologisms maximally in a picture description task.

Summarizing,

a) Studies in naming tasks have revealed high frequency of semantic paraphasia in anomics as an index of word finding difficulty. (Kohn & Goodglass, 1985).
b) Li & William (1990) reported that individuals with aphasia tend to exhibit significantly more indefinite terms, extended circumlocutions and perseverations in the naming conditions.
c) Nickels & Howard (1995) & Gagnon et al (1997) reported of presence of formal paraphasias in individuals with aphasia in naming task.
d) Gardener & Winner (1978) reported that individuals with conduction aphasia make more meaning errors or verbal paraphasias.
e) Li & William (1990) found phonemic attempts & revisions to be more prominent in the repetition of individuals with conduction aphasia.
f) Studies on picture description tasks, found that individuals with Broca's aphasia performed better when naming objects on confrontational naming task than on picture description task, whereas reverse trend was seen in individuals with Wernicke's aphasia (William & Canter,1982)

g) William & Canter (1987) found that anomics produced more of delayed responses & extended circumlocutions; Wernicke's produced more neologisms and the Broca`s produced significantly more phonemic errors on picture description task.

h) Indian scenario very limited study of types of paraphasias across various subgroups of aphasia. Shantala (1997) studied naming deficits in confrontational naming, responsive naming and generative naming task and reported of neologisms and phonetic errors in individuals with Broca's aphasia; semantic and phonemic errors in the individuals with anomics and conduction aphasia exhibited neologisms and gestural responses

CHAPTER 6

Linguistic analysis of Paraphasia

Crystal's (1987) classification of slips may be used as a guideline to consider the various types of phonemic error in person with aphasia.

1. *Initial consonant anticipated*

Quite often individuals with aphasia miss the order of an onset segment from a syllable in the sentence or phrase to be produced. For example, the error 'lelephone', for 'telephone' produced by a person with conduction aphasia shows the onset /l/ being anticipated to the front of the word by substituting for the /t/. It can be noted that the /1/ remained in its original target position. Many 'doublet' errors are created in this fashion (Buckingham, 1990).

2. *Initial consonant perseverated*

This type of ordering error is in a sense, the reverse of initial consonant anticipated. Onset consonant is produced in its initial occurrence correctly, but is incorrectly copied then and either creates a new onset consonant filling or substitutes for some target segment. An example from a person with conduction aphasia of this would be the form 'gingergead' produced for 'gingerbread', where the affricate initial onset was erroneously recopied, in this case substituting for the onset cluster /br-/.

3. *Consonant reversals*

These types of errors are often referred to as 'exchange' errors (Garrett ,1984). The errors are usually mis-ordering errors (left-to-right or right-to-left ordering errors). These errors are very rarely observed in individual with aphasia.

4. *Coda consonant misordering*

As Coda consonants are more tightly affixed to the vowel of the syllable so they follow a rime mode. When codas are misordered either from left-to-right or from right-to-left, the vowel too moves, producing an error. An example of a right-to-left copy would be "Joe" produced as "jawg" in a sentence "Joe took his dog" and a left-to-right error would be "Dan han" while producing the sentence "Dan hates milk"

5. *Consonant deletion*

This is one of the most typical phonemic paraphasias observed (Beland, Caplan & Nespoulous, 1990). Blumstein (1973) found that there was an error hierarchy that was the same for person with Broca's aphasia, Conduction aphasia, and Wernicke's aphasia, and that deletion (mostly of consonants) was the second most numerous category of error for all aphasic types.

Several significant features of consonantal deletion in person with conduction aphasia are revealed by the error analysis presented by Beland(1990). In his aphasic nominee, consonants were deleted from consonant-consonant environments and never in vowel-consonant-vowel environments.

Blumstein (1978) has also observed that it is significantly more likely that the second consonant of a consonant-consonant-vowel sequence will be deleted in paraphasic errors, the phonemic paraphasias of aphasic can be explained through the principles of syllable structure and of sonority.

6. *Consonant additions*

Consonantal epenthesis is also observed in the phonemic paraphasias in individuals with aphasia. Consonantal additions quite often are produced between adjacent rimes (i.e. intervocalic), and they rarely occur in consonant-consonant structures. Buckingham (1990) has noted a paraphasic error such as ‘papple’ for ‘apple’. The aphasic error tends to focus on reducing syllable complexity.

7. *Consonant movement*

Crystal’s examples of slips were, left-to-right, ‘pinch hit’ going to ‘pitch hint’, and ‘bacon and eggs’ going to ‘acon and heggs’, in one case, a coda consonant moving to another coda and an onset consonant moving to another onset slot.

8. *Consonant clusters*

Here, full clusters may substitute for singleton consonants as well or may exchange with them; exchanges being more numerous in slips than in paraphasias. When a person with conduction aphasia (Buckingham, 1986) repeats ‘airplane’ as ‘plclirplane’, he is demonstrating that a full cluster can be anticipated.

9. *Consonant clusters divided*

The individuals with conduction aphasia produced ‘piairplane’ for ‘airplane’, produced ‘plairpune’ a moment later. Here, cluster splitting is seen, it is also seen that the error happens in a predictable direction.

A consonant-vowel (CV) where the consonant (C) is an oral stop is more preferred on the principle of sonority than a CV where the C is a /l/ (Since the /l/ is more sonorous than the /p).

Kohn and Smith (1990) provide several examples from an individual with conduction aphasia, where, for instance, ‘green book’ repeated as ‘green rook’, where only the /r/ moved from left-to-right.

10. Vowels

Although vowels will be substituted for other vowels, moved, deleted, and added to certain types of environments, they tend to resist error more than consonants. For example, in the word ‘telephone’ an individual with aphasia attempts (Buckingham, 1987) on reading this word, for instance, as: ‘pelepone’, ‘felefone’, ‘felepone’, ‘lelephone’. It is seen that only the vocalic structure together with the final rime /own/ resisted paraphasia, the first three consonants were the most subject to paraphasic disruption.

11. Single features

The single feature error is hard to pin down. The errors like: “smell hothrr” for “spell mother”, where the error segment cannot be explained in a phonetic environment. It mainly deals with deletion, addition, or linear movement of some form or another.

12. Errors within words.

The syllable position constraint conditions movements such that onsets move to onset positions and codas move to coda positions, the instance where this constraint is disobeyed paraphasia is observed. For instance, “Soldat” spoken as “loldat” and “Text” said as “kest”. Many individuals with aphasia produce coda movements to the onset slot within the same syllable: “half” to “falf”; “after” to “fafter”, giving rise to phonemic paraphasias.

CHAPTER 7

Points to ponder for the identification of Paraphasia

a) When a person with aphasia elaborates the target word in an attempt to name it, it is not paraphasia but circumlocution. For example, referring to a pen as “blue long stick” or “write on paper”.

b) The phonemic substitution errors seen in dysarthric person cannot be labeled as paraphasias, as the problem is more at motor level. Whereas, paraphasias observed in person with aphasia, the problem lies more in processing and selection from the phonological lexicon.

c) When a person with aphasia has a stereotypic response or a stuck in type of response for a pool of questions, this phenomenon is perseveration and not paraphasia. For example; clinician: what is your name?

    Client: “apple”,

    Clinician: where did u come from?

    Client: “apple”

d) Paraphasias are primarily substitution errors either at the level of semantics or phonology.

e) Lecours and Lhermitte (1969, 1972): they observed person with aphasia producing phonemic paraphasia and suggested that phonemic paraphasia can be identified in terms of nine basic rules:

1. Deletion of a unit figuring only once in stimulus.
2. Deletion of the first of two identical units in the stimulus.
3. Deletion of the second of two identical units in the stimulus.
4. Addition of a unit which is not in the stimulus.
5. Addition of reduplication of a unit in the stimulus by anticipation.
6. Addition of reduplication of a unit in the stimulus by reiteration.
7. Change of position of unit in the stimulus by preposition.
8. Change of position of a unit in the stimulus by postposition.
9. Change in position of a unit in the stimulus when it is not possible to specify which of pre-post position has occurred

CHAPTER 8

Therapy techniques for Paraphasia

Remediation of paraphasic errors in person with aphasia is done mainly through taping the naming difficulties (Li, 1996). Various hierarchies of cues and prompts are used to focus on the semantic and the phonemic based errors.

Cueing hierarchies:

Pease and Goodglass (1978) investigated effectiveness of six types of cues:

a) The initial sound
b) Super-ordinate category
c) Environmental context or location
d) Rhyming word
e) Statement of function
f) Sentence completion

Among these, the initial sound or phonemic cue yielded for maximum response, followed by sentence completion.

Stimley and Noll (1991) suggested that phonemic cueing help the semantic system to activate the appropriate phonological word forms.

Li and Canter (1983, 1987) found that persons with Broca`s aphasia were most responsive to phonemic cueing followed by conduction, anomic and then Wernicke's aphasia. Li and William (1990) reported that semantic cues were more useful in abstract verb-naming, in which the individuals with aphasia frequently lack the necessary semantic components for word retrieval.

Linebaugh (1990) and Linebaugh and Lehner (1977) provided a sample of hierarchy of cues:

Picture

Picture +gesture

Picture +sentence completion

Picture+ sentence completion + phonemic cues

Picture+ "say _____ "

Semantic facilitation procedure:

Howard, Patterson, Franklin, Orchaed-Lisle and Morton (1985) reported that tasks that require access to semantic representations work much better on persons with aphasia, compared to techniques that focus on phonologic forms. The effect of semantic therapy persists longer than phonologic therapy. Semantic tasks included printed and auditory word to picture matching, sorting words and pictures by semantic category, and making semantic judgments.

Remediation of semantic naming deficits:

Individuals with deficits at semantic level are likely to exhibit semantic paraphasias and errors on semantic comprehension tasks. Howard et.al, (1985) provided a process to correct semantic naming deficits, which are:

a) *Picture categorization*: The individuals with aphasia are asked to separate semantic cards according to their semantic categories (e.g. animal-cat,dog,elephant and fruits-apple,banana,orange).

b) *Picture association*: The individual with aphasia is encouraged to choose two or three pictures from a pool of pictures which is associated with the target, For example, cow (target word) associated words are domestic, animal, milk etc. The complexity of the task can be increased through including distracter items.

c) *Semantic judgments*: The person can answer yes/no questions. To access the semantic information available in the person when unable to name the target word. For example, a person with aphasia who cannot name cow could be asked "does cow gives milk?"

d) *Lexical focus*: Lexical focus therapy may be useful for the individuals who have difficulty in retrieving a specific lexical entry from its semantic field (Linerbaugh ,1990) Here, firstly broad subordinate category is presented and the individual with aphasia is expected to generate as many items as possible in the category and then gradually narrower categories are taken. For example, the first order category could consist of

animals and vegetables, the second order of animals, and third orders of domestic animals. Here, cueing strategies are required for elicitation of the desired word too.

e) *Written tasks*: Hillis (1989) used written naming tasks to target a semantic system deficit in an individual with aphasia. When a semantic paraphasia was produced, the target word was illustrated, and complementary features between the target and the person`s erroneous response were discussed. For example, the perceptual differences (color, shape, taste) of two items were compared.

Semantic feature analysis treatment (SFA):

Confrontation naming is worked upon with semantic feature analysis (SFA) treatment (Boyle & Coelho, 1995; Coelho, McHugh & Boyle, 2000). During SFA treatment, the person is guided to produce words that are semantically related to the target word (i.e., semantic features). Theoretically, this activation of the features in the semantic network spreads to strongly associated concepts. SFA treatment guides the individual with aphasia to activate the most distinguishing features for a target concept, so that it has a higher level of activation than do similar concepts. According to the spreading activation theory, the lexical concept with the highest activation is the one selected. The selected concept, in turn, activates the phonologic information necessary to produce the target word (Collins & Loftus, 1975; Dell & O'Seaghdha, 1992; Levelt, Roelofs, & Meyer, 1999).

Remediation for phonologic naming deficits:

In comparison to semantic system deficits, the person with phonologic lexicon problems exhibits good recognition of the target word. So naming errors majorly comprises of phonemic paraphasias (e.g., sife/knife) and circumlocutions (e.g., you cut it with it/knife). The problem here may lie in using the input from the semantic lexicon to those in the phonological lexicon.

Lessner (1989) believes targeting retrieval of lower frequency words (i.e. the words which are frequently misnamed by the person with aphasia) that are most used in the daily activities of the person with aphasia. This could improve the access to phonologic lexicon. Some recommended procedures are:

a) *Determination of word pool*: The diagnostic profiling provides information on individual words that are difficult to retrieve in various contexts (e.g., confrontation naming, spontaneous speech, sentence completion). From this pool, lower frequency words that are useful to the person with aphasia can be selected for the therapy. It is likely that these words will be frequently misnamed by the person.
b) *Procedures to improve phonologic access*: Rosenbek, La Pointe, and Wertz (1989) believe that therapy procedures can be based on person`s existing behaviors. For example, the person who uses sentence descriptions or completion will encourage performing these behaviors more effectively. These behaviors can gradually be narrowed down to the target words. Later, as the person learns to self-cue, analyze and revise errors, therapy moves from the clinician to person with aphasia controlled activities.

c) *Incorporation of prompts*: Howard et al. (1985) reported that phonologic prompts alone cannot produce lasting effect on therapy, is important to incorporate both semantic and phonologic information. The linkage between semantic and phonologic systems has to be facilitated. In cueing hierarchy, the task can begin with descriptions of target word function or super ordinate category and progressively add phonologic information on word shape.

Oral reading tasks:

Joanette, Keller, and Lecours (1980) have shown that persons with conduction aphasia improved on word productions during oral reading tasks, the extent of paraphasias also reduced when visual stimulus provided as constant external reinforcement of target and allowed the individuals to access their visual-verbal system, which is assumed to be better or more intact than their auditory verbal system, with which the individuals were able to improve their monitoring ability.

Here the more intact system was advocated to improve performance of the impaired system. The use of intersystematic re-organization to treat neurogenic speech and language symptoms has been recommended by LaPointe (1978), Luria (1970) and Rosenbek (1976).

CHAPTER 9

Conclusion

Paraphasias are the most sticking feature in aphasia, as they vary across the different aphasic syndrome. Paraphasia was believed to be a manifestation seen in person with aphasia which was very similar to slip of tongue phenomenon in neuro-typical population. The linguistic and diagnostic significance was only understood by late 1980`s. Paraphasias are explained as speech consisting of unintended word or sound substitutions (Hegde, 1994). They are pure processing deficits either in the semantic or phonological level or in the association between the levels.

Paraphasias have been classified by various authors on basis of localization values and error structures (Goodglass, 1993) or according to the word structures and the erroneous forms (Lecours, 1983, Dell, Martin, Saffran and Gagnon, 1997) but, it was commonly found that, each of the subcategories highlighted the different kind of paraphasias across the aphasic syndromes. Thus, the classification added a diagnostic marker on the identification of the type of aphasia. It was found that person with Broca`s, Wernicke`s, Conduction and anomic aphasia exhibited paraphasias majorly.

With the help of various tasks such naming, repetition and picture description task the differential diagnosis across the type of aphasia was studied upon and it was found that Phonemic paraphasias were the most dominant in Broca`s and conduction aphasics, sometimes associated with neologism, as seen the errors are purely at the sub-lexical level (Dell et.al, 1997). In case of Wernicke's aphasia semantic type of paraphasias were dominant, thus, the errors were more confined to the lexical level (Dell et.al, 1997). A shifting and instable kind of literal paraphasias are observed in individuals with Wernicke's aphasia. Most of the erroneous

utterances in anomic aphasia were considered as circumlocutions but later there was a demarcation made and the term as formal paraphasias were used when real word substitution was done. The processing, the physiology and the strategy used by the person with aphasia across tasks (naming, repetition and picture description) show that paraphasias across the aphasic syndromes are different.

With the reference to person with bilingual aphasia, it is observed that, paraphasia does act as a very important tool to establish which of the language is preserved more. Chengappa, Bhatt and Damle (2003) investigated paraphasias on selected repetition on multilingual individuals with Wernicke's aphasia (English, Tamil, Kannada and Hindi). Results depicted a better performance in English which was the most familiar frequently used language and which included fewer paraphasias than other languages. As English was used more frequently before the brain insult, it was inferred that lexical activation of that language was strong and less disrupted compared to other languages which were not frequently used premorbidly. So, paraphasias are not only an important diagnostic marker but also plays a very vital role in planning a rehabilitation program for persons with aphasia. Thus, more studies on multilingual and in Indian context are anticipated with neurological and pathological explanations, which would make the phenomenon of paraphasia much clearer and distinct as it is an important diagnostic marker and of therapeutic significance.

Thus, it can be concluded that paraphasias are not only identified as diagnostic indicator but also as important features in the management of persons with aphasia .There have been reports in the literature where paraphasia has been assessed considering different tasks. Researchers have also attempted to associate type of aphasia with the site of lesion which is vital in the differential diagnosis of aphasia.

CHAPTER 10

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