Treatment Manual for Persons with Anomic Aphasia

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Abstract

Anomia is synonymously described using several terms like naming impairments, word finding problems, word-recall deficits, and word-retrieval difficulties. In one usage, the term is synonymous with naming disorder which means in a broader sense all aphasic patients are anomic. There have been investigations and assessments attempted to classify them into different types based on their homogeneity of features in the heterogeneous aphasia group. Hence, a treatment procedure which attempts to cater to these difficulties in different types of anomia is essential. Based on the available cognitive neuropsychological models that recognize and explain the mechanism of naming in retrieval as well as production, management procedures were developed for the treatment of anomia. Four subjects with aphasia (all males) following a language-dominant hemisphere stroke with an age range of 47-72 years participated in the present study. The target stimuli and the test stimuli to be used during therapy sessions were developed with the help of two experienced Speech-Language Pathologists. The potential categories selected were nouns and verbs under the category of daily objects, fruits, colors and body parts. The treatment techniques that benefitted most subjects with aphasia were the cueing hierarchy technique and the semantic treatment technique. However, the efficacies of these techniques over the other techniques are required to be investigated on a larger population with anomia. Hence, the present study was only a preliminary investigation of the treatment techniques for anomia.

Key words: anomia, treatment, aphasia, semantics, cueing

Anomia has been found to be one of the most common problems in patients with aphasia who often have a variety of language formation problems (Raymer & Ellsworth, 2002). Anomia is synonymously described using several terms like naming impairments, word finding problems, word-recall deficits, and word-retrieval difficulties. In one usage, the term is synonymous with naming disorder which means in a broader sense all aphasic patients are anomic. Schuell, Jenkins and Carroll (1962) found anomia to be the most prevalent general factor in aphasic disorders, and naming difficulties have been found to be the most permanent residual deficit in chronic aphasics. In another of a word-finding disorder (e.g., decreased performance on a confrontation naming task), anomia is not considered of a localizing value (Benson & Geschwind, 1985).

Anomia has also been synonymously used as anomic aphasia (Kertesz, 1982; Goodglass & Kaplan, 1983; Benson & Geschwind, 1985), nominal aphasia (Head, 1926), or amnesic aphasia (Luria, 1976). Naming difficulties often called anomia are present in all aphasics but the term anomia is also used to refer to a particular aphasia syndrome (anomic aphasia). Naming difficulties can result from a deficit at different stages of the naming process; perception (decoding), storage, selection, retrieval, or actual production of the word (encoding) (Barton, Maruszewski & Urrea, 1969; Benson, 1979). Severity of anomia can range from mild to severe, including difficulty remembering a person's own

name. Severity of anomia also depends upon the extent of lesion and site of lesion. Damage to left inferior temporal cortex has been associated with naming deficits resulting either from impaired access to phonological word forms (pure anomia) or from degraded semantic knowledge (semantic anomia). Anomia has been classified in various ways (e.g., Weinstein & Keller, 1963; Geschwind, 1967; Brown, 1972; Benson, 1979; Kremin, 1988). All the schemes are based on clinical distinctions between subtypes of naming disorders.

Aphasia therapy has always been a challenging task for the Speech–Language Pathologists (SLPs). Aphasia as a disorder itself is not homogenous or unitary due to its varied nature in terms of characteristic features and severity. There have been investigations and assessments attempted to classify anomia into different types based on their homogeneity of features in the heterogeneous aphasia group. Hence, a treatment procedure which attempts to cater to these difficulties in different types of anomia is essential. Based on the available cognitive neuropsychological models that recognize and explain the mechanism of naming in retrieval as well as production, management procedures will be designed for the treatment of anomia. The treatment manual was prepared to be used systematically so that they may encourage an evidence based practice in the treatment of anomia. This would help the clinicians to select the technique appropriate to the type of anomia that they encounter in the clinic. There are various treatment techniques available to treat individuals with anomic aphasia. For example, the Helm elicited language program for syntax stimulation (Helm-Estrabrooks & Ramsburger, 1986)

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which target the sentence types in syntax. Likewise some therapy procedures believe in stimulation for the overall facilitation of the language, for example, LOT- Language Oriented Treatment by Bandur & Shewan (2001). Some of the techniques selected for the present study was from a thorough review of literature which included Cueing Hierarchy (CH), Facilitation Therapy (FT), Circumlocution Induced Naming (CIN), Semantic Treatment (ST), and Space Retrieval therapy (SR).

The aim of the present study was to develop a treatment manual for the treatment of anomic aphasia. The study also attempted to explore the possible techniques that would benefit different types of anomic aphasia.

Method

Participants: Four subjects with aphasia (all males) following a language-dominant hemisphere stroke with an age range of 47-72 years participated in the present study. The demographic details of the participants are given in Table 1. All the participants selected for the present study were enrolled for speech-language therapy at the Institute. All participants provided written informed consent to participate in this study. The participants were assigned letter names as A1, A2, A3 and A4 for confidentiality and the data were analyzed and reported accordingly. The onset of aphasia for all participants was at least 6 months prior to inclusion in the study. All of the participants had attended individualized speech-language therapy program post-stroke. All participants were initially administered the Western Aphasia Battery (WAB; Kertesz, 1982) and they presented with severe naming problems or anomia during the time of testing.

Development of stimuli: The target stimuli and the test stimuli to be used during therapy sessions were developed with the help of two experienced SLPs. The potential categories selected were nouns and verbs under the category of daily objects, fruits, colors and body parts. A total of sixty stimuli were prepared to be used for the treatment purposes. These stimuli material were selected from the list of pictures from the UNICEF picture cards (Karanth, Manjula, Geetha & Prema, 1999). A picture (5 × 7 inches) representing each stimulus was made in such a way that each picture card had one stimuli on the card. The stimuli selected were subjected for

familiarity, frequency and imageability. Stimuli which were rated by two SLPs as highly familiar, high frequent and imageable were selected for the therapy program. Not all the stimuli were taken up during therapy session as targeted stimuli. A maximum of 5 stimuli formed the targets during the therapy sessions. The stimuli selected were all line drawings presented initially for confrontation naming before beginning the therapy sessions. The present manual was designed based on the documented principles and guidelines prescribed in the literature for persons with aphasia. The illustrations of various activities are based on the principles of aphasia management. The collected information from these resources are compiled and organized.

Procedure: Prior to the therapy program, the pre-test scores of WAB were recorded. During the period of therapy program, the persons with aphasia (PWA) participated for twenty sessions, with each session lasting approximately 45 minutes.

Speech-language therapy sessions: Depending on the naming subsection of the WAB test the words were prepared along with a list of other functional words. The words from categories like common objects, fruits, body parts, animals, vehicles, flowers, colors etc. were taken up during therapy sessions. The number of words used for each session was however variable due to the nature of responses by the PWA. Most of these words were not specifically trained/targeted during the therapy sessions; however, a few commonly-used words were included as targets during the therapy sessions. The therapy program was a one-on-one basis with the clinician and PWA. The number of correct responses was recorded for each session for each PWA. After reviewing a vast range of therapy techniques in literature, techniques widely recommended for anomia were considered for the present study. The techniques selected for the present study are listed and described briefly in Table 2. Since the objective of the study was only to prepare therapy manual for anomia and not to assess the efficacy of the therapy techniques, the techniques were used together as additional techniques to facilitate better naming in the above PWA in the present study. The responses were coded and analyzed for correct and incorrect responses. Every correct response was given a score of '1' and scored '0' for an incorrect response. Subjective remarks of each patient were also recorded in the response sheet for each session.

Table 1. *Participants' demographic information*

Information	A1	A2	A3	A4
Age (in years)	47	55	50	72
Primary language	Hindi	Hindi	Hindi	Hindi
Months post stroke	9	5	11	1
Lesion site (Hemisphere)	Left	Left	Left	Left
Premorbid Handedness	Right	Right	Right	Right
WAB aphasia quotient	30.2	45.6	15	23.7
Aphasia type	Broca's	Broca's	Global	Broca's
Associated deficits	Hypertension	Diabetes	Diabetes	Diabetes

Table 2. *Techniques used in the present study for treatment of anomia*

Sl. No.	Type of technique	Stimuli modality
1.	Cueing hierarchy	Orthographic visual
2.	Facilitation therapy	Orthographic visual auditory
3.	Circumlocution induced naming (CIN) therapy	Auditory visual
4.	Semantic treatment	Orthographic auditory visual
5	Spaced retrieval therapy (SRT)	Orthographic auditory visual

Results and Discussion

The aim of the present study was to develop a treatment manual for the persons with anomic aphasia. Due to a small sample size, the results of the study are described qualitatively. Non-parametric statistics was employed to compare the pre-therapy and the post-therapy performance of subjects with aphasia. However, Wilcoxon Signed Rank test revealed that there was no significant difference in the performance of subjects with aphasia. The results are presented and discussed under different sections.

I. Performance of subjects with aphasia on cueing hierarchy technique: Cueing hierarchy technique described by Linebaugh and Lehner (1977) was applied for the present treatment program for naming. This technique involved arranging of cues by increasing the explicitness of the cues provided for each stimulus items. Cues were arranged according to increasing stimulus power and presented until the patient produced the target word. When the patient responded accurately, cues were presented in the order of decreasing stimulus power until the patient again produces the correct response. The cues selected were orthographic, visual and auditory cues. Pre-therapy scores were considered as the baseline score. After the baseline scores were established the post-therapy scores were calculated from responses in each session. Table 3 shows pre-therapy scores and total post-therapy scores calculated for a total of twenty sessions. The Wilcoxon signed rank test results did not reveal any significant difference between the two conditions i.e., between pre-therapy and post-therapy conditions (p>0.05).

Analysis of results for pre-therapy and post-therapy condition for the cueing hierarchy technique revealed that there was an improvement in the performance of PWA. Table 3 shows that the mean scores on post-therapy (Mean=53.25, SD=20.88) was greater than the pre-therapy scores (Mean=32.00, SD=15.68). A qualitative descriptive analysis of individual data was also done and the results are discussed further. In the case of cueing hierarchy technique, partial cues, phonetic cues, description, demonstration of an action and functional description of the target were used as cues. This means that both phonological as well as semantic cues were used when the cueing hierarchy technique was employed. It was found that Subject A1 produced more number of *phonological naming errors* than the semantic errors. So, the errors observed were more of phonemic paraphasias than semantic paraphasias.

Table 3. *Pre-therapy and Post-therapy performance of individuals with aphasia*

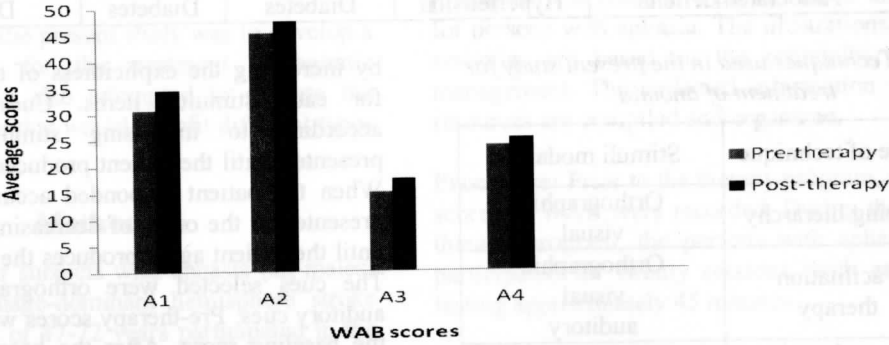| Performance	Participants			
	A1	A2	A3	A4
Performance on WAB (Pre-therapy)	30.2	45.6	15	23.7
Type of Aphasia based on WAB (Pre-therapy)	Broca's	Broca's	Global	Broca's
Performance on WAB (Post -therapy)	34.5	47.4	17.4	25
Type of Aphasia based on WAB(Post-therapy)	Broca's	Broca's	Global	Broca's

Figure 1. *Performance of subjects on WAB.*

Table 4. *Mean and SD of subjects with aphasia on various techniques (N=4)*

Techniques		Maximum score	Mean	SD
Cueing hierarchy	Pre-therapy	60	32.00	15.68
	Post-therapy	60	53.25	20.88
Facilitation	Pre-therapy	60	28.75	6.34
	Post-therapy	60	48.50	11.38
Circumlocution induced naming	Pre-therapy	60	24.00	7.25
	Post-therapy	60	42.25	14.36
Semantic therapy	Pre-therapy	60	28.50	13.77
	Post-therapy	60	51.00	26.84
Spaced retrieval	Pre-therapy	60	24.50	8.22
	Post-therapy	60	45.50	18.33

For e.g., the subject A1 produced /...en/ for /pen/ on a confrontation naming task. A few semantic errors were those of neologisms and circumlocutions in the subject A1. However relatively better performance was seen on post-therapy assessment (scores= 44.00) compared to pre-therapy (scores=25.00) for naming. Comparison of pre-therapy (scores=22.00) and post-therapy (scores=44.00) for subject A2 revealed that there was an improvement in the performance of the subject from pre-therapy to post-therapy (scores=44.00) (see Figure 1). However, the performance of subject A2 was relatively poorer in comparison to subject A1 for cueing hierarchy technique. Analysis of the errors made by subject 2 revealed that there were both phonological as well as semantic errors on confrontation naming task before therapy. After therapy using the cueing hierarchy technique it was found that the errors retained in subject A2 were phonological types of errors.

Analysis of scores for subject A3 revealed that the performance was better post-therapy (scores=35) than pre-therapy (scores=20), however, compared to subjects A1 and A2, subject A3 showed severe naming errors thus affecting verbal expression. Naming errors in subject A3 included semantic as well as phonologic type of errors. Both semantic and phonologic types of errors were evident even after cueing hierarchy therapy. Analysis of scores for subject A4 revealed that similar to subjects A1, A2 and A3, there was an improvement in the performance of subject A4 from pre-therapy (scores=55) to post-therapy (scores=83) performance. Subject A4 exhibited the least number of naming errors compared to subjects A1, A2 and A3. It was also observed that a combination of phonologic, orthographic and semantic cues benefitted subject A4 to the maximum extent. Subject A4 revealed improvement in the overall verbal expression compared to the other subjects.
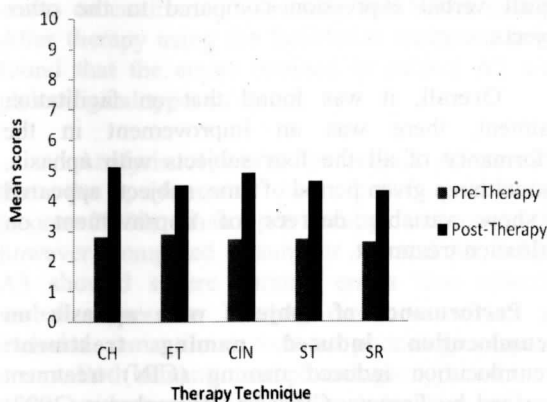
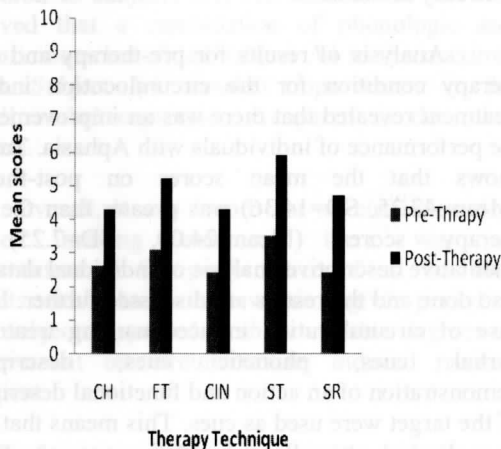Figure 2. *Comparison of scores of A1 in pre and post therapy conditions.*

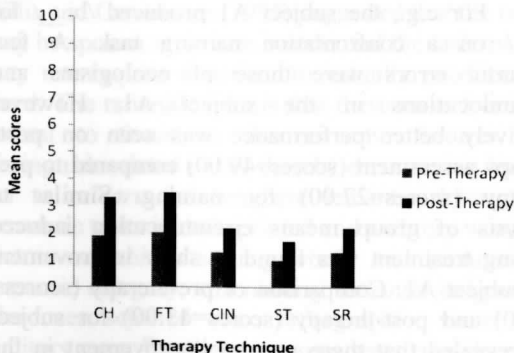Figure 3. *Comparison of scores of A2 in pre and post therapy conditions.*

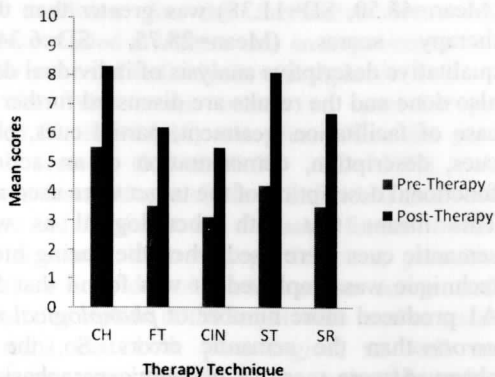Figure 4. *Comparison of scores of A3 in pre and post therapy conditions.*

Figure 5. *Comparison of scores of A4 in pre and post therapy conditions.*

Note: CH- cueing hierarchy, FT- facilitation treatment, CIN-circumlocution induced naming treatment, ST- semantic treatment, SR- Spaced Retrieval

Overall, it was found that on cueing hierarchy technique; there was an improvement in the performance of all the four subjects with aphasia. Also within a given period of time, subjects appeared to show variable degrees of improvement on cueing hierarchy technique.

II. Performance of subjects with aphasia on facilitation treatment: Facilitation technique described by Hickin, Best, Herbert, Howard and Osborne (2002) was applied for the present treatment program for naming. Facilitation is similar to priming—it examines the effect of performing a task *once* on naming. For example, someone more likely to be able to name a picture accurately was asked to repeat the name of the picture, than if they simply had a second attempt at naming.

Words which are functionally useful were selected for facilitation technique. Cues were arranged according to increasing stimulus power and presented until the patient produced the target word. When the patient responded accurately, cues were presented in the order of decreasing stimulus power until the patient again produced the correct response. The cues selected were orthographic, visual and auditory. Pre-therapy scores were considered as the baseline scores. After the baseline scores were established the post-therapy scores were calculated from responses for each session. Table 4 shows pre-therapy scores and total post-therapy scores calculated for a total of twenty sessions.

Analysis of results for pre-therapy and post-therapy condition for the facilitation treatment technique revealed that there was an improvement in the performance of individuals with Aphasia.

Table 4 shows that the mean scores on post-therapy (Mean=48.50, SD=11.38) was greater than the pre-therapy scores (Mean=28.75, SD=6.34). A qualitative descriptive analysis of individual data was also done and the results are discussed further. In the case of facilitation treatment, partial cues, phonetic cues, description, demonstration of an action and functional description of the target were used as cues. This means that both phonological as well as semantic cues were used when the cueing hierarchy technique was employed. It was found that Subject A1 produced more number of *phonological naming errors* than the semantic errors. So, the errors observed were more of phonemic paraphasias than semantic paraphasias.

For e.g., the subject A1 produced /ki__ / for /kita:b/ on a confrontation naming task. A few semantic errors were those of neologisms and circumlocutions in the subject A1. However at the end of the sessions their relatively better performance was seen on post-therapy assessment (Scores=45.00) compared to pre-therapy (scores= 29.00) for naming. Similar to analysis of group means, facilitation treatment was found to show improvement for subject A1 as indicated in Figure 3. Comparison of pre-therapy (scores=31.00) and post-therapy (scores=52.00) for subject A2 revealed that there was an improvement in the performance of the subject from pre-therapy to post-therapy (scores=52.00) (see Figure 4). However, the performance of subject A2 was relatively poorer in comparison to subject A1 for facilitation treatment. Analysis of the errors made by subject A2 revealed that there were both phonological as well as semantic errors on confrontation naming task before therapy. After therapy using the facilitation treatment it was found that the errors retained in subject A2 were phonological types of errors.

Analysis of scores for subject A3 revealed that the performance was better post-therapy (scores=35.00) than pre-therapy (scores=20.00), however, compared to subjects A1 and A2, subject A3 showed severe naming errors thus affecting the verbal expression. Naming errors in subject A3 included semantic as well as phonologic type of errors. Both semantic and phonologic types of errors were evident even after facilitation treatment. Analysis of scores for subject A4 revealed that similar to subjects A1, A2 and A3, there was an improvement in the performance of subject A4 from pre-therapy (scores=35.00) to post-therapy (scores=62.00) performance. Subject A4 exhibited the least number of naming errors compared to subjects A1, A2 and A3. It was also observed that a combination of phonologic, orthographic and semantic cues benefitted subject A4 to the maximal extent. Subject A4 revealed improvement in the

overall verbal expression compared to the other subjects.

Overall, it was found that on facilitation treatment, there was an improvement in the performance of all the four subjects with aphasia. Also within a given period of time, subjects appeared to show variable degrees of improvement on facilitation treatment.

III. Performance of subjects with aphasia on circumlocution induced naming treatment: Circumlocution induced naming (CIN) treatment described by Francis, Clark and Humphreys (2002) was applied for the present treatment program for naming. CIN therapy refers to accessing a word when the patients themselves circumlocute until they finally access the name by themselves without the aid of external cueing. Table 4 shows pre-therapy scores and post-therapy scores calculated for a total of twenty sessions.

Analysis of results for pre-therapy and post-therapy condition for the circumlocution induced treatment revealed that there was an improvement in the performance of individuals with Aphasia. Table 4 shows that the mean scores on post-therapy (Mean=42.25, SD=14.36) was greater than the pre-therapy scores (Mean=24.00, SD=7.25). A qualitative descriptive analysis of individual data was also done and the results are discussed further. In the case of circumlocution induced naming treatment, partial cues, phonetic cues, description, demonstration of an action and functional description of the target were used as cues. This means that both phonological as well as semantic cues were used when the cueing hierarchy technique was employed. It was found that subject A1 produced more number of *phonological naming errors* than the semantic errors. So, the errors observed were more of phonemic paraphasias than semantic paraphasias.

For e.g., the subject A1 produced /bi__/ for /billi/ on a confrontation naming task. A few semantic errors were those of neologisms and circumlocutions in the subject A1. However relatively better performance was seen on post-therapy assessment (scores=49.00) compared to pre-therapy (scores=27.00) for naming. Similar to analysis of group means circumlocution induced naming treatment was found to show improvement for subject A1. Comparison of pre-therapy (scores= 24.00) and post-therapy (scores=43.00) for subject A2 revealed that there was an improvement in the performance of the subject from pre-therapy to post-therapy scores. However, the performance of subject A2 was relatively poorer in comparison to subject A1 for circumlocution induced naming treatment. Analysis of the errors made by subject A2 revealed that there were both phonological as well as semantic

errors on confrontation naming task before therapy. After therapy using the facilitation treatment it was found that the errors retained in subject A2 were phonological types of errors.

Analysis of scores for subject A3 revealed that the performance was better post-therapy (scores=22.00) than pre-therapy (scores=14.00), however, compared to subjects A1 and A2, subject A3 showed severe naming errors thus affecting verbal expression. Naming errors in subject A3 included semantic as well as phonologic type of errors. Both semantic and phonologic types of errors were evident even after circumlocution induced naming treatment. Analysis of scores for subject A4 revealed that similar to subjects A1, A2 and A3, there was an improvement in the performance of subject A4 from pre-therapy (scores=31.00) to post-therapy (scores=55.00) performance. Subject A4 exhibited the least number of naming errors compared to subjects A1, A2 and A3. It was also observed that a combination of phonologic and semantic cues benefitted subject A4 to the maximal extent. Subject A4 revealed improvement in the overall verbal expression compared to the other subjects.

Overall, it was found that on circumlocution induced naming treatment, there was an improvement in the performance of all the four subjects with aphasia. Also within a given period of time, subjects appeared to show variable degrees of improvement on circumlocution induced naming treatment.

IV. Performance of subjects with aphasia on semantic treatment: Semantic treatment described by Howard, Patterson, Franklin, Orchard-Lisle and Morton (1985) was applied for the present treatment program for naming. Word-picture matching, featuring distracters that are semantically related to the target were selected. Davis and Pring (1991) and Hillis and Caramazza (1995) suggested that the target may be spoken or written words, and the task may or may not require a patient to actually produce the word. The rationale here is that these tasks force the patient to focus on the semantic features that distinguish related items, thereby encouraging him or her to *relearn* the complete semantic description. Semantic tasks include printed and auditory word-to-picture matching, sorting words and pictures by semantic category, and making semantic judgments. The cues selected were orthographic, visual and auditory cues. Pre-therapy scores were considered as the baseline score. After the baseline scores were established the post-therapy scores were calculated from responses in each session. Table 1 shows pre-therapy scores and post-therapy scores calculated for a total of twenty sessions.

Analysis of results for pre-therapy and post-therapy condition for the facilitation treatment technique revealed that there was an improvement in the performance of individuals with Aphasia. Table 2 shows that the mean scores on post-therapy (Mean=51.00, SD=26.84) was greater than the pre-therapy scores (Mean=28.50, SD=13.77). A qualitative descriptive analysis of individual data was also done and the results are discussed further. In the case of semantic treatment, partial cues, phonetic cues, description, demonstration of an action and functional description of the target were used as cues. This means that both phonological as well as semantic cues were used when the cueing hierarchy technique was employed. It was found that Subject A1 produced more number of *phonological naming errors* than the semantic errors. So, the errors observed were more of phonemic paraphasias than semantic paraphasias.

For e.g., the subject A1 produced /ka.../ for /ka:r/ on a confrontation naming task. A few semantic errors were those of neologisms and circumlocutions in the subject A1. However relatively better performance was seen on post-therapy assessment (scores=46.00) compared to pre-therapy (scores= 27.00) for naming. Similar to analysis of group means, semantic treatment was found to show improvement for subject A1 as indicated in Figure 3. Comparison of pre-therapy (scores=24.00) and post-therapy (scores=43.00) for subject A2 revealed that there was an improvement in the performance of the subject from pre-therapy to post-therapy scores (see Figure 4). However, the performance of subject A2 was relatively poorer in comparison to subject A1 for facilitation treatment (see Figures 3 and 4). Analysis of the errors made by subject 2 revealed that there were both phonological as well as semantic errors on semantic treatment task before therapy. After therapy using the semantic treatment it was found that the errors retained in subject A2 were phonological types of errors.

Analysis of scores for subject A3 revealed that the performance was better post-therapy (scores=17.00) than pre-therapy (scores=10.00), however, compared to subjects A1 and A2, subject A3 showed severe naming errors thus affecting verbal expression (see Figure 4). Naming errors in subject A3 included semantic as well as phonologic type of errors. Both semantic and phonologic types of errors were evident even after semantic treatment. Analysis of scores for subject A4 revealed that similar to subjects A1, A2 and A3, there was an improvement in the performance of subject A4 from pre-therapy (scores=35.00) to post-therapy (scores=62.00) performance (see Figure 5). Subject A4 exhibited the least number of naming errors compares to subjects A1, A2 and A3. It was also observed that a combination of phonologic,

orthographic and semantic cues benefitted subject A4 to the maximal extent. Subject A4 revealed improvement in the overall verbal expression compared to the other subjects.

Overall, it was found that on semantic treatment, there was an improvement in the performance of all the four subjects with aphasia. Also within a given period of time, subjects appeared to show variable degrees of improvement on semantic treatment. Boyle (2004) studied the effect of semantic feature analysis (SFA) treatment on confrontation naming with anomic aphasia. The findings indicated that confrontation naming of treated nouns improved and generalized to untreated nouns for both participants, who appeared to have different lexical access impairments. Both the participants demonstrated improvement in some aspects of discourse production associated with the confrontation naming SFA treatment. These findings support previous work regarding improved and generalized naming associated with SFA treatment and indicated a need to examine effects of improved confrontation naming on more natural speaking situations. The findings of the present study also support Boyle (2004) as an improvement was observed in the performance of individuals with aphasia on semantic treatment technique, however the treatment efficacy and generalization cannot be explained through the present study.

V. Performance of subjects with aphasia on spaced retrieval (SR) therapy:

Spaced retrieval therapy described by Bourgeois, Camp, Rose, Blanche, Malone and Carr (2003) was applied for the present treatment program for naming. Spaced retrieval treatment approach was developed to facilitate recall of information by individuals with anomia. Essentially spaced retrieval therapy was considered as an errorless learning procedure that can be used to facilitate recall of a variety of information. Spaced retrieval therapy was administered by gradually increasing the interval between correct recall of target items. Spaced retrieval therapy opined to be an alternative for managing naming impairment. The cues selected were orthographic, visual and auditory cues. Pre-therapy scores were considered as the baseline score. After the baseline scores were established the post-therapy scores were calculated from responses in each session. Table 4 shows pre-therapy scores and post-therapy scores calculated for a total of twenty sessions.

Analysis of results for pre-therapy and post-therapy condition for the spaced retrieval technique revealed that there was an improvement in the performance of individuals with Aphasia. Table 4 shows that the mean scores on post-therapy (Mean=45.50, SD=18.33) was greater than the pre-therapy scores (Mean=24.55, SD=18.33). A

qualitative descriptive analysis of individual data was also done and the results are discussed further. In the case of facilitation treatment, partial cues, phonetic cues, description, demonstration of an action and functional description of the target were used as cues. This means that both phonological as well as semantic cues were used when the spaced retrieval technique was employed. It was found that Subject A1 produced more number of *phonological naming errors* than the semantic errors. So, the errors observed were more of phonemic paraphasias than semantic paraphasias.

For e.g., the subject A1 produced /bʌ..../ for /bus/ on a confrontation naming task. A few semantic errors were those of neologisms and circumlocutions in the subject A1. However relatively better performance was seen on post-therapy assessment (scores=43.00) compared to pre-therapy (scores=26.00) for naming. Similar to analysis of group means, spaced retrieval treatment was found to show improvement for subject A1. Comparison of pre-therapy (scores=24.00) and post-therapy (scores=51.00) for subject A2 revealed that there was an improvement in the performance of the subject from pre-therapy to post-therapy scores. However, the performance of subject A2 was relatively poorer in comparison to subject A1 for spaced retrieval treatment. Analysis of the errors made by subject A2 revealed that there were both phonological as well as semantic errors on confrontation naming task before therapy. After therapy using the spaced retrieval treatment it was found that the errors retained in subject A2 were phonological types of errors.

Analysis of scores for subject A3 revealed that the performance was better post-therapy (scores=22.00) than pre-therapy (scores=14.00), however, compared to subjects A1 and A2, subject A3 showed severe naming errors thus affecting verbal expression. Naming errors in subject A3 included semantic as well as phonologic type of errors. Both semantic and phonologic types of errors were evident even after spaced retrieval treatment. Analysis of scores for subject A4 revealed that similar to subjects A1, A2 and A3, there was an improvement in the performance of subject A4 from pre-therapy (scores=34.00) to post-therapy (scores=66.00) performance. Subject A4 exhibited the least number of naming errors compares to subjects A1, A2 and A3 (Figures 2, 3, 4 and 5). It was also observed that a combination of phonologic, orthographic and semantic cues benefitted subject A4 to the maximal extent. Subject A4 revealed improvement in the overall verbal expression compared to the other subjects.

Overall, it was found that on spaced retrieval treatment, there was an improvement in the performance of all the four subjects with aphasia.

Also within a given period of time, subjects appeared to show variable degrees of improvement on spaced retrieval treatment. Limited data are available to address whether SR could be used with disorders other than dementia. Recent work by Bourgeois and colleagues (2003) revealed that they used the SR paradigm in individuals with TBI, another problem that is accompanied by memory difficulties (Melton & Bourgeois, in press). Only one published study reported using SR with a person with aphasia. Brush and Camp (1998b) employed SR with two persons defined as having had a stroke (one of whom appeared to have aphasia) and seven individuals with dementia. They found that SR facilitated recall of clinician's name, patient's room number, and a compensatory technique for naming difficulty. The persons with stroke learned the clinician's name faster than the persons with dementia (three vs. nine sessions). However, only one aphasic individual participated in the study, and only limited documentation of the study design was provided.

The primary purpose of the present study was to develop a treatment manual for anomic aphasia. As a preliminary try out of the manual, it was administered on a small sample of four participants. The therapy programs utilized a combined semantic and phonological treatment approach to improve word naming through the use of various techniques which used cues, descriptions, and cognitive related tasks. The general naming condition within which these techniques were carried out was naming at the single-word level. Individual performance for the treatment program, results of assessments, as well as qualitative analysis for each participant are discussed below. Group performance and results are also discussed in the sections below.

Previous studies have shown positive effects of cueing treatments on naming. In many single and multiple case studies the long-term effect of semantic cueing treatment on naming was established, not only on trained but also on untrained items (Drew & Thompson, 1999; Coelho, McHugh & Boyle, 2000; Wambaugh, 2003). The positive effects of phonological techniques have also been noted (Hickin et al., 2002). In a review of word finding therapy, Nickels (2002) concluded that semantic and phonological techniques are effective, and suggested that a combination of both may prove to be most effective. As orthographic cues are found to assist in retrieving the phonological word form, these cues were also used in treatment and better response to phonologic, orthographic and semantic cues were found in the present study. The effect of treatment based on orthographic cues is reported to be equally effective as (Hickin et al., 2002) or more effective than (Basso, Marangolo, Piras & Galluzzi, 2001) treatment based on phonological cues. Use of orthographic cues is found to be effective in

individuals with better written than spoken naming. Subject A4 was found benefit maximum with the use of orthographic cues along with phonologic and semantic cues. This could be because once grapheme-phoneme conversion is relearned, the person with aphasia may use the available orthographic information to generate his own phonological cues. Studies also support that generalization to untrained words is expected with use of multiple cues while training (Nickels, 2002).

The effect of cueing treatments on verbal communication is unknown. It is often implicitly assumed that improved performance on a naming task brings about improved verbal communication, but this is not well supported by research. Of over 50 studies investigating the efficacy of impairment-oriented word finding treatment, only a handful explicitly consider generalization to spontaneous speech, with contradictory results (Boyle & Coelho, 1995; McNeil, Robin & Schimdt, 1997; Franklin, Buerk & Howard, 2002; Doesborgh, van de Sandt-Koenderman, Dippel, van Harskamp, Koudstaal & Visch-Brink, 2003). Although much is known about the efficacy of different cueing techniques on naming, it is not fully understood which cues are suitable for which individuals. There is no simple one-to-one relationship between the loci of impairment and the cues that will facilitate word finding: semantic techniques can improve naming for individuals with good semantic processing (Nickels & Best, 1996) and phonological tasks can improve naming for individuals with semantic impairments (Raymer, Thompson, Jacobs & LeGrand, 1993; Nickels, 2002).

Conclusions

The treatment manual containing five well known therapy techniques for treatment of anomia was administered on four subjects with aphasia. The techniques included cueing hierarchy, facilitation, circumlocution induced naming technique, semantic treatment and spaced treatment techniques. The pre-therapy and post-therapy scores of these individuals with aphasia were compared qualitatively. Analysis of scores across individuals with aphasia revealed that subject A4 showed greater improvement than the subjects A1, A2 and A3. This could be attributed to the less severe condition of anomia in subject A4. Similarly subject A3 showed lesser improvement compared to the other subjects with aphasia as subject A3 had greater severity of aphasia compared to the other types of aphasias in subjects A1, A2 and A4. This indicates that the type of aphasia and severity are yet other factors contributing to improvement of anomia in aphasic conditions. The treatment techniques that benefitted most subjects with aphasia were the cueing hierarchy technique and the semantic treatment technique. However, the

efficacies of these techniques over the other techniques are required to be investigated on a larger population with anomia. Hence, the present study was only a preliminary investigation of the treatment techniques for anomia. The above techniques adopt both phonological treatment and semantic treatment techniques in a broader sense and need to be used according to the nature of deficit in the individuals with anomia. To conclude, specific and theoretically motivated treatment methods can result in improvement in individuals with naming difficulty, however a larger sample size and inclusion of generalization ability to spontaneous speech will facilitate beneficial management strategies for anomic aphasias.

The treatment manual can be used for individuals with anomia in order to regain their naming ability through restitutive or substitutive approaches. However, the generalization of naming using the above techniques could not be assessed hence, generalization effect needs to be studied and then the technique can be used for treatment of anomia. Even though single subject designs are excellent for demonstration of experimental control, only limited assumptions can be drawn about external validity. Therefore, it is important that the effects demonstrated here be investigated further.

Although the present study does not prove the efficacy of any of the treatment techniques, the treatment-specific effects found at the impairment level suggest that there may be routes that lead to improved verbal communication: a semantic route and a phonological route and a further analysis of the data and increase in sample size may support to explain the efficacy of a specific treatment technique.

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