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AUTHOR: Vyvyan Bui

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Suzanne Moineau		4/13/15
THESIS COMMITTEE CHAIR	SIGNATURE	DATE
Lori Heeschen		4/13/15
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THESIS COMMITTEE MEMBER	SIGNATURE	DATE
THESIS COMMITTEE MEMBER	SIGNATURE	DATE

Exploring the Efficacy of Treatments for Anomia in Discourse

Vyvyan T. Bui

California State University, San Marcos

Author Note

Vyvyan T. Bui, Department of Speech-Language-Pathology, Communicative Sciences & Disorders, California State University, San Marcos.

Correspondence concerning this paper should be addressed to Vyvyan Bui, Department of Speech-Language-Pathology, Communicative Sciences & Disorders, California State University San Marcos 333 S. Twin Oaks Valley Rd. San Marcos, CA 92096-4000.

Abstract

This thesis explores the efficacy of two treatments for anomia in discourse for a participant with mild expressive aphasia. The first treatment utilizes a phonological and semantic cueing hierarchy, while the second is a discourse approach to semantic feature analysis, was chosen for implementation. The treatments are outlined in the paper and the results are presented and analyzed in order to demonstrate the efficacy of both treatment methods for treating anomia at the discourse level.

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Chapter One: Introduction

Background: Aphasia

Aphasia is a language disturbance caused by damage to the language centers of the brain or neural pathways in which all four modalities of language are affected: auditory comprehension, reading comprehension, written expression, and verbal expression (Kendall et al., 2008). This means that aphasia is a deficit in both the decoding and encoding of language (Darley, 1982). Aphasia most often occurs due to stroke (CVA), brain injury, brain tumors, or other neurological damage, but is most commonly associated with strokes (LaPointe, 2005). However, it is important to note that aphasia is not attributable to sensory or motor loss or dementia (Darley, 1982). Despite the fact that aphasia affects all modalities of language, often times, individuals with aphasia are often classified into two categories based upon which characteristics are more affected: fluent and nonfluent aphasia (DeLeon, et al., 2007). These are then narrowed into eight different types of aphasia. Two types of commonly occurring aphasia, Broca's aphasia and Wernicke's aphasia are often categorized as expressive and receptive aphasia respectively.

Broca's Aphasia

For the purposes of this thesis, only Broca's aphasia, a form of non-fluent aphasia will be discussed. Individuals diagnosed with Broca's aphasia often suffer damage to the inferior frontal gyrus, or Broca's area (Ward, 2010). This area of the brain is important for language production. These individuals can be characterized with expression skills that are more compromised than comprehension abilities. This often results in apparent

word retrieval problems as well as speech that often contain extended pauses, awkward articulation, omission of functor words and grammatical morphemes, speech circumlocutions, and substitutions (Helm-Estabrooks, 2003). These characteristics of Broca's aphasia result in halting and hesitant speech.

It is important to note that though these labels, such as fluent and non-fluent aphasia, do exist, many individuals cannot be characterized into one type of aphasia. In fact, individuals with aphasia often display varying deficits that mirror characteristics of both classical types of expressive and receptive aphasia (Brookshire, 2007). Despite this, both types of aphasia share one key characteristic that affects the flow of conversation and overall communication. This characteristic is referred to as anomia and has subsequently been the subject of many studies involving aphasia and treatments for this disorder of language.

Aphasia and Age

Aphasia, regardless of the type, affects individuals of all ages (Carter, 1978). The different types of aphasia and extent of impairment vary from client to client and depend on the site and amount of the brain that is damaged as well as the nature of the impairments (Boyle, 2011). In regards to age, this type of communication disorder affects approximately 80,000 individuals each year— 15% affected are under the age of 65. This percentage nearly triples to 43% in reference to individuals 85 years of age and older affected by aphasia (Engelter et al., 2006).

With this in mind, according to Darley (1982), various studies argue that the age of onset of aphasia correlates with the degree of recovery. For example, Goldstein (1948) and Vignolo (1964) concluded that patients under the age of at least 60 have a better

chance at language recovery than those over 65 years old. Sands, Sarno, and Shankweilder (1969) reported that age at the time of injury was the most important factor that determined the extent of recovery of function. They found that on average, recovery was greater in younger patients. In a second study, Sands et al., (1965) found that individuals with the average age of onset of aphasia of 47 recovered more compared to those that averaged at least 61 years. This implies that though older individuals have the potential to recover, younger individuals have greater potential for greater recovery. In addition to this, Sasanuma (1989) and Holland et al (1989) found that elderly patients with aphasia showed less functional improvement.

Despite these findings, Sarno (1991) reported that research regarding age, as a variable for recovery, was contradictory thus implying that the prognosis of aphasia cannot only be attributed with age. She studied and compared a middle age group (50-64) and an older group (65-80) and found that there was little correlation between age and recovery. However, Sarno (1991) argued that patterns were seen in regards to severity across different types of aphasia. In addition to this, Kertesz and McCabe (1997) also found some correlation between age and recovery, however, they found that this correlation was insignificant and that the correlation between severity of aphasia and recover was much greater. They argued that it was possible that age, severity, and recovery were in fact interrelated. Schuell (1964) also argued that the correlation between age and recovery was indirect as she found some young individuals with severe aphasia, and other individuals over the age of 60 with good recovery.

With this contradictory research in mind, research concerning treatment for individuals with aphasia over the age of 65 is minimal. One possible reason for this may

be due to the fact that prognosis is argued to be guarded when onset is after the age of 65 as shown above (Goldstein, 1948). However, because research in the area itself is contradictory, the argument that individuals over the age of 65 have a poor prognosis lacks definiteness and thus more research concerning treatment for individuals over the age of 65 is needed.

Not only this, but with an increase in focus on quality of life in individuals with aphasia in literature, quality of life should always be considered regardless of age (LaPointe, 2005). According to Engelter et al. (2006), aphasia in stroke patients is associated with increased mortality, decreased functional recovery, and reduced probability to return to work compared stroke patients without aphasia. These factors all affect quality of life. Spaccavento (2014) argued that aphasia has a profound effect on a person's quality of life, as it can be attributed to causing emotional distress, depression, and social isolation, due to loss of language.(Spaccacvento, 2014). Spaccacvento (2014) also found that, on average, individuals with a mean age of 68.4 showed that quality of life worsened after brain damage. That being said, Spaccavento (2014) argued that changes in quality of life do not appear to be age dependent, but rather due to an onset of depression and poor reacquisition of motor function. With this in mind, regardless of if an individual is over or under the age of 65, treatment should be utilized in order to increase quality of life.

Anomia

One of the most common characteristics of all types of aphasia is anomia—a problem with word or lexical retrieval. Both stroke induced and progressive forms of aphasia are characterized by anomia (Henry, Beeson, & Rapcsak, 2008). Individuals with

anomia have difficulties with lexical retrieval in 20% or more of the words they attempt to retrieve. This is compared to the less than 1% of words that normal speakers have trouble retrieving (Friedmann, Biran, & Dotan, 2013). In regards to expressive aphasia specifically, anomia often results in circumlocution, or the use of many words to speak around a target word (Helm-Estabrooks, 2003). This adds wordiness and indirect language and affects the flow of conversation and the overall communication process.

Lexical Retrieval

In individuals with and without aphasia or anomia, the main component of language is lexical retrieval—the process of moving from a concept to word or representation (Friedmann, Biran, & Dotan, 2013). Lexical retrieval, or word retrieval, is a multi-step process that has been researched and studied extensively. Research shows that in normal speech, two or three words per second are retrieved from a lexicon that contains thousands of words. That being said, on average, "normal" errors of lexical selection occur once per every thousand words (Levelt, 1999). It has been agreed upon that many factors influence the efficiency and success of retrieval, however, there is still debate concerning how lexical retrieval works as a whole (Ward, 2010). Current research pertaining to lexical retrieval contains contradicting theories concerning the extent of the process thus making the understanding of anomia difficult to understand (Ward, 2010; Levelt, 1991; Friedmann et al., 2013, Bock, 1987; Dell, 1986; Dell, Burger, & Svec, 1997; Dell & O'Seaghdha, 1992; Kempen & Huijbers, 1983; Levelt, 1989; Levelt, Roelofs, & Meyer, 1999; Stemberger, 1985; Macdonald, 1994; Tabor, Juliano, & Tanenhaus, 1997).

Neurologically, it is hypothesized that in lexical retrieval, Wernicke's area retrieves words from the language area of the brain. These words are required to express a message (Friedmann et al., 2013). These words are then used to create a sentence that follows phonologic, syntactic, and semantic rules. This means that the correct sounds for a specific word must be chosen and then these words are put in a specific sequence to create meaning. Wernicke's area then sends the sentence forward to Broca's area, which translates the sentence into a plan that is then sent to the primary motor cortex, which then works to execute movements. This plan is then spoken (Brookshire & McNeil, 2007).

Theories concerning lexical retrieval involve the selection and encoding of morphological, phonological, and phonetic concepts to be articulated. In the first step of lexical retrieval, a non-verbal concept is selected (Ward, 2010). Sometimes referred to as conceptual processing or the conceptual level of word retrieval, here, a representation of a word is created, but the word itself has yet to be formulated. This representation can include previous knowledge, visual images, or semantic properties. During this stage, representational information behind the word is retrieved and a representation in the semantic lexicon is then activated (Strijkers & Costa, 2011). Deficits at the level of the conceptual system result in overall poor comprehension of words and pictures (Friedmann et al., 2013).

The next step of word retrieval is the semantic lexicon (Friedmann et al., 2013). Here, words are organized semantically, that is they are organized by words and information about the meanings of words (e.g. words' categories, descriptions, etc.) (LaPointe, 2005). For example, semantic information may include properties of the

concept or the function of the target. This can come from various sources such as what someone hears or sees (Friedmann et al., 2013).

During the semantic lexicon stage, lexical or lemma selection also occurs. This selection involves the retrieval of syntactic features of the word (Strijkers & Costa, 2011). These features are referred to as the lemma—conceptual representations that specify the syntactic components of the word. According to Badecker, Miozzo, and Zanuttini (1995), a lemma contains a word's semantic and grammatical features, but not any phonological or orthographic features. Damage at the semantic lexicon stage often results in anomia that can be facilitated by semantic cues.

Once lemma retrieval occurs, the third stage of lexical retrieval begins. This is referred to as phonological encoding or the phonological output lexicon stage. Here, the lexical phonological representation of the target is activated in the phonological output lexicon. This involves the actual representation of the word (e.g. phonemes, syllables, stress). The phonological output lexicon is organized by word frequency—the more frequently a word is accessed, the faster it can subsequently be accessed. Finally, the phonological representation is stored until the word is produced. Deficits at this stage result in word retrieval errors that can be facilitated by both phonological and semantic cues. After this stage, the word then moves into the final stage of phonetic encoding in which the phonemes for articulation are prepared and then sent to the motor system to be produced (Friedmann et al., 2013).

The last stage of lexical retrieval before verbal output is the phonological output buffer stage. This stage stores the phonological representation of the word for a short period of time in order to compose the target word based upon number of phonemes and

morphemes. This composition is then phonetically encoded for articulation and word production (Friedmann et al., 2013)..

Lexical Retrieval at the Semantic and Phonological Level in Anomia

With these stages of word retrieval in mind in mind, there are various types of anomic impairment that are associated with the different stages. For the purposes of this thesis, only anomia at the semantic level and the phonological level will be discussed.

The first type of anomia results from difficulty retrieving specific words due to the inability to distinguish between different concepts (Ward, 2010). Here, word retrieval halts at the semantic level and a deficit occurs at the semantic lexicon level of word retrieval. This means that the lemma selection itself is incomplete and semantic information is missing thus causing the word retrieval error. For example, at this level, semantic paraphasias are common (e.g. table for chair, orange for apple). This incomplete selection is caused by weakened connections between semantic features and the target word. Theoretically additional cueing and information helps to unblock the erred word (Friedmann et al., 2013).

The second type involves the inability to retrieve the associated phonological information to articulate a word that has already been selected by the patient—this means the individual is able to retrieve the concept and the semantic representation of the word, but retrieval halts at the phonological level. Here, the breakdown occurs at the level of the phonological output lexicon. In this case, phonological paraphasias are common (e.g. gog for dog). However, because individuals cannot access accurate phonological information, but they can access the semantic representation, semantically related words may be activated instead (e.g. cat for dog) (Friedmann et al., 2013). Again, as in the case

of errors at the semantic level, theoretically, additional cues should help with word retrieval.

Lexical Retrieval Debate

Currently, there is debate surrounding the relationship between the interaction of semantic and phonological representations during lexical retrieval in an individual with anomia (Laine, Kujala, Niemi, & Uusipaikka, 1992). One theory, known as Levelt's model or the discrete/serial model, argues that lexical retrieval occurs linearly, with the first stage occurring independently followed by the second stage (Ward, 2010). Here, according to Levelt, the semantic concept is chosen and syntactic properties are accessed in the first stage. Then, phonological encoding occurs separately in the second stage. Because the second stage does not begin until the first stage has finished, Levelt argues that phonological factors do not influence word selection. That being said, this model proposes that phonological activation is limited only to the selected target and related words are not activated during this process (Laine et al., 1992). That is, the word that is selected is the only word that is activated phonologically.

In regards to failures of lexical retrieval, the serial model argues that retrieval blocks occur solely at single, specific stages in lexical retrieval (Saito & Takeda, 2001). For example, if the phonological form of the target cannot be assessed, it can be assumed that only the phonological output lexicon has been affected. According to this model, because the stages do not overlap, if an individual has a deficit in the phonological output lexicon, they still have the ability to retrieve semantic and syntactic information about a concept. However, because they break down specifically at the phonological level, they will produce a phonologically incorrect version of the word (e.g. "gog" for "dog"). That

being said, theoretically, applying additional semantic information to an individual with a deficit at the phonological output lexicon level should be ineffective in retrieving the target word because this level of word retrieval is already intact. However, since the cause of the deficit is the weakness of the activation of the phonological form of the target, supplying additional phonological information should be effective. This information includes providing the initial sound of the target word (e.g. "d" for "dog").

The second theory, Dell's model or the interactive model, argues that the stages of lexical retrieval interact during the process (Ward, 2010). In this theory, it is argued that partial phonological processing occurs before and after the lemma is selected thus implying that phonological factors do influence the word selection. Here, because the two stages interact, multiple lexical-semantic items are also phonologically activated (Laine et al., 1992). For example, if a person is trying to say "dog", lemma selection may activate other semantically related items such as "puppy" or "cat." Then, in the second stage words such as "cap" or "guppy" may also be activated, as they are phonologically similar to the semantically related items.

In regards to lexical retrieval failures, the interactive activation model argues that the word retrieval error occurs before the semantic information is selected. This means that though a concept may be chosen, a breakdown occurs before semantic, syntactic, and phonological information is processed completely. That being said, if a breakdown occurs at the level of the semantic lexicon, as in Levelt's theory, additional semantic information should be beneficial. Unlike Levelt's theory, however, if a breakdown occurs at the level of the phonological output lexicon, semantic or phonological information

should, therefore, activate the target, releasing the retrieval blocks (Saito & Takeda, 2001).

Treatments of Anomia

Boyle (2011) states that the "pervasiveness and persistence" of anomia has resulted in the basis for many therapy studies designed to alleviate it. Current research for treatment of anomia is constantly advancing and growing. At the moment, much of this current literature studies different techniques that target the word level. Very few studies expand further to target the discourse level (Boyle, 2011). Not only this, but even fewer study the effects of treatments in individuals over the age of 80. This literature review explores the current studies that touch upon treatment for anomia at the discourse level with individuals ages 31-77 (Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003; Antonucci et al. (2); Boyle, 2011; Peach and Reuter, 2010).

With this in mind, currently most research concerning treatment for anomia starts at the word level and uses semantic and/or phonological cues in order to activate the connections to improve lexical retrieval (Antonucci et al. (2009); Boyle, 2011; Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003; Peach and Reuter, 2010). This is because, as stated above, anomia often occurs at the level of the semantic or phonological output lexicon. Despite the fact that aphasia affects individuals of all ages, the existing research has predominately involved only participants under the age of 60. The participants in existing studies often exhibited word-finding difficulties and aphasia, however had no severe comprehension difficulties. Not only this, but a majority of the existing research studies anomia and its treatment at the word level. Of the research that studied anomia at the discourse level, most involved picture naming treatment at the word

level given before discourse treatment was initiated (Antonucci et al. (2009); Boyle, 2011; Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003; Peach and Reuter, 2010).

Treatments for anomia at the discourse level often fall into two categories: those that are phonological and those that are semantic in nature. This is due to the underlying theories of the cause of anomia mentioned previously (Antonucci et al. (2009); Boyle, 2011; Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003; Peach and Reuter, 2010).

Current cueing treatments vary from using phonological or semantic systematic cueing hierarchies. The purpose of using these cues is to activate the pathways of the different levels of lexical retrieval thus releasing retrieval blocks (Cameron and Wambaugh, 2006). Overall, these studies use cues that have been specifically beneficial for participants in the past in order to use them consistently within treatment to study their effects (Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003). These studies have found an overall increase in production of targeted words with the participants increasing their ability to demonstrate the production treated information units in the context of the different scenarios including: story retell, creating a verbal shopping list, describing past events, and other structured discourse tasks (Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003). Many of these tasks aimed to elicit target words in conversation that would occur in everyday life. All words that were not retrieved were then cued using a cueing hierarchy, thus providing the participants with multiple cues until they were able to retrieve the word independently. Findings suggest that the increased production of target information units in context indicate that

this treatment approach is helpful in improving the ability to produce more informative connected speech. Participants also improved in terms of communicative appropriateness. However, generalization to untreated stimuli has been inconsistent between various studies. These treatments focus on using cues to help word retrieval and eventually have individuals or family members provide the cues (Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003).

Like research in cueing treatment in discourse, one specific cueing treatment, semantic feature analysis, in discourse is a new treatment approach in the field of speech language pathology. The studies involving semantic feature analysis in discourse have looked at individuals with aphasia with a primary lexical impairment and multiple years post onset of stroke (Boyle, 2011, Peach and Reuter, 2010; Antonucci et al.; Boyle, 2004; Boyle & Coelho 1995). Semantic feature analysis aims to specifically strengthen semantic networks at the level of the semantic lexicon to help with word retrieval problems (Boyle, 2011). Like most current research, this treatment is often used to target the word level. However, within the past five years there has been some limited research regarding semantic feature analysis used to target the discourse level (Boyle, 2011, Peach and Reuter, 2010). In treatments using semantic feature analysis, a semantic feature chart is utilized after a discourse task such as describing a picture or event (see Appendix B). Using the chart, clients are expected to describe the category the target word belongs to, the use of the target, the action, the associating characteristics, the location, and what the target reminds the client of. This is expected to strengthen the semantic pathways that are important in word retrieval to ultimately assist with word retrieval of the target word. Research has shown that semantic feature analysis used at the word level is successful in

treating anomia. Results at the discourse have been more fluctuating, however, for the most part research has shown that semantic feature analysis has positive affects on trained stimuli, but little affect on overall generalization of word retrieval to real world situations. More specifically, studies have found that overall, SFA in discourse have lead to increases in content information units, increase in lexical retrieval, increase in informativeness, and increase communicative effect (Boyle, 2011, Peach and Reuter, 2010; Antonucci et al.; Boyle, 2004; Boyle & Coelho 1995).

In most of semantic feature analysis and other cueing treatments at the discourse level, a two-part treatment involving picture naming and discourse is presented (Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al. 2003; Antonucci et al. (2); Boyle, 2011; Peach and Reuter, 2010). That is, these treatments often have one stage in which word retrieval is targeted at the word level and a second stage in which it is targeted at the discourse level. That being said, the current study aimed to look specifically at the discourse level without the immediate effect of a preceding a picture naming treatment. This is due to the fact that the participant had more significant breakdowns at the discourse level than at the word level and had been previously successful at confrontational naming. In addition to this, this thesis aims to look at an individual in their 80's as individuals affected with aphasia may benefit from treatment at any age and specially looks at discourse treatment to benefit those with more difficulty at this level of communication.

Statement of the Problem/Significance of the Study:

As stated previously, current literature studying treatments for anomia often targets the word level (Cameron and Wambaugh, 2006; Herbert et al. 2001; Herbert et al.

2003; Antonucci et al. (2); Boyle, 2011; Peach and Reuter, 2010). However, few studies target the discourse level—an important aspect of treatment for anomia as discourse mirrors overall communication more than the word level (Cameron and Wambauch, 2006; Peach & Reuter, 2010). Of these studies, even fewer study the effects of treatments in individuals over the age of 80. In fact most studies involve adults in their 60's or younger. However, as stated previously it is important to study individuals above the age of 60. This is because, as individuals with aphasia age, prognosis becomes less promising (Sands, Sarni, & Shankweilder, 1969). This is due to the possible loss of function and independence as well as the possibility of the onset of cognitive impairments—all of which can co-occur with aging and impact overall communication (Helm-Estabrooks, 2003). Studying this older age range at the discourse level gives us insight into the growing problem of anomia in the aging population and helps us to review treatments and strategies that may work to help improve the prognosis for older individuals with aphasia.

In addition to studying an older age range and anomia at the discourse level, this thesis aims to look into the theories surrounding lexical retrieval and whether they occur linearly or interactively. As discussed previously, the first theory of word retrieval argues that because lexical retrieval happens linearly, solely phonological cues will release a word retrieval block at the level of the phonological output lexicon. In contrast the second argues that because the stages of word retrieval actually overlap, a combination of both semantic and phonological cues will help release the retrieval block at this same level. With this in mind, the thesis aims to support the theory that word retrieval occurs interactively rather than linearly. The proposed thesis looks at a participant with word retrieval errors at the level of the phonological output lexicon and

predicts that targeting failed lexical items in discourse using semantic cues will produce somewhat promising results. This counters the first theory of lexical retrieval as that theory supports only phonological cues will be beneficial for anomia at the level of the phonological output lexicon. Not only this, but in order to further support the interactive theory of lexical retrieval, this thesis predicts that targeting items using both semantic and phonological cues will also be beneficial for this particular participant.

Because current literature pertaining to the treatment of anomia in discourse is limited, the proposed thesis attempts to add to the limited literature targeting anomia at the discourse level. It addresses the efficacy of using solely semantic cues through semantic feature analysis versus using both a semantic/phonologic cueing hierarchy in treating anomia in discourse for a 85-year-old client diagnosed with expressive aphasia.

Unlike past studies involving SFA and discourse, the client chosen for this thesis had been previously trained and successful in using treatment to retrieve failed items in picture naming at the word level. Though, research has shown that SFA has been proven to improve picture naming at the word level in individuals with aphasia, this thesis aims to give insight into two treatments and their relationship to discourse (Boyle, 2004; Boyle & Coelho 1995).

Summary of Selection:

In the end, because of the participant's anomia is characterized by both phonological and semantic paraphasia and she has had success with both semantic and phonological cues, two treatments methods were chosen. The first method involved semantic feature analysis at the discourse level. The second involved a semantic/phonologic cueing hierarchy.

Methodology

This study has a single subject design. The methodology of this study encompasses two different treatments with similar forms of data collection. The exact methodology is detailed below. This thesis aims to determine the effectiveness of two different treatments of word finding at the discourse level in an 85-year-old individual and compare the results between a treatment using semantic cues versus one using semantic and phonological cues.

Purpose of the Study

As stated previously, the purpose of this study was to find the most efficacious treatment for an 85-year-old English-speaking client with mild anomia at the discourse level due to a cerebrovascular accident (CVA) and to subsequently support the interactive theory of word retrieval. This participant was found to produce both phonological and semantic paraphasias n conversation. For the purposes of this thesis, the following question was proposed: In an 85 year old individual with mild anomia characterized by semantic and phonological paraphasias, is a semantic/phonological cueing treatment at the discourse level more efficacious when compared to a discourse approach using semantic feature analysis? This was measured by studying the participant's number of word retrieval failures, the number of content information units, and the number of content information units per minute.

Chapter Two: Methodology

Introduction

This study aims to determine the efficacy of two treatment programs. The design, setting, participants, materials, and procedures are presented below.

Participant:

One right-handed woman with mild Broca's aphasia, as previously determined by the Western Aphasia Battery (Keretesz, 2006), participated in this treatment. English was her primary language, but she had some experience with Slovak in the past. She was an 85-year-old female individual. This participant sustained a left CVA, which resulted in mild Broca's aphasia, marked by word retrieval errors at the discourse level. Her word retrieval errors in discourse were categorized by both semantic and phonological paraphasias. In regards to the steps of lexical retrieval explained above, this implies that her deficits occur at the level of the phonological output lexicon. The participant previously attended treatment for aphasia twice a week. At the time of the thesis, her deficits were found to be predominately at the discourse level.

Methods:

Stimulus/materials used for treatment A and B:

1) 8 pictures conveying prepared food items with ingredients clearly visible (2 for testing with treatment A, 2 for testing with treatment B, 4 for post testing)
2) Semantic/phonologic cueing hierarchy (see appendix A)
3) Test of Adolescent/Adult Word Finding (German, 1990)

Table 1: Treatment Stimuli for Treatment A and B

	Treatment A		Treatment B	
Trained Stimuli	Banana Split	Fried Rice	Hamburger	Baked Potato
Untrained Stimuli (Semantically Related)	Fruit Salad	Cobb salad	Hot Dog	Soup
Untrained Stimuli (Semantically Unrelated)	Hot Dog	Soup	Fruit Salad	Cobb Salad

Table 1 Treatment Stimuli

Pre and Post-Test

Pre and post-testing was administered to show performance before and after treatment on untrained stimuli. During both pre and post testing, the client was presented with eight pictures--fried rice, cobb salad, baked potato, soup, hamburger, hot dog, fruit salad, and banana split. The fried rice and banana split were used for treatment A. These were paired with two semantically related pictures that would be used to test for generalization of semantically related topics—cobb salad and fruit salad. The hamburger and baked potato were used for treatment B. These were paired with the hot dog and soup as the semantically related untreated pictures. For each treatment, the four untreated, pictures were used to test for generalization of semantically unrelated topics.

As stated previously each of these pictures displayed the ingredients clearly. The pictures were displayed on an iPad. In order to measure word retrieval in discourse, the client was asked to state what food was presented in the picture and to independently verbally explain a recipe for the presented picture. All instances of word retrieval failure were recorded and are shown in Figures 1 and 2. The participant's responses were

recorded and transcribed to calculate content information units as shown in Figures 3 and 4.

Content information units are used to measure an individual's informativeness. They are referred to as "discrete, new bits of information supplied by the narrator." (Helm-Estabrooks, 2003). For the purpose of this thesis, content information units were determined by counting the number of appropriate nouns, verbs, and adjectives used during each recitation and the rules are outlined in Manual of Aphasia and Aphasia Therapy (Helm-Estabrooks, 2003). This is shown in Appendix C. These tasks were used to obtain pre and post treatment data at the discourse level. The Test of Adolescent/Adult Word Finding was also administered before and after treatment to test for generalization of naming at the word level (German, 1990).

The Test of Adolescent/Adult Word Finding was administered to the client during both pre and post treatment sessions for each treatment as well as during the 1 month and 4-month post treatment sessions. Tasks include: picture naming of nouns and verbs, sentence completion, description naming, and category naming. Scores from each of these subtests provide information on naming in different contexts and are show in Table

Methods Treatment A:

In the first phase of treatment, a semantic/phonologic cueing hierarchy was implemented. The treatment was based off of Cameron and Wambaugh's (2006) hierarchy, but modified for the client.

Procedure:

Treatment A for the participant was conducted over 5 weeks and included 10-sessions at 45 minutes per session. Included in these sessions were one pre-treatment, 8 treatment sessions, and one post-treatment session described above.

During each treatment session, the client was presented with two pictures—one of fried rice and one of a banana split. The participant was asked to describe what the picture was and how to make it. Any instances of word retrieval failures were noted and recorded by listing the erred words on a data sheet. The clinician then used the erred words with a semantic/phonologic cueing hierarchy (appendix A). The clinician first described the situation that the client had been previously discussing when the error took place (e.g. "You had some trouble when you were trying to describe dicing this item"). The clinician then pointed out the ingredient in the picture that the participant could not recall or did not accurately state. The participant was then walked through the steps of the cueing hierarchy shown in Appendix A. First, the clinician asked a wh-question pertaining to the erred ingredient (e.g. What do you chop?). If the participant was unable to answer the question, a semantically loaded sentence completion cue was given (e.g. You dice the onions and then you chop the…). If she was still unable to recall the item, a third step involved a semantically loaded sentence completion and a phonemic cue (e.g. You dice the onions and then you chop the /k/…). Lastly, a verbal model was given and a repetition was elicited. With each failure, the participant started at step 1 of the hierarchy. If she was able to retrieve the word at step 1, the participant would move on to the next erred word. If the participant was unable to state the word, the participant moved on to step 2. Once a correct word was elicited, the steps of the hierarchy were reversed starting

at the step in which the participant was able to retrieve the word successfully and moving back sequentially to step 1 of the hierarchy. At the end of each treatment session, the participant was asked to restate the recipe to place the target words back into the context of the recipe. Instances of word retrieval errors were noted to compare to the original recitation.

Cueing/prompting/feedback/reinforcement schedule and type:

The premise of this treatment involved giving verbal, semantic and phonemic cues after the discourse task. Probing for more information was used when needed to keep the flow of the conversation.

Positive reinforcement was provided after each individual task. These included, but were not limited to, "You're doing a great job!" "Excellent work!"

Scoring rubric/procedure and determination of when to advance or change:

Data was obtained via a data collection sheet. All instances of word retrieval failures were recorded. For the purposes of this treatment, the clinician focused on directly measuring the number of word retrieval failures, time, and the number of content information units produced. These were charted to note the client's progress and decrease in word retrieval failures.

Methods Treatment B:

In the second phase of this treatment, semantic features analysis was implemented. This type of treatment, consistent with the article presented above (Peach and Reuter, 2010), utilizes semantic features of words in order to help with access and generalization. In the case of the study presented, semantic feature analysis was used to

increase word retrieval in discourse and was implemented via use of a semantic feature analysis chart, which can be found in Appendix B.

Procedure:

Treatment B for the participant was conducted over 5 weeks and included 10-treatment sessions at 45 minutes per session. Included in these sessions were one pre-treatment, 8 treatment sessions, and one post-treatment session.

During each treatment session, the client was presented with two pictures—one of hamburger and one of a baked potato. The participant was asked to describe what was in the picture and how to make it. Any instances of word retrieval failures were noted and recorded by listing the erred words on a data sheet. The clinician then used the erred words with a semantic feature analysis chart shown in Figure 5. The participant was asked to follow the steps of the semantic feature analysis chart as outlined below.

Using the semantic feature analysis chart pictured in Appendix B, the client was asked to describe what category the target word belonged to, the use of the target word, the action of the target word, the characteristics of the target word, the location of the target word, and then association of the target word. At the end, the client was asked to read the chart using complete sentences and to attempt to name the picture again. The client was expected to use the target word in the sentences and refrain from using words such as “it” or “them” in place of the word. If she was unable to retrieve the word, the clinician provided the client with the word and walked through the semantic feature analysis chart once again. After the review, the clinician moved on to the next erred word. At the end of each session, the participant was asked to restate the recipe to place the target words back into the context of the recipe.

Cueing/prompting/feedback/reinforcement schedule and type:

During the discourse activities (picture descriptions and procedural questions), if the client was stuck on a word the clinician would ask the client for details about the word (e.g. "Can you describe it?" "What kind of properties does it have?"). Probing for more information was used when needed.

Feedback was given if the client was still unable to name the presented picture after the semantic feature analysis was completed. The clinician then provided the client with the word and reviewed the chart with the client.

Positive reinforcement was provided after each individual task. These included, but were not limited to, "You're doing a great job!" "Excellent work!"

Scoring rubric/procedure and determination of when to advance or change:

Data was obtained via a data collection sheet. All instances of word retrieval failures were written in the corresponding recorded. For the purposes of this treatment, the clinician focused on directly measuring the number word retrieval failures, time, and content information units. These were charted to note the client's progress and decrease in word retrieval failures.

Chapter Three: Results

The graphed data presented below represents pre and post-testing and treatment data obtained during the sessions.

Treatment A:

Treatment A involved a phonological and semantic cueing hierarchy applied to word retrieval errors from a task in which she verbally explained the steps to a recipe

Figure 5 represents the number of word retrieval failures that the client experienced with treatment one with the targets "banana split" and "fried rice." This therapy resulted in an overall decrease in word retrieval errors from baseline compared to post therapy. An overall decrease in word retrieval errors in the two trained stimuli (Banana Split and Fried Rice) from seven to two errors per recipe was observed. With a few exceptions, word retrieval errors moved in a downward projection from session to session as seen in Figure 5. This graph shows that, again despite some fluctuation, ultimately the participant made less word retrieval failures on both target stimuli at the last session compared to the first session.

As seen in Figure 1, Treatment A also resulted in a decrease in word retrieval errors in three out of six untrained stimuli from pre testing to post testing. The potatoes decreased from six word retrieval errors to three, the fruit salad four errors to two, and the soup from two errors to one. The other three stimuli, the cobb salad, hot dog, and hamburger, showed no change in word retrieval.

With this in mind, Treatment A also revealed an increase in overall content information units for one of the trained stimuli (banana split) from 12 content information units to 14. Treatment A also resulted in the increase of two untrained stimuli—one semantically related and one not. The semantically related stimuli, the cobb salad, increased from 11 content information units to 13, while the semantically unrelated stimuli, the hamburger, increased from 16 content information units to 21. Two other untrained stimuli, the soup and the hot dog, resulted in no change in informativeness whereas the last two stimuli, the fruit salad and baked potato, decreased in content

information units from 12 to 10 content information units and 20 to 10 content information units respectively. This is shown in Figure 2.

Treatment A also resulted in an overall decrease of seconds it took for the participant to recite the trained stimuli. The participant's time decreased from 102 seconds to 45 seconds for the banana split and 137 seconds to 50 seconds for the fried rice. There was also an overall decrease in seconds for all untrained stimuli. As seen in Table 3, the time it took to recite the recipe for the baked potato decreased from 91 seconds to 49 seconds, 142 seconds to 111 seconds for the hamburger, 102 seconds to 87 seconds for the hot dog, 116 seconds to 59 seconds for the fruit salad, 120 seconds to 64 seconds for the cobb salad, and 110 seconds to 63 seconds for the soup.

Though not all targets increased in content information units, all targets increased in content information units per second. Table 3 lists the times as well as the average content information units per second for both treatment. As seen here, the trained stimuli, the banana split and the fried rice, both increased in content information units per second—from .118 to .311 content information units per second and from .088 content information units per second to .400 content information units per second respectively. The semantically related stimuli, fruit salad and cobb salad, also increased from .103 to .169 content information units per second and .092 to .203 content information units per second. The semantically unrelated stimuli, the hamburger, baked potato, hot dog, and soup, all increased in an average of .070 content information units per second.

Treatment B:

Treatment B involved a semantic cues in semantic feature analysis applied to word retrieval errors from an activity in which the participant verbally explained various a recipe.

Figure 6 represents the total number of word retrieval failures during treatment two with "hamburger" and "potato." This treatment resulted in an overall decrease in word retrieval errors on both of the trained stimuli from five word retrieval errors to three for the potato and from five word retrieval errors to two for the hamburger. As seen in Figure 6, by the last session, both recitations of the trained stimuli decreased by two to three word retrieval errors. Again, this graph shows that despite some fluctuation, ultimately the participant made less word retrieval failures on both stimuli at the last session compared to the first session.

As seen in Figure 2, Treatment B also showed a decrease in word retrieval failures in one of the two semantically related stimuli. The hot dog decreased from five word retrieval failures to one, while the soup increased from two to three. Not only this, but two of the four semantically unrelated stimuli also decreased in overall word retrieval failures. The cobb salad and banana split each decreased from five content information units to three and three content information units to two respectively.

As seen in Figure 4, treatment B also resulted in an increase in content information units in both of the trained stimuli. The hamburger increased from 17 content information units to 25, while the potato increased from 10 information units to 25. Not only this but there was an increase in content information units for both semantic related untrained stimuli—the hot increased from 13 to 18 content information units whereas the

soup increased from 14 to 21 content information units. One out of four the semantically unrelated untrained stimuli, the cobb salad also increased from 14 content information units to 16. However, some of the targets that showed no increase maintained the same number of content information units or a slight decrease.

Treatment B, however, did not show a decrease in seconds used per recipe for all recipes recited. The fried rice, fruit salad, cobb salad, baked potato, and soup all increased in seconds by an average of 37 seconds. In contrast, the banana split, hamburger, and hot dog decreased in number of seconds by an average of 13 seconds. For the most part, the time remained relatively stable from pre therapy to post therapy. Not only this, but Treatment B only showed an increase in content information units per second in only four of the eight target stimuli. The fried rice increased from .239 to .240 content information units per second, the hamburger from .167 to .308, the hot dog from .124 to .199, and the baked potato from .143 to .275 content information units per second.

Maintenance:

Table 5 presents the number of content information units used to describe each of the recipes during pre and post testing as well as to test for generalization after 1 month and after 4 months. This shows an overall increase of content information units for most target words. For example, the hamburger increased from 16 content information units pre-treatment to 20 content information units post 1 month treatment and 24 content information units post 4 months. The hot dog increased from 13 content information units to 18 content information units 1 month post and slightly decreased to 15 content information units 4 months post treatment. In addition to this, the soup recipe increased from 14 to 20 content information units one month post treatment.

Figure 5 represents the number of word retrieval failures for each of the recipes during pre treatment sessions for each of the treatments as well as 1 month after the end of treatment and 4 months after the end of treatment. The graph shows that, for the most part, 1 month and 4 months after treatment, less word retrieval errors were observed compared to during pre treatment A and B. For example, the trained stimuli from treatment A, the banana split decreased from seven word retrieval failures pre-treatment to two failures 1 month post and one failure 4 months post. The other treatment A trained stimuli, the fried rice, decreased from seven word retrieval failures pre-treatment to three failures 1 month and 4 months post treatment. The trained stimuli for treatment B, the baked potato, decreased from six failures to one failure one month post and slightly increased to three failures four months post. The hamburger also decreased from five word retrieval failures pre-treatment to four failures one and four months post.

After 1-month post treatment B, the test of word finding was administered once again. Results can be seen in Table 2. Overall, the participant performed with higher scores on all subtests compared to baseline testing. Scores remained relatively stable from treatment B post testing to the 1month post testing. During the 1-month post treatment session, the participant showed a decreased number of word retrieval failures on all four trained stimuli and a decrease in one of the untrained stimuli.

After four months post treatment B, the test of word finding revealed maintenance of scores for each of the subtests. After 4 months, there was an overall increase or maintenance of content information units across five of the eight stimuli. After 4 months, the participant showed a decrease in word retrieval failures compared to pre treatment in five out of eight stimuli, four of those being trained stimuli.

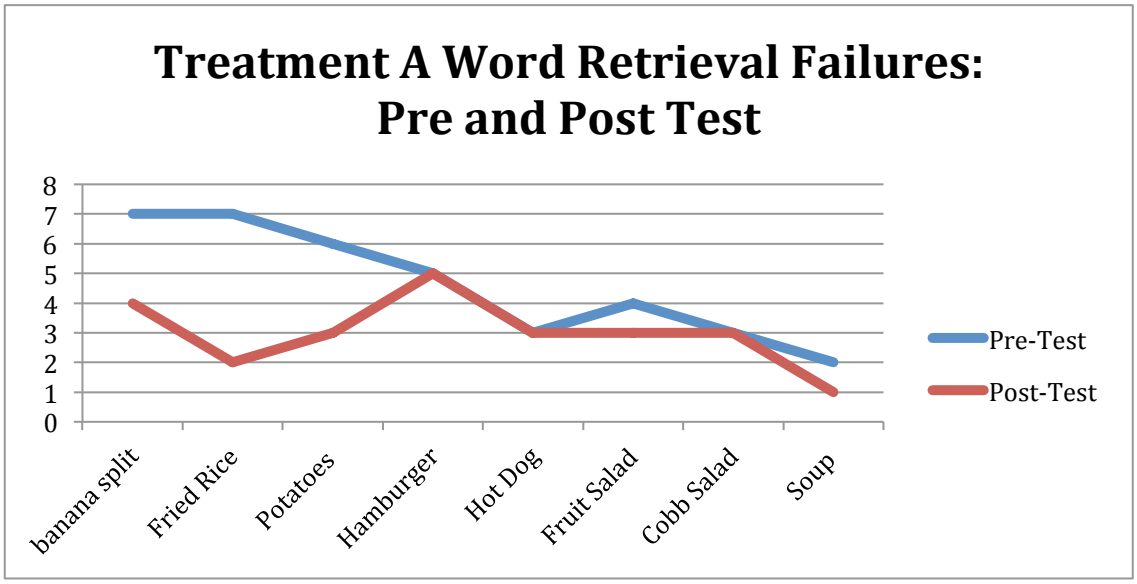

Figure 1. Treatment A word retrieval failures: Pre and post test. This figure illustrates the number of word retrieval failures recorded in treatment A for pre treatment to post treatment for all stimuli.

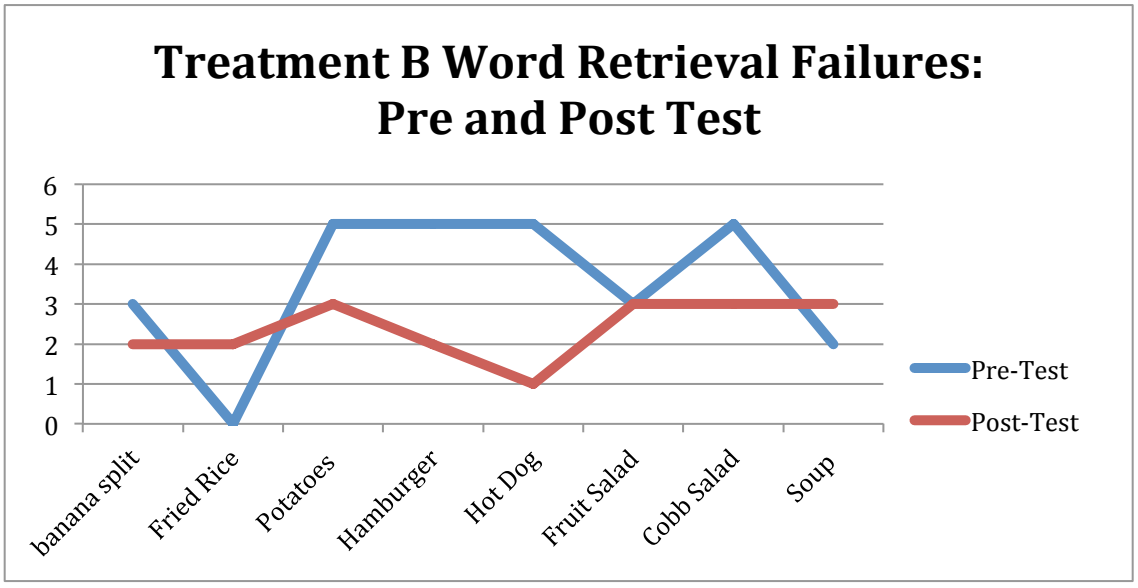

Figure 2. Treatment B word retrieval failures: Pre and post test. This figure illustrates the number of word retrieval failures recorded in treatment B for pre treatment to post treatment for all stimuli.

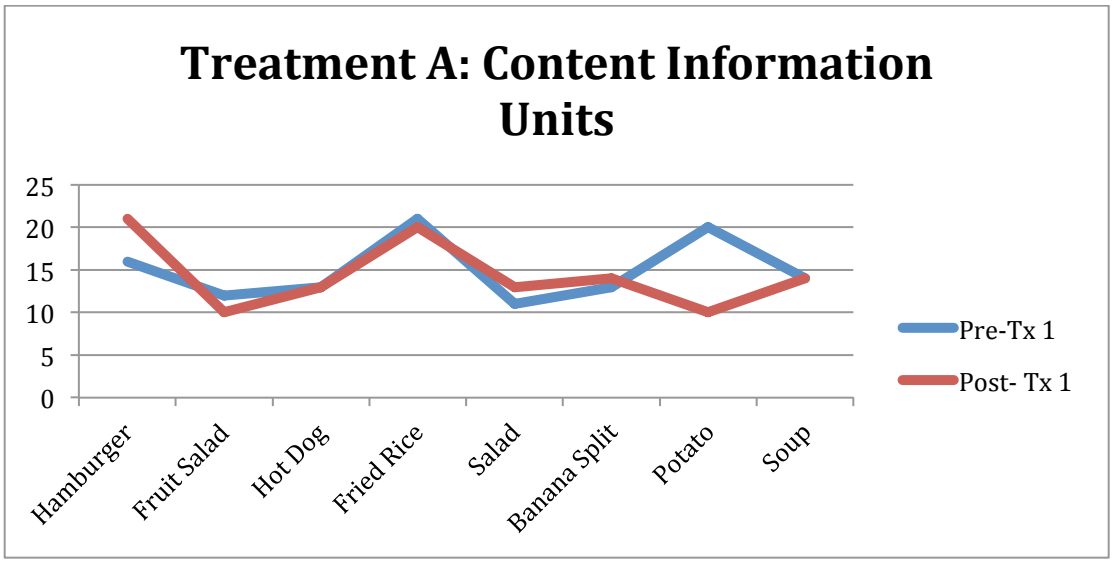

Figure 3. Treatment A: Content information units. This figure illustrates the number of content information units recorded in treatment A for pre treatment (Jun 2) to post treatment (Jun 26) for all stimuli.

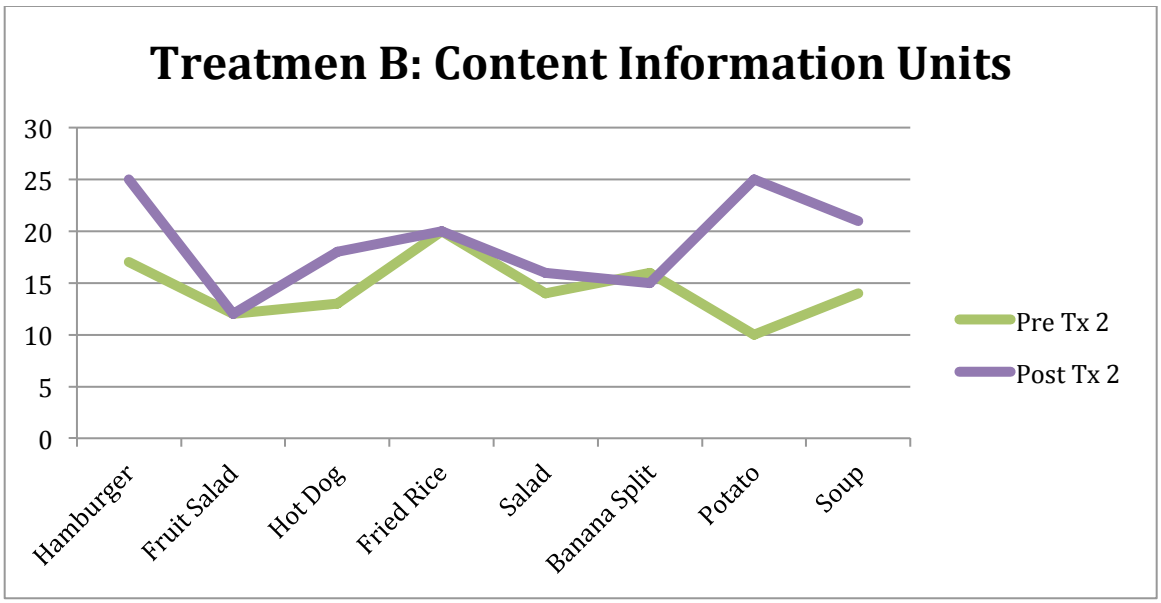

Figure 4. Treatment B: Content information units. This figure illustrates the number of content information units recorded in treatment B for pre treatment (Jun 2) to post treatment (Jun 26) for all stimuli.

Table 2: Pre-test and Post-test Scores on Test of Adolescent/Adult Word Finding.

	Pre-Treatment A: 6/2/14	Post-Treatment A: 6/26/14	Pre-Treatment B: 7/8/14	Post-Treatment B: 8/7/13	1 Month Post: 9/8/14	4 Months Post: 12/10/14
Picture Naming: Nouns	7	13	13	16	16	16
Sentence Completion Naming	5	9	10	9	8	10
Description Naming	4	5	5	5	5	6
Picture Naming: Verbs	11	12	14	15	15	15
Category Naming	13	14	13	13	15	14

Table 2 Pre-test and Post-test Table: Number of Words Retrieved.

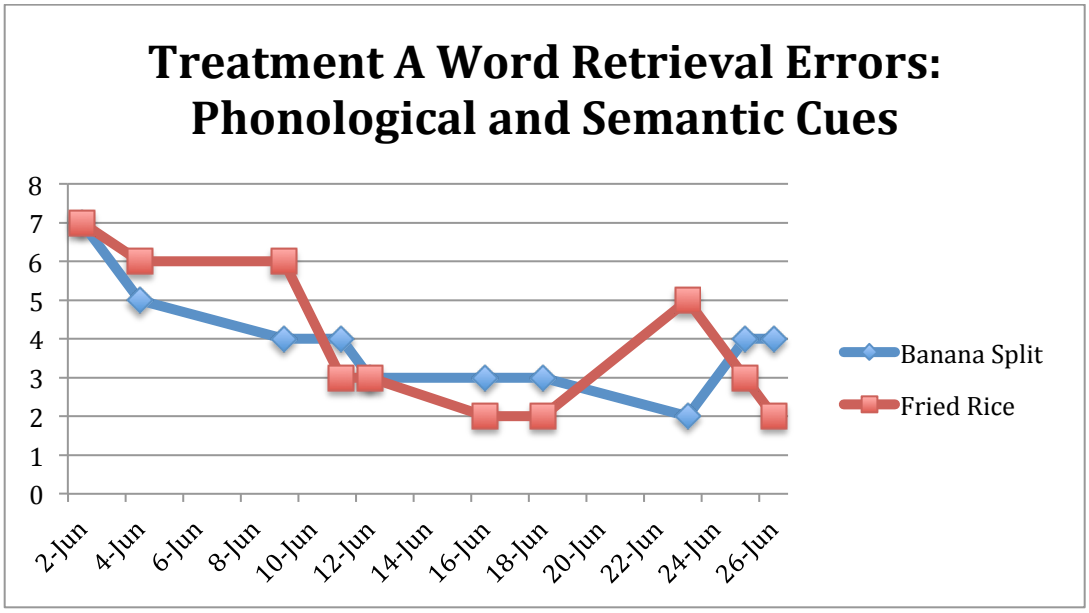

Figure 5. Treatment A word retrieval errors: Phonological and semantic cues.

This figure illustrates the number of word retrieval errors observed in treatment A from pre treatment (Jun 2) to post treatment (Jun 26).

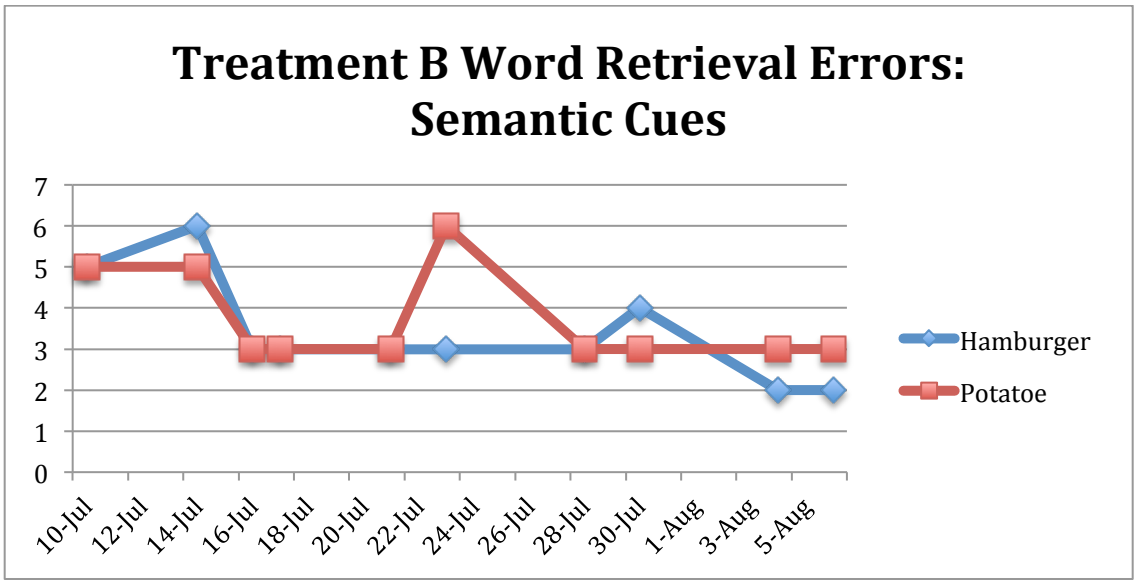

Figure 4. Treatment B word retrieval errors: Semantic cues. This illustrates the number of word retrieval errors in treatment B from pre (July 10) to post treatment (Aug 5).

Table 3: Treatment A Pre-test and Post-test: Recitation of Recipes in sec and CIUs/sec

	Pre-Treatment A		Post-Treatment A	
	Recitation in Seconds	CIUS Per Second	Recitation in Seconds	CIUS Per Second
Banana Split	102	.118	45	.311
Fried Rice	137	.088	50	.400
Fruit Salad	116	.103	59	.169
Cobb Salad	120	.092	64	.203
Hamburger	142	.113	111	.189
Baked Potato	91	.143	49	.204
Hot Dog	102	.118	87	.149
Soup	110	.109	63	.222

Table 3. Treatment A: Recitation of recipes in seconds and CIUs/sec

Table 4: Treatment B Pre-test and Post-test: Recipes in Seconds and CIUs/sec

	Pre-Treatment B		Post-Treatment B	
	Recitation in Seconds	CIUs Per Second	Recitation in Seconds	CIUs Per Second
Banana Split	54	.296	51	.294
Fried Rice	59	.339	83	.240
Fruit Salad	63	.190	75	.160
Cobb Salad	73	.192	116	.138
Hamburger	102	.167	81	.308
Baked Potato	70	.143	106	.275
Hot Dog	105	.124	91	.199
Soup	70	.2	129	.163

Table 4. Treatment B: Recitation of recipes in seconds and CIUs/sec

Table 5: Content Information Units

	Pre Tx A 6/2/14	Post Tx A 6/26/14	Pre Tx B 7/10/14	Post Tx B 8/6/14	1 Month 9/8/14	4 Months 12/10/14
Hamburger	16	21	17	25	20	24
Fruit Salad	12	10	12	12	11	6
Hot Dog	13	13	13	18	18	15
Fried Rice	21	20	20	20	13	16
Salad	11	13	14	16	11	12
Banana Split	13	14	16	15	13	14
Potato	20	10	10	25	14	22
Soup	14	14	14	21	20	9

Table 5. Content information units for pre and post treatment A and B, 1 month post treatment, and 4 months post treatment.

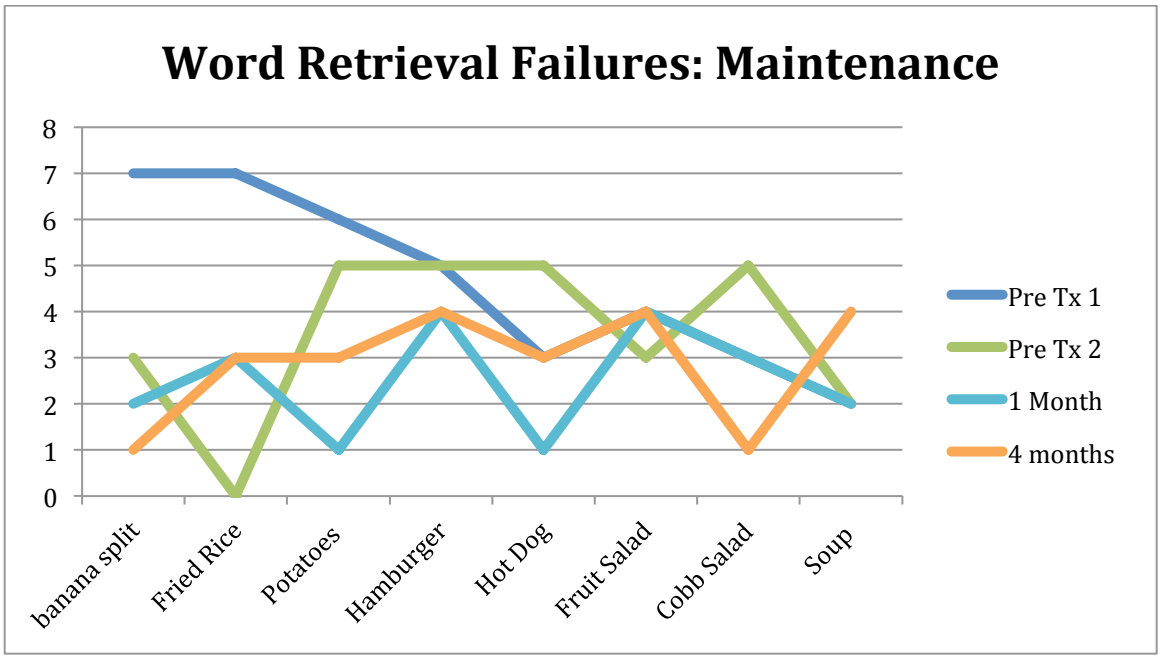

Figure 5. Treatment A and B word retrieval errors. This figure illustrates the number of word retrieval errors observed in treatment A and B from pre treatment (Jun 2) and 1 month and 4 months after treatment.

Chapter Four: Discussion and Conclusion

The purpose of the study was to explore the efficacy of two different treatments for an 85-year-old English-speaking client with mild anomia as a result of expressive aphasia due to a cerebrovascular accident (CVA). As stated previously, her word retrieval failures could be characterized by both semantic and phonological errors. Two treatment methods were executed: a semantic/phonologic cueing treatment in discourse and a discourse approach to semantic feature analysis. The following question was proposed: In an 85 year old individual with mild anomia, is a semantic/phonological cueing treatment at the discourse level more efficacious when compared to a discourse approach to semantic feature analysis? By comparing the two approaches, this thesis also aims to support an interactive approach to word retrieval.

The semantic/phonological cueing treatment correlates with the theory that word retrieval is interactive. This theory argues that because word retrieval is an interactive process, word retrieval breakdowns occur after partial phonological processing and lemma selection have occurred. That being said, theoretically, applying both phonological and semantic cues should be efficacious if a breakdown occurs at the level of the phonological output lexicon.

The semantic cueing treatment, on the other hand, was used to show that semantic cues could be beneficial for word retrieval. This would oppose the serial theory of word retrieval. According to this theory, because the two stages of word retrieval have no overlap, semantic cues would offer little benefit to a breakdown at the level of the phonological output lexicon. Instead, only phonological cues are effective as semantic information is already processed at the time of the breakdown. As stated above, this thesis proposed to support the theory that word retrieval is actually interactive and thus a semantic cueing treatment as well as a phonological and semantic cueing treatment was predicted to be efficacious. However, because the semantic and phonological cueing treatment targeted two levels of word retrieval, it was hypothesized that it would be more beneficial.

Overall, both therapy approaches proved to be beneficial for the participant. Both treatments resulted in an overall decrease in word retrieval errors. However, each had different effects in regards to the time and the informativeness of the presentation based on content information units. Not only this, but both therapy treatments also resulted in increased or maintained scores on each of the subtests for the test of word finding.

Overall, both treatments were efficacious for the participant, however as hypothesized, the semantic and phonological cueing treatment produced overall better results.

Treatment A

Treatment A involved a phonological and semantic cueing hierarchy applied to word retrieval errors from verbal explainations of various recipe s. This treatment was chosen in order to support the idea that word retrieval is an interactive process in which the stages of retrieval overlap and interact and both semantic and phonological cues work to benefit word retrieval at the level of the phonological output lexicon.

This treatment resulted in an overall decrease in word retrieval errors from baseline compared to post therapy. With a few exceptions, word retrieval errors moved in a downward projection from session to session as seen in Figure 5. This was expected as outlined by previous literature. These results imply that the two types of cues presented in this structured fashion, as hypothesized by the interactive theory, helped to activate both semantic and phonological pathways to help unblock words. Overall, this decrease in word retrieval errors implies that this discourse approach was efficacious for this client and that this particular cueing treatment helped to create semantic and phonologic relations to help the participant to retrieve trained stimuli.

Treatment A also resulted in a decrease in word retrieval errors in untrained stimuli. These results imply some generalization of skills for word finding to untrained stimuli. This was not found in previous studies. This generalization can be accounted for by the fact that two off the untrained stimuli contained semantically related ingredients. Not only this, but also all stimuli were related semantically in that they all involved recipes and foods that the participant encountered often. However, because generalization

of decreased word retrieval failures was not consistent across all stimuli, further research should be performed to support these findings.

With this in mind, treatment A also revealed an increase in overall content information units for both trained stimuli as well as an overall increase of content information units produced per second. This implies increased informativeness as the participant was able to produce more content information units in a shorter amount of time. The treatment also resulted in some generalization of increased informativeness for both semantically related and unrelated stimuli thus further supporting its efficacy.

Treatment B

Treatment B involved utilizing semantic feature analysis to help activate semantic pathways at the level of the phonological output lexicon on erred words from recited recipes. This treatment specifically used semantic cues and resulted in an overall decrease in word retrieval errors. This was expected as cited in the current literature. This reveals that activating the semantic pathways using this treatment technique was efficacious for this participant and in turn implies that, unlike the serial theory of word retrieval argues, semantic cues are actually beneficial for word retrieval breakdown at the level of the phonological lexicon output.

Treatment B also showed a decrease in word retrieval failures in untrained stimuli. Like in treatment A, this implies some generalization of skills for word finding to untrained stimuli. This was not found in previous studies. Again, this generalization can be accounted for by the fact that two off the untrained stimuli contained semantically related ingredients while the other stimuli were also recipe related. However, because

generalization of decreased word retrieval failures was not consistent across all stimuli, further research should be performed to support these findings.

Treatment B also resulted in an increase in content information units in both of the trained stimuli. Not only this but there was an increase in content information units for most of the untrained stimuli. However, some of the targets that showed no increase maintained the same number of content information units. However, unlike Treatment A, Treatment B did not show an increase in content information units produced per seconds used per recipe recited. This reveals stable or decreased informativenss within the same time frame.

Generalization

Overall treatment A and B revealed some generalization with untrained stimuli. Results were inconsistent with only about half of the untrained stimuli benefitting from generalization effects. In addition to this, generalization effects were seen on the increased scores of the Test of Word Finding for Adults and Adolescents (German, 1990). Though this reveals more generalization effects than previous studies, further research should be performed to study generalization with cueing therapy.

Maintenance

After 1-month post Treatment B, The Test of Word Finding was administered once again (German 1990). Results can be seen in Table 2. Overall, the participant performed with higher scores on all subtests compared to baseline testing. Scores remained relatively stable from Treatment B post testing compared to the 1-month post

testing. This implies that both treatments A and B had some generalization effects that maintained even after treatment stopped.

During the 1-month post treatment session, the participant also showed a decreased number of word retrieval failures on both trained and untrained stimuli compared to baseline data. Again, this implies maintenance effects of both treatments.

After four months post Treatment 2, The Test of Word Finding revealed maintenance of scores for each of the subtests as scores remained relatively stable and improved since the first time the test was administered (German, 1990).

In addition to this, after 4 months, content information units for each of the recipes recited remained relatively stable compared to the last recitation with treatment. Not only this, but the participant showed an overall decrease in word retrieval failures in most stimuli compared to pre treatment.

Comparison of Treatment A and B

Looking at both treatments, one can see the participant benefitted in different ways. For example, both studies resulted in an overall decrease in word retrieval errors from pre therapy compared to post therapy. However, Treatment B also shows overall less word retrieval errors than compared to treatment A. This implies that Treatment A is more successful in decreasing word retrieval errors.

In addition to this, Treatment B shows overall more content information units produced per recitation. However, when comparing content information units per second, Treatment B actually showed a decrease compared to Treatment A, which showed an increase in content information units per second. This implies that Treatment A was more

successful in producing more informative responses and less word retrieval errors. This could possibly be due to the fact that Treatment A targets both stages of word retrieval.

Other Considerations

It is important to note that the recipes and pictures chosen for this treatment were functional for the client. All recipes were based upon ingredients and recipes that the participant often encountered. The client was exposed to these procedures or ingredients in her day-to-day life. The pictures chosen were specifically selected as to show the ingredients clearly so that the participant's memory would not be an issue in recalling a specific recipe. Because of the ingredients were functional for the participant, after treatment, it was found that the client was able to recall functional words that she had had trouble at the start of the treatment (e.g. carrot, hard boiled egg). Choosing such stimuli that is relevant to the client should increase motivation and help support maintenance of these targets in day-to-day life.

Informally, the client stated that the she preferred the practice of using semantic feature analysis in discourse to help her recall words on a day-to-day basis due to the visual aspect of the treatment. She stated that when she had trouble producing words, she would recall the semantic feature analysis chart to try to help her and that she preferred the visual aspect of this treatment. Her family members also noted this application.

After Treatment A and B, her family reported that the participant was became more thoughtful in finding her words throughout the day. Specifically, the family noted improvements in overall speech and that providing phonemic cues, as demonstrated in Treatment A, were effective. They also noted that the participant was more willing to stop and think about words after both treatments. Though neither reported an overall

decrease in word retrieval failures, both reported overall improved communication and quality of life.

Limitations:

The results of this study are encouraging, however, because research is so limited, additional individuals with various aphasia types and severity levels should be studied in order to better understand the effects of that these two particular treatments have on anomia.

In addition to this, the current results were limited as the recitation of recipes could be slightly open-ended thus allowing for varying answers. This inconsistency could skew the results as recitations could vary from trial to trial. Though, this open-endedness mirrors that of every day life, it could be beneficial to call for more definite or structured answers in future research.

Another limitation of this study included the effect that emotional state may have had on the results. The client also showed some fluctuation throughout the therapy sessions. This could be due to stress, fatigue, or influences from the client's daily life. Informally, the participant was asked to note her level of stress on a scale from one to ten. It was found that on days that her stress levels were higher, the participant had more trouble retrieving words. All of these factors cannot be controlled by the clinician, but can influence data. It can be suggested that in future research, levels of stress or fatigue be monitored and recorded to give insight into the correlation between performance and influences on treatment outcome and possibly allow the clinician to decrease the client's stress levels prior to the treatment session.

In addition to these factors, it should be noted that after Treatment B ended, the participant attended unrelated, additional treatment sessions with another therapist utilizing semantic feature analysis. Though, the target stimuli were unrelated to that used in this study, it is possible that the effects of the treatment with semantic feature analysis generalized and affected the participant's scores during the generalization and maintenance measurement studies.

Conclusions:

This thesis set out to study the effectiveness of two different treatment methods—one with solely semantic cues and one with semantic and phonological cues. It was assumed that if the process of lexical retrieval were interactive, both treatments would result in the strengthening of semantic or phonemic representations that were associated with the target words during treatment and that both would hopefully reduce instances of word-finding difficulty. However, it was hypothesized that because a treatment using both types of cues targeted both levels of word retrieval, it would produce more beneficial results. Not only this, but by comparing both treatments, this thesis aimed to support the theory that word retrieval is an interactive.

A review of the above results indicates that both types of treatments resulted in a decrease the number of word retrieval failures. However, the approach with semantic and phonological cues resulted in slightly greater changes in number of word retrieval errors and less word retrieval errors compared to that of only semantic cues. This reveals that for an individual with mild anomia as a result of expressive aphasia, using both types of treatments in discourse may be effective and that specifically, semantic and phonological cues used in discourse are slightly more beneficial. The success of both treatments also

implies that word retrieval is interactive with phonological processing and semantic processing overlapping. Overall, the results of this thesis suggests potential for individuals to improve their ability to communicate following either treatment, with slightly better results shown with using semantic and phonological cues.

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Appendix A

Semantic/Phonologic Cueing Hierarchy

Step #	Description
1	Wh- questions (e.g. What do you chop?)
2	Semantically non-speicifc sentence completion (e.g. You chop the _____).
3	Semantically loaded sentence completion cue (e.g. You dice the onions and then you chop the orange _____).
4	Semantically loaded sentence completion and first sound cue (e.g. You dice the onions and then you chop the orange /k/ _____).
5	Verbal model and repetition.

Appendix B

Semantic Feature Analysis Chart:

Group	Use	Action
Properties	Location	Association

Appendix C (Helm-Estabrooks, 2003)
Rules for Content Information Units

Count each of the following once:

- Words that describe correct elements of the picture (e.g. the carrot)
- Single pieces of information conveyed by several words (e.g. Turn it on)
- Correct personal pronouns
- Content unit that is repeated without adding more information
- Reused words that add information
- Interjections that convey meaning

Do not count the following:

- Words that give misleading information
- Misleading paraphasias
- Neologisms
- Incorrect personal pronouns
- Informative words that are repeated and do not ad information