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THE EFFECT OF A SEMANTIC-BASED PROTOCOL ON NAMING AND DISCOURSE PERFORMANCE IN PARTICIPANTS WITH APHASIA

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THE EFFECT OF A SEMANTIC-BASED PROTOCOL ON NAMING AND DISCOURSE PERFORMANCE IN PARTICIPANTS WITH APHASIA

By

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ABSTRACT

THE EFFECT OF A SEMANTIC-BASED TREATMENT PROTOCOL ON NAMING AND DISCOURSE PERFORMANCE IN PARTICIPANTS WITH APHASIA

By

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The present study examined the effects of a semantic-based treatment protocol on two participants with aphasia who demonstrated word-finding problems in discourse. Both participants' word-finding impairments were hypothesized as semantic in nature. The semantic-based treatment protocol was designed to strengthen access to target words.

The study addressed two research questions. First, did the semantic-based treatment increase the accuracy of naming and decrease latency as measured by total naming time? Second, did the increase in accuracy of naming and a decrease in latency result in an increase in efficiency of discourse performance?

Two participants with mild expressive aphasia were given the treatment protocol in a single-subject multiple-baseline across treatment sets design. The effects of twelve sessions of the semantic-based treatment were measured on naming accuracy and total naming time. In addition, the effects of the semantic-based treatment protocol were measured on four types of discourse samples.

Results indicated that both participants improved naming accuracy but not total naming time with application of the treatment protocol. In addition, improvements in discourse performance were noted in the picture description task but did not generalize to the other discourse types.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter I – Introduction

The ability to express words to communicate with others is something many individuals take for granted. Split-second access to words allows for competent interaction in conversational contexts. However, even the most competent speakers experience instances when they are momentarily unable to express a word, finding themselves in a tip-of-the-tongue state.

However, for the tens-of-thousands of individuals diagnosed with aphasia each year, impaired word finding, word retrieval, or anomia is common (Kohn & Goodglass, 1985). As a result, their expressive language is often limited which may impair their ability to communicate their basic wants, needs, thoughts, and feelings.

Although word-finding impairments are exhibited by individuals with aphasia in many different speech tasks, picture naming has often been used to examine the behavior. Kohn and Goodglass (1985) explained that this methodology has the advantage of being able to test a predetermined set of words (unlike spontaneous discourse). Picture naming has also become a key component in treatment protocols for aphasia. Clinicians use pictures to elicit responses, and then, if needed, provide some cue or strategy to improve word retrieval. Ultimately, the goal is to generalize improved picture naming to less structured contexts such as discourse.

In their attempts to show improved word-finding abilities as a result of a treatment protocol, researchers have continued to use the picture-naming methodology as the measure of progress. One of the tenets of research is to isolate the effects of an

independent variable (such as a treatment protocol) on a dependent variable (such as picture naming) while controlling other variables. A primary concern in the methodology of word-finding research, especially treatment studies, is of the obligatory context of the trained set of words. Without requiring an attempt at the word, researchers cannot judge the effectiveness of the retrieval. Thus, picture naming has become a common method to demonstrate change (Nickels & Best, 1996a).

Functional Communication

The American Speech-Language-Hearing Association (ASHA) Advisory Panel (1990) defined functional communication as "the ability to receive a message or to convey a message, regardless of the mode, to communicate effectively and independently in a given environment." With the increasing focus on improving functional communication in individuals with communication disorders, clinicians must question whether picture-naming ability is the appropriate standard of improvement for all clients in word-finding research and clinical practice. The severity of the word-finding deficits can vary greatly among individuals with aphasia. For some individuals with severe expressive impairments, increasing one-word responses to pictures may improve their ability to express their needs, thus making it an appropriate goal.

For others with more intact expressive abilities, increasing word-finding abilities in discourse may be a more appropriate goal. This goal would improve their functional ability to interact verbally in social and work contexts. However, a review of the literature

on word finding reveals minimal documentation as to the success of word-finding treatments on discourse performance.

Research Hypothesis

Much research has established that different treatment protocols and techniques can improve participants' word finding in picture-naming tasks (Nickels & Best, 1996). An extension of this line of investigation is examination of the effectiveness of treatment protocols in the natural context of discourse. One method of extending the investigation is to examine ratings of improvement in word finding during discourse tasks before and after treatment (Le Dorze, Boulay, Gaudreau, & Brassard, 1994).

The current investigation used a cognitive-neuropsychological approach to select a semantic-based treatment protocol for two adults with aphasia who demonstrated word-finding deficits. The treatment protocol emphasized decreased time in naming in conjunction with accuracy of word finding. The success of that protocol was measured using the traditional picture-naming methodology as well as discourse performance. It was hypothesized that as a result of treatment, participants would both increase word - finding accuracy and decrease time of naming. It was further hypothesized that these behaviors would generalize to discourse, resulting in improved performance on several measures.

Chapter II – Review and Rationale

Approaches to Treatment for Word-Finding Deficit

Approaches to word-finding treatment have been organized in two ways: reorganization of intact cognitive processes or remediating the underlying deficit. Both approaches will be discussed below.

Nickels and Best (1996a) described the reorganization approach as making use of intact processes to compensate for those that are impaired. Instead of altering the deficit underlying the naming disorder, this approach seeks to capitalize on residual skills to circumvent the naming problem. For example, Bachy-Langedock and De Partz (1989) taught a patient with deep dyslexia, letter-sound relationships to assist in sounding-out words while reading. In addition, they utilized this ability to assist in naming performance. When the patient experienced a word-finding problem, he was instructed to visualize the written form of the word and use his reading skills and sound out the word. In this way, the patient was capitalizing on intact skills of word decoding to circumvent the naming deficit. Results showed a decrease in error rate of naming from 49% to 11% after nine months of treatment.

In another example of the reorganization approach, Nickels (1992) modified the treatment techniques of De Partz (1989). The study was similar in that it focused on improving reading aloud to assist in spoken naming. However, because the subject was unable to blend phonemes together to produce a complete word, the approach was

altered. When the subject was unable to read a word, he would sound out the initial phoneme, which would act as a self-generated cue to read the word. In cases where the subject experienced an instance of word-finding failure, he would use the same visualization of the written form and the subsequent self-generated phonemic cue to produce the word. This technique was also successful in improving naming accuracy. The commonality in these two examples is use of a cue (sounding out a word, visualizing the word form, or sounding out the first phoneme) to provide access to the intact vocabulary.

The second category of approaches to word-finding treatment focuses on remediating the underlying deficit. When focusing on remediation of underlying deficits, one must approach the treatment with one of three assumptions about the word-finding deficit. One may believe that the word-finding impairment is a storage problem, a retrieval problem, or a combination of storage and retrieval problems. Therefore, therapy must focus on reteaching the missing information, improving the functioning of defective access routines, or both (Nickels & Best, 1996a).

Each of the above assumptions regarding altering the underlying deficit of the word-finding problem have different predictions for generalization (Nickels & Best, 1996a). First, *reteaching* information follows the assumption that stored information has been lost and must be relearned. Predictions for generalization are usually guarded, and item-specific improvement is often the result.

Second, improving defective *access routines* assumes that the stored information is still present but that the cause of the word-finding deficit is an access problem. Predictions for

generalization are more optimistic when treatment focuses on improving access to those words.

Why does improving access routines provide more optimistic predictions for generalization? The theoretical assumptions underlying the expectations of generalization include the relatedness of the semantic system. It is assumed that individual words can be accessed through a number of routes. It is further assumed that each access route is also connected to other words in the semantic system. Thus, by improving access routes in word-finding therapy, access to other untreated words will improve.

Semantic Treatment versus Phonological Treatment

Two techniques frequently used to improve access to words are phonological techniques and semantic techniques. The efficacy of these techniques to word-finding treatment has been examined extensively in the literature (Nickels & Best, 1996a). Phonological techniques attempt to utilize phonemic cues to improve access to words (Howard, Patterson, Franklin, Orchard-Lisle, & Morton, 1985; Miceli, Amitrano, Capasso, & Caramazza, 1994; Raymer, Thompson, Jacobs, &. Le Grand, 1993). These cues can include the initial phoneme, blend, or syllable of a word. The technique often starts with clinician-generated or self-generated phonemic cues, and the goal of treatment is improved word finding through unprompted use of these cues.

In contrast, semantic-based techniques use tasks that require an individual to process semantic information about a target word rather than information about the phonological

form of the target. This approach relies upon processing of the meaning of target words and the relationship between words to improve access to target words. The specific tasks vary but usually include some of the following: using semantic information such as categories, antonyms, synonyms, and functions to cue the retrieval of the target word; sentence completion tasks; answering yes-no questions requiring semantic processing; verbal picture descriptions; and picture identification in the presence of distracter pictures.

The key element among these semantic tasks is that semantic processing is required. However, while some propose that the level of semantic processing required in the task will affect the remediation of word finding, initial research has proved inconclusive. For example, Barry and McHattie (1991) investigated whether questions designed to activate increasingly detailed semantic knowledge would influence word-finding ability. Three levels of semantic knowledge were investigated. Questions required general semantic knowledge regarding the broad semantic category of the target (e.g., Is a table or a lemon a fruit?), lexically specific semantic knowledge (e.g., Is a banana or a lemon a yellow citrus fruit?), or some intermediate level of semantic knowledge requiring some within-category information (e.g., Is an apple or a lemon a fruit grown in hot countries?). No significant differences in effectiveness of word-finding ability were found among the levels of semantic processing.

Level of Breakdown and Choice of Treatment

Successful language therapy requires that the treatment method match the level of breakdown in the communicative system. Recent research has supported this view for word-finding deficit by using model-guided assessment to determine the level of breakdown in word finding (Hillis, 1993; Raymer, Rothi, & Greenwald, 1995). Treatment techniques that target this level, either semantic or phonological, are then incorporated in therapy. One model that has proved useful in this regard is derived from cognitive-neuropsychology (Raymer et al., 1997).

A cognitive-neuropsychological approach to language processing combines investigations of performance on language tasks by individuals who are non-neurologically impaired and by persons who have sustained a brain injury. Evidence from this research has led to the development of models of the language processing systems (e.g., Lesser, 1989; Ochipa, Maher, & Raymer, 1998), that attempt to describe how individuals comprehend and produce spoken and written words. Research and clinical practice in aphasia rehabilitation have used these models to identify an individual's level of linguistic breakdown and to then provide therapy addressing that level of breakdown (Hillis, 1993; Raymer, Rothi, & Greenwald, 1995).

One example of a cognitive-neuropsychological approach is in the research and treatment of word-finding difficulties. Although word-finding difficulties are common in aphasia, the underlying cause of the impairment varies across individual patients. Deficits in visual, semantic, and phonological processing can all cause impairments in word-finding

performance. As the understanding of the various deficits that can cause word finding has progressed, the importance of choosing the appropriate therapy approach to address the underlying deficit has grown as well.

In a study of 3 subjects with word-finding problems, Nickels and Best (1996b) investigated whether the different underlying deficits of those word-finding problems could be remediated with the same semantic therapy. Assessment of comprehension and naming tasks showed that all 3 subjects had a semantic deficit causing their word-finding difficulty. The therapy employed with all 3 subjects involved written word to picture matching, however the results of the study were different among the subjects. Two subjects showed long-lasting improved naming of treated items as well as transient generalization to untreated items. The third subject showed no improvement from the semantic therapy. Nickels and Best theorized that the third subject may have had a "different semantic deficit" from the other subjects.

In another example of the movement toward matching the underlying deficit of the word-finding difficulty and the choice of appropriate therapeutic techniques, Ochipa, Maher, and Raymer (1998) used a cognitive neuropsychological model to identify an individual patient's level of breakdown. Once the level of breakdown was discovered, the study evaluated the effectiveness of a semantically based naming treatment in an individual with anomia whose deficit was theorized to result from underspecified semantic guidance in word retrieval. The study examined one subject with aphasia whose impairment resulted from a traumatic brain injury. The treatment approach required the subject to name a picture. If the subject produced a semantic error, the clinician drew a picture of

the error response and then reviewed the similarities and differences between the error response and the target word. Then, the subject imitated the target word. Finally, after 10 seconds, the subject was asked to produce the name again. Improvements were noted in both oral and written naming when the semantically based treatment was applied. Generalization was noted through a 30% improvement of untrained semantic associates.

The above evidence emphasizes the need for better analysis of word-finding deficits in both research and clinical practice. If, as the evidence suggests, differing levels of deficit can affect word-finding performance, then choosing the most efficacious therapy becomes a vital outcome of the diagnostic process. The evidence suggests that therapists and researchers must go beyond the establishment of general word-finding deficits. They must also determine at what level the breakdown is occurring so that an appropriate therapy can be chosen.

Nickels and Best (1996a), in their review of the literature on word-finding therapies, proposed the need for research to address "the role that the precise locus (and degree) of the naming deficit has on the success of any particular therapy task." Conclusions and choices will become clearer through research that specifies the level of breakdown and how the therapy addresses that breakdown.

Why Semantic Treatment?

Nickels and Best (1996a) suggest that semantic therapy is more likely to result in more generalization than phonological therapy. Previous research has shown only item-specific

improvement for phonological techniques (e.g., Hillis and Caramazza, 1994; Miceli, Amitrano, Capasso, and Caramazza, 1996), in contrast to generalization to untreated items for semantic treatment.

Howard, Patterson, Franklin, Orchard-Lisle, and Morton (1985) conducted one of the first important studies indicating that semantic treatment was effective for improving naming performance. This study compared phonological and semantic treatments in 12 subjects with aphasia. The semantic treatment involved auditory word-picture matching with semantically related foils, written word-picture matching, and answering yes-no questions that required access to meaning (e.g., Is a cat an animal?). The phonological treatment involved repetition, phonemic cues, and rhyme judgments. Both semantic and phonological treatments resulted in significant naming improvements, however only the semantic treatment resulted in significant generalization to untreated items. The interpretation of this study was that it presented clear evidence that semantic treatment was effective. Furthermore, for some patients, semantic treatment resulted in more generalization than phonological treatments.

In a series of studies by Pring and colleagues (Davis & Pring 1991; Marshall, Pound, White-Thomson, & Pring, 1990; Pring, White-Thomson, Pound, Marshall, & Davis, 1990), variations on the semantic therapy of picture-word matching task used by Howard et al. (1985) were investigated, with generally positive results. Marshall et al. (1990) investigated the effects of a semantic task that required matching one of four written words to a picture. The written words comprised the target, as well as two semantically related words and an unrelated word. Post-therapy assessment indicated significant

improvement for treated items and semantically related foils, but not for unrelated foils and items not appearing in therapy. This improvement was maintained one month after therapy concluded.

In their investigation of a picture and word matching task, Pring, Hamilton, Harwood, and Macbride (1993) found generalization to non-target items that appeared in the therapy task. The semantic task involved making decisions between target words and pictures that included distracters. Improvement, as measured by the number of items correctly named from a closed list, was found for items directly targeted in the therapy task and for items which appeared as distracters. Related items that did not appear in the therapy task did not improve. This study provides evidence that, for certain patients, semantic therapy can result in generalized improvement of word finding.

Some research studies have attempted to pinpoint the exact mechanism operating in semantic therapy. In their study of the contrasting effects of a semantic versus a formal-semantic intervention technique on the naming performance of a patient with anomic aphasia, Le Dorze, Boulay, Gaudreau, and Brassard (1994) used a single-subject study of a patient with a moderately severe mixed aphasia and anomia. The focus of the study was investigating the importance of the appearance of the written or spoken target word during the semantic therapy. The formal-semantic therapy included pointing to the picture (along with distracters) with an auditory presentation of a stimulus word, matching the written word to the picture, and answering a yes-no question requiring semantic judgment. The semantic therapy technique included the same comprehension tasks, except a definition always replaced the written or spoken target word.

Results indicated that the naming performance improved significantly under the formal-semantic therapy condition, but there was no change under the purely semantic therapy. Le Dorze et al. (1994) stated that the results indicated that the inclusion of word forms is a critical element in the facilitation technique.

As the above evidence suggests, semantic therapy can improve word finding. However, it is important to question how those studies showed improvement as a result of word-finding therapies. Was improvement measured through a picture-naming task or through change in conversational discourse?

Measuring Success in Word-Finding Treatment

In the literature on word-finding therapy, there are many studies which report improved naming abilities as evidenced by the above examples. Although the semantic therapy tasks vary, the dependent variables used to measure change are consistent. Most studies of word-finding deficits measure success through a subject's improved accuracy of naming a subset of pictures in a structured stimulus-response format.

For example, Wiegel-Crump and Koenigsknecht (1973) measured success by the percentage correct in picture-naming of 150 pictures at six-session intervals and the percentage correct of the 20 drilled and 20 non-drilled items. They investigated the effects of word-finding therapy amongst 4 adults with aphasia with deficits in picture naming. After an initial screening of 150 pictures, 20 drilled and 20 non-drilled items were randomly selected from the list of error words. Upon incorrect response, therapy

consisted of giving various auditory-verbal cues including gestures, associated words, synonyms, carrier phrases, and initial phoneme or syllable cues to stimulate the correct response. After 6, 12, and 18 sessions, progress in naming performance was measured for drilled, non-drilled, and total items named. The mean latency of response for the items was also measured.

In their investigation of the effects of the amount of stimulus repetition on naming performance, Helmick and Wipplinger (1975) measured success by the change in the naming accuracy of 45 pictures by a man with mild aphasia. The 45 pictures were randomly assigned to one of three conditions: maximum stimulus repetition (24 stimulus repetitions per word), minimum stimulus repetition (6 stimulus repetitions per word), and nontreated words. Daily pretests measuring the number correct out of the 45 aforementioned pictures were used to chart progress. At the end of 4 weeks of therapy, a final posttest of the 45 stimulus pictures was taken. Two weeks after therapy was terminated, the patient was asked to name all 45 pictures again.

Seron, Deloche, Bastard, Chassin, and Hermand (1979) measured success by the number of errors in naming and semantic classification of 240 target items. In their comparison of therapy techniques that focus on recovery of access strategies versus reteaching lexical items, Seron et al. used a pre- and post-test assessment to demonstrate change. The testing consisted of a naming task and a semantic classification task, both of which consisted of the same 240 target items. The number of naming and semantic classification errors were measured before and after 20 therapy sessions.

Huntley, Pindzola, and Weidner (1986) measured success by the number correct of a

possible 96 word responses. They investigated the effects of various cue combinations on the photograph naming abilities of 16 subjects with aphasia who were categorized as mild or severe naming disordered. The cues included sentence completion, initial syllable, printed word revealed by letter, word spelled aloud, and a multiple choice cue of printed words. These cues were arranged into 8 two-cue combinations. Effects of each of the cue combinations were measured out of 96 possible word responses (8 cue combinations x 12 word stimuli per cue combination).

In their investigation of the generalization of naming after picture-word matching tasks, Pring et al. (1993) used sets of 72 pictures that related in context, such as items in a kitchen, items related to personal dress and appearance, and items used in gardening to measure success. Each set of 72 pictures was organized into three subsets of 24 items, each acting as treated items, related distracter items that appear in the task, and related items that did not appear in the task. Treatment lasted for two weeks and consisted of a word to picture matching task and a picture to word matching task. The number of the 24 treated, 24 related distracters seen, and 24 related items unseen were measured pre- and post-therapy as evidence of improvement.

The commonality in the above studies is that success was measured within a structured naming task using a closed set of words and pictures. The tasks require one-word responses to picture stimulus presentation. These measures of success are reasonable; however, additional questions present themselves when thinking about making functional gains for people with aphasia. Conversational discourse is what makes up most of our communication. The ultimate goal of our profession is to improve natural communication,

which implies improving discourse ability. How is improving a subject's ability to name pictures presented on index cards functional? Is therapy focusing on improving picture naming efficacious in today's atmosphere of limited therapeutic resources?

While it is very important to show progress in the words targeted in therapy to establish the effectiveness of the chosen therapy, further analysis of functional change in natural communication is also vital. If improved conversational discourse can be established from word-finding therapy, then it can be said that valuable therapeutic resources are being used to make functional changes in patient's communicative abilities.

Naming and Discourse

It is a rare occurrence when we are asked to identify objects or pictures with one-word answers. Natural interaction usually involves much more than single-word responses to pictures. The ability to retrieve words during discourse involves much more cognitive demand and often does not involve the use of a picture or object to cue retrieval. Natural use of language requires split-second access to words in more abstract contexts. Furthermore, a fundamental tenet of language is the ability to use words without the referent in the context. This demand of competent language use seems to oppose the common word-finding tasks that utilize the stimulus referent to produce the word.

Moreover, the increased processing requirements of discourse include attention to the context of the interaction, the topic, the partner, and all of the demands of syntactic, semantic, and pragmatic use of language. When treating naming disorders, the ultimate

goal for many patients is to improve word retrieval in natural contexts. However, as discussed previously, most studies investigating the efficacy of word-finding treatment do not measure naming or word finding in natural contexts.

Some attempts have investigated discourse abilities of patients with aphasia and naming disorders. Nicholas, Obler, Albert, and Helm-Estabrooks (1985) attempted to distinguish between patients with Alzheimer's dementia, Wernicke's aphasia, anomic aphasia, and a control group based on their discourse derived from a picture description task. The study was intended to address the difficulty in the differential diagnosis of the above disorders with respect to their discourse. Based on their experience, the researchers attempted to describe discourse through 14 variables that were present in empty or noninformative speech. Also, Nicholas et al. investigated the correlation between naming abilities and 14 variables associated with empty discourse production. Results indicated that indefinite terms and deictic terms were the only measures in which the subjects with anomic aphasia significantly differed from the normal controls; subjects with anomic aphasia produced more of both measures.

While the Nicholas et al. study was an attempt to measure discourse abilities of subjects with aphasia with naming disorders, it was not a study of the effectiveness of word-finding therapy. However, the aforementioned LeDorze et al. (1994) study did include an assessment of the subject's discourse. The study investigated the importance of the word form versus a definition in the effectiveness of three semantic therapy tasks. Along with a more structured closed-set assessment of naming, the study used the subjective rating of the subject's narrative description of the "cookie theft" picture of the

Boston Diagnostic Aphasia Exam (Goodglass & Kaplan, 1983) and the "bank robbery" picture of the Montreal-Toulouse Aphasia Battery (Nespoulous, Lecours, Lafond, Lemay, Puel, Joanette, Cot, & Rascol, 1986). The subjective ratings occurred both prior to and after the intervention. Le Dorze et al. asked eight speech and language pathologists to rate the subject's ability to transmit a message, find adequate words, and the quantity of information provided in the two picture description tasks on a 5 point scale from 0 (*poor*) to 5 (*excellent*). While some positive changes were perceived in the narrative discourse performance of the subject, no data were provided to explain what aspects of discourse had changed. Therefore, the effects of the naming therapy on the discourse performance of the subjects cannot be objectively defined.

In their investigation of semantic and phonological treatment tasks, Davis and Pring (1991) included a composite picture description task to investigate generalization to other situations. Seven subjects with aphasia following stroke were treated under three conditions: word to picture matching with related distracter pictures, word to picture matching with unrelated distracter pictures, and repeating the picture name in presence of picture. The primary assessment of treatment effects was confrontation naming of the pictures prior to therapy, after therapy, and at 1- and 6-month intervals. However, to assess more functional communication change from the treatments, researchers included a composite picture description task that forced subjects to produce picture names in sentence contexts. The number of pictures named correctly in the composite picture task was measured at the same time intervals mentioned above.

While these studies assess more naturalistic naming performance than confrontation

naming tasks, there are still many questions left unanswered. What specific changes in discourse performance result from naming therapy? What discourse variables changed as a result of word-finding therapy? Some evidence has been reported that suggests improvement in discourse, although improvement was measured through subjective ratings (Le Dorze et al., 1994). Objective data demonstrating that word-finding therapy has a positive effect on a patient's conversational discourse should be the next step in the research of the effectiveness of specific treatment tasks.

Importance of Timely Word Finding in Discourse

If it is important to improve word finding in conversational contexts, then one must isolate the reasons why discourse is disrupted with word-finding difficulty. In addition to the communication of intended meaning, one of the factors that makes word-finding problems disruptive in discourse is the delayed latency of response. The demands of discourse require split-second retrieval of words that depends on the changing context. In many instances, the most notable change in the discourse of a person with anomic aphasia is the delayed access to words.

Therefore, word-finding therapy must not only improve the access of the desired word but it also must reduce the latency of the retrieval. Wiegel-Crump and Koenigsknecht (1973), in their aforementioned study, found that a therapy program of concentrated language drill led to significant improvement in accuracy and latency of response in word retrieval skills for picture-naming by adults with aphasia. In addition to increasing picture

naming accuracy from zero to an average of 84% following 18 therapy sessions, the mean latency of response decreased from 24.4 seconds to 3.3 seconds.

The concept of drill in therapy to increase accuracy and decrease latency is common. One has only to reflect on one's own education to recall instances in which repeated drilling was used as a study technique. Many children are required to learn multiplication tables and do so through repetition. In the process, the time in which children recall the answers seems to steadily decrease.

In a non-neurologically impaired person, finding words while conversing is usually a simple and unconscious act. However, all people experience instances when they cannot retrieve a word. This inability is what people with anomia deal with regularly. The ultimate goal for therapy is to improve the client's word-finding ability. Inherent in that process is to decrease the time required for word retrieval. This is especially true in the discourse process, which requires split-second retrieval abilities to stay on topic.

Resource Allocation Theory

If each of us has limited resources when it comes to language and speech, then the amount of resources required to produce a response must affect our remaining abilities. Do certain tasks require more resources than others? From experience, many people believe that certain tasks do require more cognitive effort. In aphasia research, there is some evidence that the complexity of the task has an influence on the performance of the subjects. For example, in their investigation of the auditory comprehension of yes-no

questions by subjects with aphasia, Bacon, Potter, and Seikel (1992) found that performance on the tasks decreased as the stimuli became more abstract. In other words, as the questions became more abstract, the demands on the subjects increased which ultimately affected the accuracy of the responses.

Based on resource allocation theory, the amount of resources required to process an answer affects the availability of co-occurring processing. Because discourse performance is a more demanding task than picture naming, investigation of word finding in such a context should be the ultimate measure of efficacy in therapy for naming disorders for the subset of subjects who can use discourse. For severely impaired subjects, assessment in discourse context would not be appropriate.

As was mentioned previously, one important goal of word-finding therapy should be decreasing the latency of response. That is, word-finding therapy must make access to words more automatic than pre-treatment levels. With increased automaticity, more resources are available for the demands of discourse. Therefore, the two-fold goal of increasing the accuracy of word finding as well as decreasing the time required to access those words should produce measurable change in discourse performance as well as structured naming tasks.

Research Questions

It is the intention of this study to investigate whether a semantic therapy task adapted to stress automaticity of response will affect discourse production in a picture description

and a spontaneous speech task. The present study will utilize a common set of semantic therapy tasks adapted to stress automaticity of response. It will emphasize the speed at which words are retrieved, attempting to make the access more automatic. Based on the theory that we have finite cognitive and linguistic resources to bring to a task, it is hypothesized that as a result of behavior change following treatment, more resources will be available to produce speech and language in a conversational context. Change will be measured in structured naming tasks as well as discourse tasks. Objective measures will be used to quantify the change in the discourse performance resulting from the semantic therapy.

Therefore, two research questions will be addressed by the study. First, will semantic therapy increase the accuracy of naming and decrease latency, as measured by total naming time? Second, will an increase in accuracy of naming and a decrease in total naming time result in an increase in efficiency in discourse?

Chapter III - Methodology

The study employed a multiple baseline across treatment sets design for two participants. The effects of four weeks (12 sessions) of semantic therapy were measured on naming and discourse performance.

Participants

Speech-language pathologists from the mid-Michigan area referred three individuals with aphasia for possible inclusion in the study. All were described as having aphasia with predominantly expressive difficulties characterized by a word-finding problem. One individual (F.S.), a 71 year-old male, was disqualified from the study after pre-experimental testing because his naming impairment was too mild. During target selection, F.S. incorrectly named 47 of 210 pictures, fewer than the required 60 or more errors.

Both participants with aphasia who were included in the study met requirements for several demographic characteristics including age, education, handedness, insult location, post-onset duration, native speaker, history of mental illness or substance abuse, and current treatment status. Table 1 displays the demographic information for both participants illustrating homogeneity between them.

Participant 1 (D.R.) was a 73 year-old male who incurred a left-hemisphere cerebrovascular accident (CVA) 1 year and 8 months prior to this study. He was

Table 1: Pre-Experimental Demographic Characteristics of Participants with Aphasia

	D.R.	A.H.
Age	73	48
Education	Post-graduate degree	Associate's degree
Handedness	Right	Right
Insult	CVA-Left Hemisphere	CVA-Left Hemisphere
Post-Onset Duration	1 Year, 8 Months	1 Year, 10 Months
Native Speaker of English	Yes	Yes
History of Mental Illness/Substance Abuse	None	None
Current Speech/Language Treatment	None	None

described by his wife as being frustrated at his inability to express his thoughts and feelings. Participant 2 (A.H.) was a 48 year-old male who incurred a left-hemisphere cerebrovascular accident 1 year and 10 months prior to this study. He was described by his wife as having trouble talking because of pauses in his speech. The location of the CVA in the left-hemisphere was confirmed for both participants through a review of participants' medical records.

In addition to the demographic criteria, each participant with aphasia met two pre-experimental criteria designed to assess the following: confounding communication impairments, and the presence and type of word-finding impairment. The test batteries were given in full to participants before decisions were made on inclusion in the study.

Assessment to Control for Confounding Communication Impairments

The Tasks for Assessing Motor Speech Programming Capacity (TAMSPC) (Duffy, 1995) were given to exclude severe apraxia of speech. Both participants displayed mild apraxic behaviors. The Rating Scale Form for Deviant Speech Characteristics (Duffy, 1995) was used to rule out the confounding effects of dysarthric behaviors on discourse performance. D.R. and A.H. were both rated as normal, indicating the absence of any dysarthric behavior. A hearing screening was given to rule out the effects of a hearing impairment on communicative abilities. The signal was presented at 25dB HL at 1000, 2000, and 4000 Hz. Both participants passed.

Both subjects were also given yes-no questions to assess auditory comprehension skills, as well as a task of pointing to pictures of common household objects to exclude

visual agnosia. The pictures consisted of cup, fork, candle, broom, book, television, brush, clock, door, iron, light bulb, and rocking chair. D.R. and A.H. were 100% accurate on both tasks. The Aphasia Severity Rating Scale from the Boston Diagnostic Aphasia Exam (Goodglass & Kaplan, 1983) was used as an overall assessment of the severity of the participants' aphasia. D.R.'s aphasia was rated 4 and A.H.'s aphasia was rated 3. Both participants displayed mild communication difficulties in conversation.

Assessment to Confirm Presence and Type of Word-Finding Deficit

Both participants were given an assessment to document that the underlying etiology of the word-finding difficulty was in the semantic system. A cognitive-neuropsychological model, as shown in Figure 1 (Raymer, Foundas, Maher, Greenwald, Morris, Rothi, & Heilman, 1997), was used as a guide to find the locus of the word-finding impairment.

The model in Figure 1 presumes that accurate word finding is dependent upon an intact semantic system that contains meaning information for words. The semantic system can be accessed through the different input modalities of auditory words, written words, or viewed objects. The input lexicons allow for recognition of stimuli. In addition, the phonological and orthographic output lexicons store word forms for pronunciation and spelling of familiar words. Raymer et al. (1997) also include the sublexical processes involved in grapheme-to-phoneme and phoneme-to-grapheme conversions that are independent of the semantic system. Many lexical tasks rely on the coordination of the above systems. In particular, oral and written naming depend on the access of meaning information as well as the selection of word forms in the corresponding output lexicons.

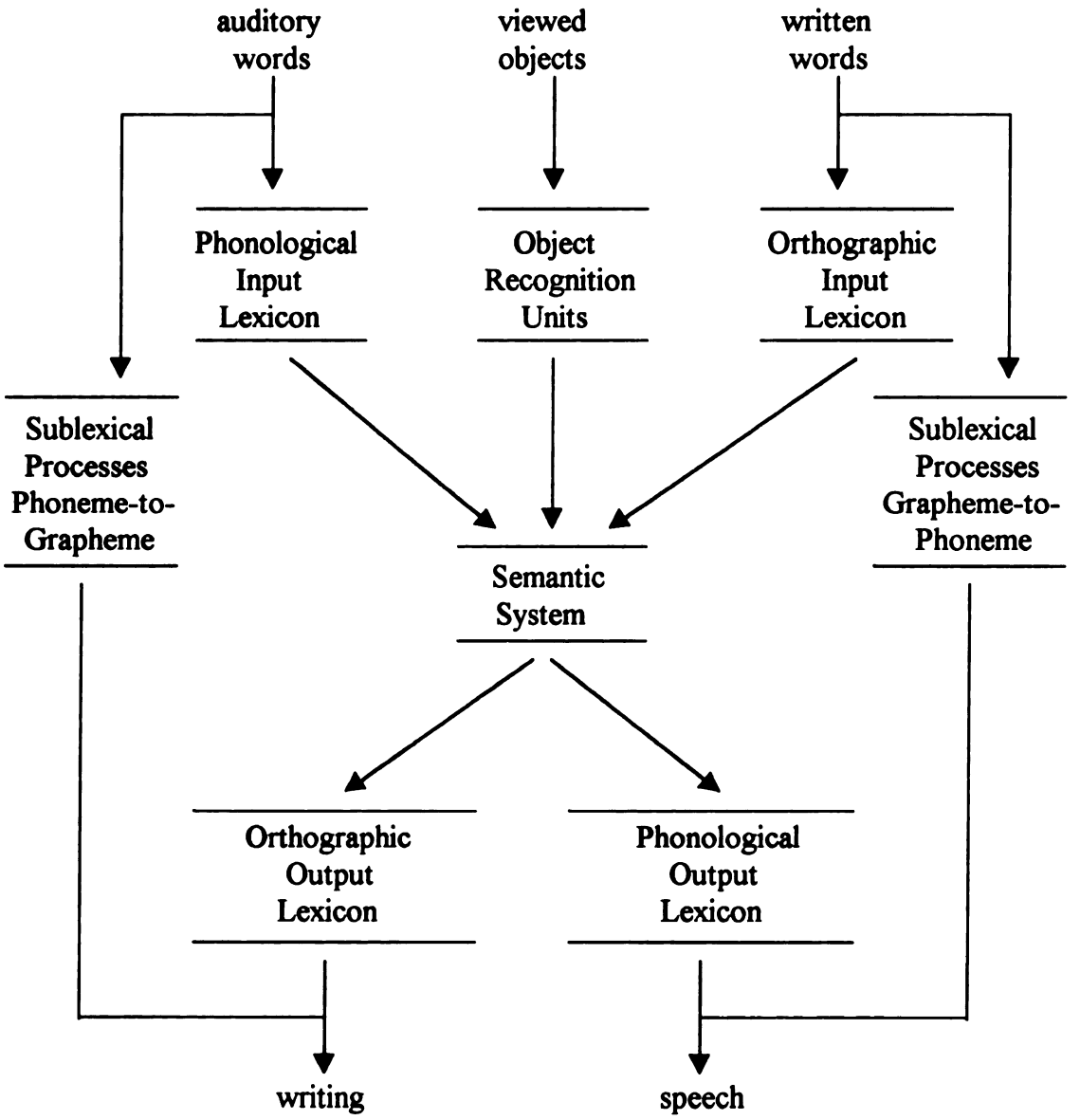


Figure 1. Model of Lexical Processes Involved in Oral and Written Naming (Raymer et al., 1997).

To establish a semantic deficit underlying the naming failure, analysis of performance patterns (both of accuracy and errors) across lexical tasks were undertaken. The typical performance pattern for a semantic impairment in naming includes multimodal naming failure (oral and written) for all forms of input (e.g., pictures, written words, auditory definitions) and errors that are semantic in nature (Raymer et al., 1997). Auditory and reading comprehension deficits may be evident, particularly with semantic distracters in the tasks. If sublexical processes are impaired, semantic errors may be anticipated in oral reading and writing to dictation. Finally, item-specific error consistency may be demonstrated across tasks.

All participants were given an assessment battery aimed at documenting that a word-finding impairment was present and was a result of insufficient semantic information activated to specify retrieval of the correct lexical item in the output lexicon. The assessment battery included the following:

1. The Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983) was used which consisted of 60 line-drawn pictures of graded difficulty. D.R. scored 24/60 while A.H. scored 37/60. Both participants scored within one standard deviation of the mean number correct for aphasics with a BDAE severity rating of 3, demonstrating a mild to moderate expressive aphasia. An error analysis revealed predominately semantic errors for both participants. D.R.'s errors were 66% semantic and A.H's errors were 70% semantic.

2. Subtests of the Psycholinguistic Assessment of Language Processing in Aphasia (Kay, Lesser, & Coltheart, 1992) were used to further determine the type of word-finding impairment for both participants.

(a) The auditory word-picture matching subtest was used to assess auditory comprehension ability, and the written word-picture matching subtest assessed written comprehension ability. D.R. scored 95% and 98% respectively. A.H. scored 88% and 90% respectively. Both participants showed the ability to access the semantic system through spoken and written inputs. In addition, both showed the ability to perform the experimental treatment tasks of auditory and written word-picture matching.

(b) The oral reading of words and nonwords subtests were used to assess the sublexical process of grapheme-to-phoneme conversion. Both participants showed impaired oral reading although A.H.'s impairment was more severe. D.R. read words with 90% accuracy and nonwords with 58% accuracy. A.H. read words with 63% accuracy and nonwords with 13% accuracy.

(c) The writing to dictation subtests were used to establish functioning of the sublexical process of phoneme-to-grapheme conversion. Participants wrote single words and nonwords presented orally by the examiner. D.R. scored 80% for words and 30% for nonwords. A.H. scored 10% for words and 0% for nonwords. Both participants showed impaired functioning of the phoneme-to-grapheme conversion process although A.H.'s performance was further compromised by paresis of right upper extremity.

3. Further assessment of each participant's naming impairment was also performed using both picture naming and naming from auditory definitions. Oral and written picture naming was evaluated using 50 line drawings taken from the Snodgrass and Vanderwart collection (1980). The collection included 260 pictureable nouns selected across 15 common categories from the Battig and Montague (1969) category norms. Snodgrass and

Vanderwart collected 40 subjects' ratings of the familiarity of the pictures on a 5 point scale (1 being very unfamiliar and 5 being very familiar). To control for the confounding effects of word familiarity on naming performance, ratings for the 50 pictures were 2.5 and above. High familiarity words were used with the intention that if a naming impairment was evident with high familiarity words then an impairment with low familiarity words could be inferred. Half of the 50 pictures were assigned to oral naming and half to written naming.

D.R. scored 18/25 on oral naming and 18/25 on written naming. An analysis of D.R.'s naming errors revealed predominantly semantic errors. D.R.'s oral naming errors were 86% semantic and written naming errors were 57% semantic. A.H. scored higher on oral naming with 24/25 but lower on written naming with 5/25. A.H.'s one oral naming error was semantic while analysis of his written errors was not performed due to illegible writing secondary to right paresis.

Because of the fact that high familiarity words were used, A.H.'s oral naming score of 24/25 was considered a mild impairment. Both subjects displayed errors in both modalities, giving evidence of deficits in the semantic system instead of either output lexicon.

Oral and written naming from auditory definitions was also assessed. The stimuli consisted of the same 50 target words used in the picture-naming task with definitions given as stimuli instead of pictures. The 25 target words used in oral picture naming were used in written naming from auditory definitions. The 25 target words used in written picture naming were used in oral naming from definitions.

Both participants showed deficits in naming from auditory definitions. D.R. scored 20/25 on oral naming from definitions with 60% semantic errors and 16/25 on written naming from definitions with 44% semantic errors. A.H. scored 18/25 on oral naming from definitions with 100% semantic errors and 2/25 on written naming. Error analysis was not performed on written naming from definitions due to illegible writing from A.H.

Summary of Pre-Experimental Assessment of Participants

A summary of both participants' pre-experimental test results is included in Table 2. Both subjects displayed both oral and written naming failures for pictures and auditory definitions. In addition, error analysis revealed predominantly semantic errors. For both D.R. and A.H., the percentage of semantic errors was always greater than phonologic or spelling errors. Table 2 displays evidence that both participants' naming impairments are of the semantic type.

Materials

The materials for the experimental paradigm consisted of a subject profile form (see Appendix A), a data collection form for treatment tasks (see Appendix B), a data collection form for discourse variables (see Appendix C), and 260 line drawings from the Snodgrass and Vanderwart collection (1980). The line drawings were placed on 4 in. x 6 in. cards.

In addition, a 3' x 4' posterboard was used. The picture on the posterboard depicted a family at a museum. In the picture, there were 10 empty frames in which pictures can be

Table 2: Pre-Experimental Test Results of Participants with Aphasia

	D.R.	A.H.
TAMSPC	Mild Apraxic Behaviors	Mild Apraxic Behaviors
Rating Scale Form for Deviant Speech Characteristics	Normal	Normal
Hearing Screening	Passed	Passed
Yes-No Questions	15/15	15/15
Point to Pictures on Auditory Presentation (Household Items)	12/12	12/12
BDAE Severity Rating	4	3
Boston Naming Test	24/60	37/60
Semantic Errors	67%	70%
Phonologic Errors	33%	17%
Other	0%	13%
PALPA		
Auditory Word-Picture Matching	38/40	35/40
Written Word-Picture Matching	39/40	36/40
Oral Reading		
Words	27/30	19/30
Non-words	14/24	3/24

Table 2 (cont'd).

	D.R.	A.H.
PALPA		
Writing to Dictation		
Words	16/20	1/10
Non-words	6/20	0/10
Picture Naming		
Oral Naming	18/25	24/25
Semantic Errors	86%	100%
Phonologic Errors	14%	0%
Written Naming	18/25	5/25
Semantic Errors	57%	*
Spelling Errors	43%	*
Auditory Definitions		
Oral Naming	20/25	18/25
Semantic Errors	60%	100%
Phonologic Errors	0%	0%
Other	40%	0%
Written Naming	16/25	2/25
Semantic Errors	44%	*
Spelling Errors	22%	*
Other	34%	*
Oral Picture Naming-Target Selection	119/210	150/210
Comprehension of Misnamed Target Words	100%	100%

*A.H. used left hand because of right paralysis. Writing output was illegible at times and therefore not classified.

placed with Velcro. The materials also included a Sony TCM-929 tape recorder, a Sony CCD-TRV65 video camera recorder, a tripod, and a Timex Ironman digital stopwatch.

Procedure

Setting

Each participant was given the option of scheduling the treatment at their residence or the Oyer Speech-Language-Hearing Clinic at Michigan State University. D.R. chose to meet at the clinic while A.H. chose his residence. The treatment procedure consisted of 4 baseline sessions and 12 treatment sessions over 4 weeks. The sessions required about one hour each and consisted of completion of all tasks in the treatment protocol. In addition, each participant was required to complete four discourse tasks pre-treatment, mid-treatment, and post-treatment. The participant and the experimenter were present during the sessions. All sessions were videotaped.

Determination of Target Words

Both participants were required to name 210 pictures before the initial baseline session (Snodgrass and Vanderwart, 1980). Of the incorrectly named pictures, 30 were assigned to treatment set A and 30 to treatment set B, and the remaining pictures were assigned to set C for assessment of generalization. As seen in Table 2, D.R. correctly named 119/210 (91 errors) and A.H. correctly named 150/210 (60 errors). Both D.R. and A.H. displayed 100% comprehension of the error words in a point to the picture task. Each participant's

error responses were randomly placed in a 5 x 5 matrix. The participants were simply asked to point to a picture given the auditory presentation of the target words. Only D.R.'s errors were sufficiently high to allow for assessment of generalization with set C.

Selecting the 60 incorrectly named words with the highest rating controlled effects of word familiarity. The rationale for selecting target words with the highest word familiarity ratings was that progress during treatment would be more likely with more familiar words. An alternating selection process beginning with the most familiar word was used to assign the words to set A or set B. Since the research design was a multiple baseline across treatment sets design, participants acted as their own controls. Thus, mean familiarity ratings for each participant's set A and B needed to be similar. D.R.'s mean familiarity ratings were 3.44 for set A and 3.40 for set B. A.H.'s ratings were 2.91 for set A and 2.85 for set B, showing that the effect of word familiarity was controlled for in each participant's target selection.

Experimental Design

A single-subject multiple baseline across treatment sets design was used to investigate the effects of a semantic-based treatment on picture-naming performance and discourse performance. The design required each participant to have two sets of 30 target pictures, designated as set A and set B. For each participant, the dependent variables in the experimental paradigm were naming accuracy and total naming time. Baseline measurement for both set A and B began in unison. Baseline for set A was measured every session while set B was measured every other session to control for rehearsal

effects.

In addition, four discourse samples were collected from each participant pre-treatment, mid-treatment, and post-treatment. The four types of discourse samples were a picture description sample, a monologue sample, a storytelling sample, and a conversational sample.

Measurement of Naming Performance

At each session, for both baseline and treatment, the 30 target pictures were placed in a 6 x 5 matrix while the participant's head was turned away. The experimenter then directed the participant's attention to the upper left-hand corner of the matrix by pointing to it. The experimenter instructed the participant to "Look up here. Start here and name all the pictures as quickly and clearly as you can. Start now." Accuracy of naming and total naming time were measured. Determination of a correct response was done online. Self-corrections were allowed to simulate ecological speaking performance. Total naming time was defined as the period beginning with the experimenter saying "Start now" and ending with the participant's last naming response. Each session consisted of three naming trials everyday for set A and every other day for set B.

Baseline Procedure

For baseline procedures, the experimenter measured naming performance for set A using the above procedures. Baseline was measured every session for set A and every other session for set B. Baseline sessions required approximately 30 minutes. The

establishment of baseline stability was attained before initiating the treatment protocol for set A. The criterion set for baseline stability was a less than 10 percent change in number correct over three consecutive sessions. While total naming time was also measured in baseline, its stability was reported descriptively. Decisions to begin treatment were made regarding baseline stability of the number correct for set A.

Set B was held in baseline until two criteria were attained. First, improvement of at least 20 percent (equivalent to six target words) was attained after treatment began on set A, and second, baseline stability for set B had to be attained. Baseline stability for set B was defined as four consecutive sessions of less than 10% change in the number correct. When these criteria were met, treatment began for set B.

The Semantic-Based Treatment Technique Modified to Increase Automaticity

The study utilized three commonly used semantic techniques (Howard et al., 1985; Pring et al., 1990; Marshall et al., 1990; Davis & Pring, 1991; Le Dorze et al., 1994).

1. Participants pointed to the picture upon auditory presentation of a stimulus word (picture was presented along with four distracter pictures). The distracter pictures included two within-category items and two semantically-unrelated items. The semantically-unrelated items were chosen randomly from the other categories in the Snodgrass and Vanderwart collection (1980).

2. Participants pointed to the picture upon written word presentation. The corresponding picture was presented with the same set of picture foils serving as distracters.

3. Participants answered a yes-no question that specified an attribute of the target item (e.g., "Do dogs have four legs?"). The yes-no question, stated by the experimenter, required a semantic judgment by the participant.

The intervention required that the participants perform each of the three semantic tasks for 15 of the 30 words in the training set at every session. With a total of 12 sessions, each target word was trained a total of six times. The words in the training set were randomly assigned a 1 or 2. Target words for each session alternated between the odd and even numbered pictures. The order of presentation during each session was also randomly selected by shuffling the 15 pictures before beginning the session. In addition, the order of the three treatment tasks for each picture was randomly assigned.

For each response, the experimenter confirmed correct responses. The experimenter responded to incorrect performance by saying, "No, that is incorrect" and then presented the stimulus again. If the response was correct, the experimenter confirmed the response. If it was incorrect, the experimenter then gave the correct answer and described the semantic properties of the target word.

Following the semantic-based treatment technique, the treatment technique for increasing speed of response and automaticity was initiated. Total naming time was measured in the manner described earlier (see p. 36). To stress automaticity of response, the participant had three trials of naming per set of pictures. The participant was told his total naming time after each trial, and the experimenter said, "Good, now try to name them faster." A summary of the activities for the daily sessions is presented in Appendix D. It includes a flow chart of the intervention protocol.

Procedure for Discourse Samples

Each participant was asked to engage in three discourse assessment sessions. The sessions included elicitation of four types of language samples: a picture description sample, a monologue sample, a storytelling sample, and a conversational sample.

For the picture description sample, the experimenter told the participant to describe a picture in as much detail as possible. The picture consisted of people at a museum with five target pictures from set A and five from set B placed in the frames.

For the monologue sample, the experimenter instructed the participant to describe his weekend or his family in as much detail as possible. For the storytelling sample, the participant was instructed to tell the story of Cinderella or the Wizard of Oz. Finally, the experimenter engaged in conversation with the participant about various topics such as sports, family, and hiking.

The analysis of each sample encompassed the middle three minutes of the sample. To select this sample, the experimenter calculated the length of the entire sample and subtracted three minutes. Then, the remaining time was divided in half. This number was added to the starting time of the sample and became the beginning of the three-minute sample.

The three-minute discourse samples were orthographically transcribed from the videotape, and transcripts were arranged for analysis by utterance. Utterance boundaries were determined using Lund and Duchan's (1988) guidelines for segmenting utterances. Appendix E contains the orthographic transcriptions of D.R.'s and A.H.'s discourse samples elicited for the study.

Dependent Variables

Variables measured at each session.

At the end of each session the naming trials were performed. The number of pictures correctly named and the total naming time required were measured by procedures described above (see page 36).

Discourse variables.

The following variables were measured pre-treatment, mid-treatment, and post-treatment for all four types of discourse samples described above: number of pauses greater than 2 seconds in length, number and type of paraphasias (verbal, literal, and neologistic), number of word retrieval failures, instances of indefinite reference (i.e., using terms such as thing, something, or stuff), MLU, total words, type-token ratio, and instances of circumlocution.

Assessment of generalization.

All misnamed target pictures from the 210 pictures initially assessed, and which were not assigned to set A and B, were used to assess generalization. Naming performance was assessed pre-treatment and post-treatment using the same procedures as for set A and B during the treatment. However, only D. R. misnamed enough pictures to form a generalization set.

Data Collection

Accuracy of naming and total naming time were collected at each session. Performance in the three semantic-based treatment tasks was charted using the form in Appendix B.

The data form in Appendix C was used to collect the discourse variables.

Data Analysis

Naming accuracy and total naming time.

Naming accuracy and total naming time data were examined for the rate and magnitude of change, using visual inspection of graphic data and the split-middle technique (White, 1974). Baseline and treatment levels of naming accuracy and total naming time were plotted for both participants. Visual inspection was used to determine a positive, negative, or neutral trend for baseline and treatment phases. Comments on the slope and level of performance were also made using visual inspection.

Furthermore, White's (1974) split-middle technique, (as discussed in Kazdin, 1982), was used to describe the rate of behavior change in naming accuracy and total naming time for both participants. The split-middle technique was applied to the graphs of baseline and treatment phases, and celeration lines (representing acceleration or deceleration) were drawn for both phases for each participant.

The split-middle technique is a method of smoothing data to determine likelihood of change. It requires that a series of median split lines be drawn, dividing the data points in the target section into two equal groups, without regard to the data values marked on the abscissa or ordinate. Separate celeration lines were drawn for each participant's baseline and treatment phases.

The procedure for drawing a celeration line in one phase (baseline or treatment) was as follows. First, a median split line was drawn from the abscissa, dividing data points into

two equal groups. Then a median split line was drawn, again from the abscissa, in each of the two sections created. Next, two median split lines were drawn from the ordinate (one for the group of data points in each section created after the first median split line). In each of the sections created from the first median split line, the median split line from the ordinate and the second median split line from the abscissa were extended until they intersected, creating an intersection point for the group of data points in each section. Finally, the two points of intersection were connected, forming a celeration line that expressed the rate of behavior change within the target section.

Trend, slope, and level of the data were calculated from the celeration lines. Trend (the direction of the celeration line) was determined by visual inspection of the celeration lines in both baseline and treatment phases. Slope (the amount of change in a celeration line) was determined by the ratio of the ordinate intercept of the initial and final points of each celeration line. Level of the celeration lines (the difference between baseline and treatment phases) was calculated by comparing the ordinate intercepts of the final point in the baseline phase celeration line and the initial point in the treatment phase celeration line.

Comparison of celeration lines for rate and magnitude of change allowed judgments of treatment effectiveness. Rate of change was measured by trend, change in slope (calculated as the ratio of baseline slope to treatment slope), and latency of change (defined as time of change in the treatment phase slope relative to the first data point in the treatment phase). Magnitude of change was measured by change in level (calculated as the ratio of the last data point in the baseline phase to the first data point in the treatment phase).

The statistical significance of the change across phases was evaluated by projecting the baseline celeration line through the treatment phase, and noting the number of data points in the treatment phase that were above or below the extended baseline celeration line. Under the null case, it is hypothesized that there is no difference in performance between the baseline and treatment phases, resulting in equal celeration lines (trend and slope) in baseline and treatment phases, and half of the data points in the treatment phase above the projected baseline celeration line and half below. The binomial test (Siegel, 1956), with $p = .05$, was used to test this hypothesis.

Discourse variables and naming accuracy of untrained stimuli.

Discourse variables were collected three different times (pre-treatment, mid-treatment, and post-treatment). Change in the frequency of occurrence for the discourse variables was examined over time.

Chapter IV - Results

Reliability

Naming Data

Interjudge reliability for naming data was conducted by comparing the experimenter's scores with those of a research assistant with a bachelor's degree in Audiology and Speech Sciences from Michigan State University. The assistant viewed the videotapes of 10% of the total number of sessions scored (3 of 32 total sessions). The date of the sessions was randomly assigned by assigning each session a letter, either A or D, which denoted the participant, and a number from 1 to 16, which denoted the session number. The naming accuracy and total naming time for 3 sessions were calculated.

Point-to-point reliability between the research assistant and the experimenter was calculated by dividing the number of agreements by the total number of data points. This value was then multiplied by 100 to get a percentage of agreement. Accepted criteria for scoring the naming data was set at 90% or greater agreement. Point-to-point reliability and agreement between the experimenter and research assistant for naming accuracy was 100%. Point-to-point reliability for total naming time was 94%. Both scores demonstrate confidence in the accuracy of the naming data.

Discourse Data

Interjudge reliability for the discourse variables was also calculated. The experimenter's scores were compared with those of the research assistant for 10% of the

discourse samples (three samples). The assistant viewed the assigned videotapes and scored them using the data collection form in Appendix C. Confidence in the experimenter's scoring was maintained if 90% agreement was attained. Reliability for the scoring for the discourse samples was 96%.

Intrajudge reliability was also calculated for the naming data and discourse variables. The experimenter scored 10% of the sessions at the conclusion of the study. Reliability for naming accuracy was 100% and 94% for total naming time. Disagreements resulted from inclusion of a filler at the end of a naming trial, which made the original time slightly longer than the reassessment.

Naming Data

The design of this investigation (single-subject multiple baseline across treatment sets design) was utilized to assess the effectiveness of a semantic-based treatment on word-finding performance. This design allows for the inference of conclusions from the graphic illustration of the performance of the participants. Visual inspection of graphic displays of each participants' naming accuracy and total naming time for sets A and B were completed to describe the experimental effects.

In addition, the split-middle technique (White, 1974) was used to statistically examine and describe the behaviors of the plotted data. The slope and level behaviors were reported for both baseline and treatment phases to further reveal experimental tendencies. The rate and magnitude of change between the phases were also calculated.

D.R.'s Naming Accuracy

Visual inspection.

Figure 2a displays D.R's naming accuracy for set A collected during the baseline and treatment phases. A ***positive*** trend was found in naming accuracy data when phases were compared. The slope of this trend from baseline to treatment was judged as ***steep***. The overall level of D.R.'s naming accuracy data for set A demonstrated an ***increase*** from the initial baseline observation to the endpoint of treatment. All of D.R.'s naming accuracy treatment scores for set A were above baseline scores.

Figure 2b displays D.R.'s naming accuracy data for set B. As seen in the graph, D.R.'s set B baseline schedule changed at the fifth session. Because of an unscheduled visit to a physician, D.R. departed earlier than scheduled during session 5. The decision was made to adjust the baseline measurement schedule for set B by changing from the even numbered sessions to the odd for the rest of the baseline phase. The decision was made to minimize the possible rehearsal effects of D.R. naming set B on two consecutive sessions.

For D.R.'s naming accuracy for set B, a ***positive*** trend was found from baseline to treatment with a ***steep*** slope observed in this trend. The overall level of D.R.'s naming accuracy data in set B also demonstrated an increase from the initial baseline observation to the final treatment observation. Again, all data points were above baseline levels.

From visual inspection, improvement in naming accuracy was illustrated for both set A and B. An interesting consistency in set A and B is in the relatively low initial baseline data points. Naming accuracy for both sets rose roughly four points from the initial session to the second baseline session, and a consistent baseline performance was soon

established in the three sessions that followed.

Statistical inference.

The experimenter also utilized White's (1974) split-middle technique to statistically describe the slope and level behaviors of the same data sets. The arrowed lines displayed on the graphs of the naming accuracy data (see Figure 2) are called celeration lines. The statistical ratios determined for the celeration lines are calculated by dividing the greater number by the lesser number. Therefore, the reference point of the slope of the line begins at 1.000. A celeration line with a slope of 1.000 represents no change in value from one point to another. Thus, a flat line will have a slope of 1.000 and a steep line, either negative or positive, will have a slope larger than 1.000.

Figures 3a and 3b display the celeration lines for D.R.'s naming accuracy for set A and B. For D.R.'s set A (Figure 2a), the slope in the baseline phase was 1.019 with level of 15.7 in the last baseline session. The slope in D.R.'s treatment phase was 1.322 with a level of 23 in the initial treatment session. The change in slope from baseline to treatment was 1.297 and the change in level was 1.465.

For D.R.'s naming accuracy of set B (Figure 2b), the slope in the baseline phase was 1.043 with an ending level of 16.2. As for the treatment phase, the slope was 1.155 with a level of 25.8 in the initial treatment session. The change in slope from baseline to treatment was 1.107 while the change in level was 1.593.

As stated in the procedure section, the baseline celeration line was extended into the treatment phase and the binomial test (Siegel, 1956) with $p = .05$ was used to assess the statistical significance of the change in the treatment phase. For D.R.'s naming accuracy

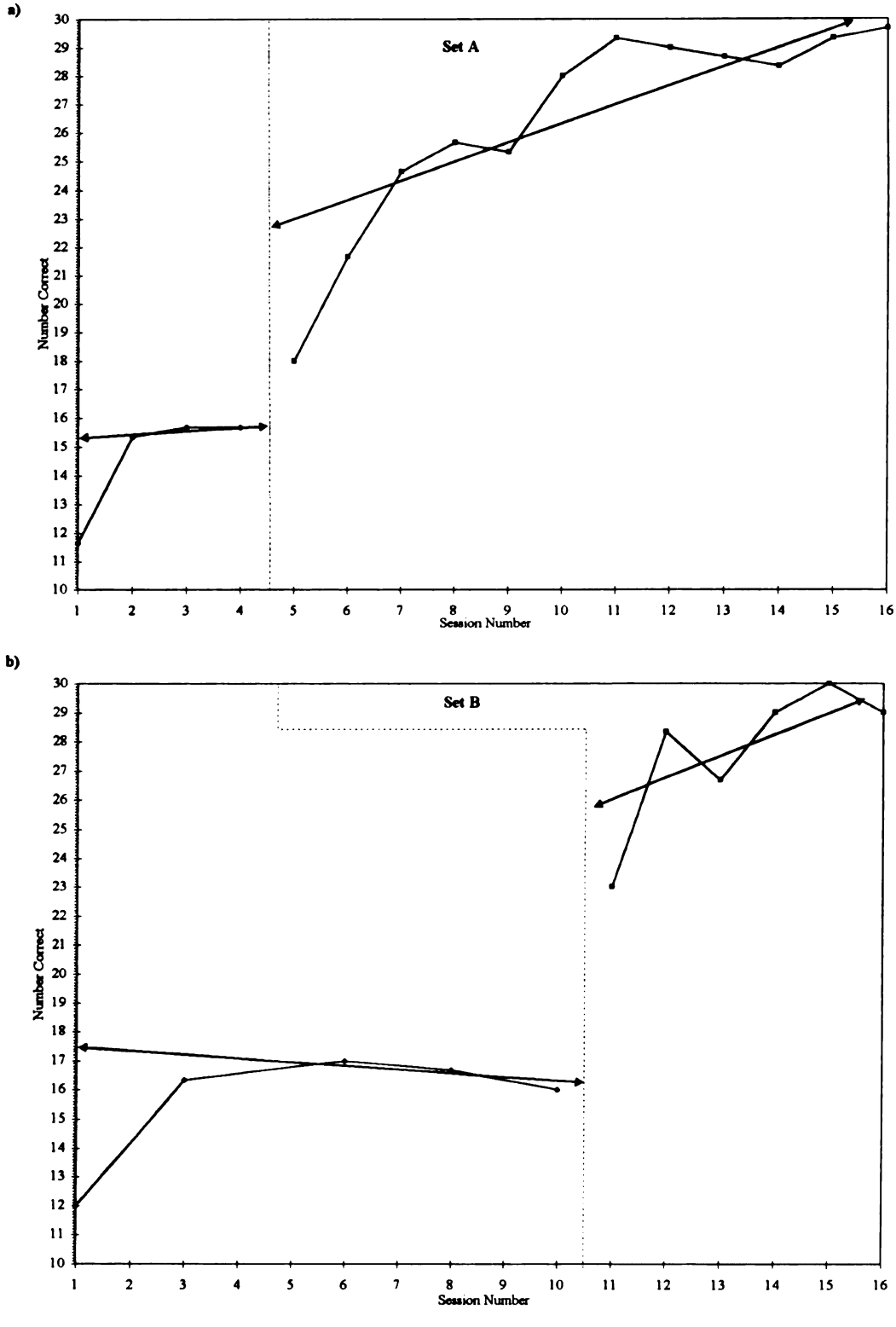


Figure 2. D.R.'s Naming Accuracy Data with Celeration Lines

data in set A, the binomial test revealed a significant change with $p<.001$. For set B, $p = .016$, which also demonstrated a significant change in the treatment phase.

D.R.'s Total Naming Time

Visual inspection.

D.R's total naming time for set A collected during baseline and treatment is displayed in Figure 3a. A ***negative*** trend was found in total naming time data when phases were compared. The slope of this trend from baseline to treatment was judged as ***gentle***. The overall level of D.R.'s total naming time for set A demonstrated a ***decrease*** from the initial baseline observation to the endpoint of treatment. For set A, 75% of D.R.'s data points in the treatment phase were below baseline scores.

Total naming time for set B is displayed in Figure 3b. A ***negative*** trend was found from baseline to treatment with a ***flat*** slope observed in this trend. The overall level of D.R.'s naming accuracy data in set B also demonstrated a decrease from the initial baseline observation to the final treatment observation. However, little change was demonstrated from the initial treatment observation to the endpoint of treatment.

Visual inspection of both data sets indicated a decrease in total naming time. However, treatment phase data points did not continue to decrease after initial gains. After improvements in total naming time as a result of initiation of treatment, little change occurred (see sessions #5-16).

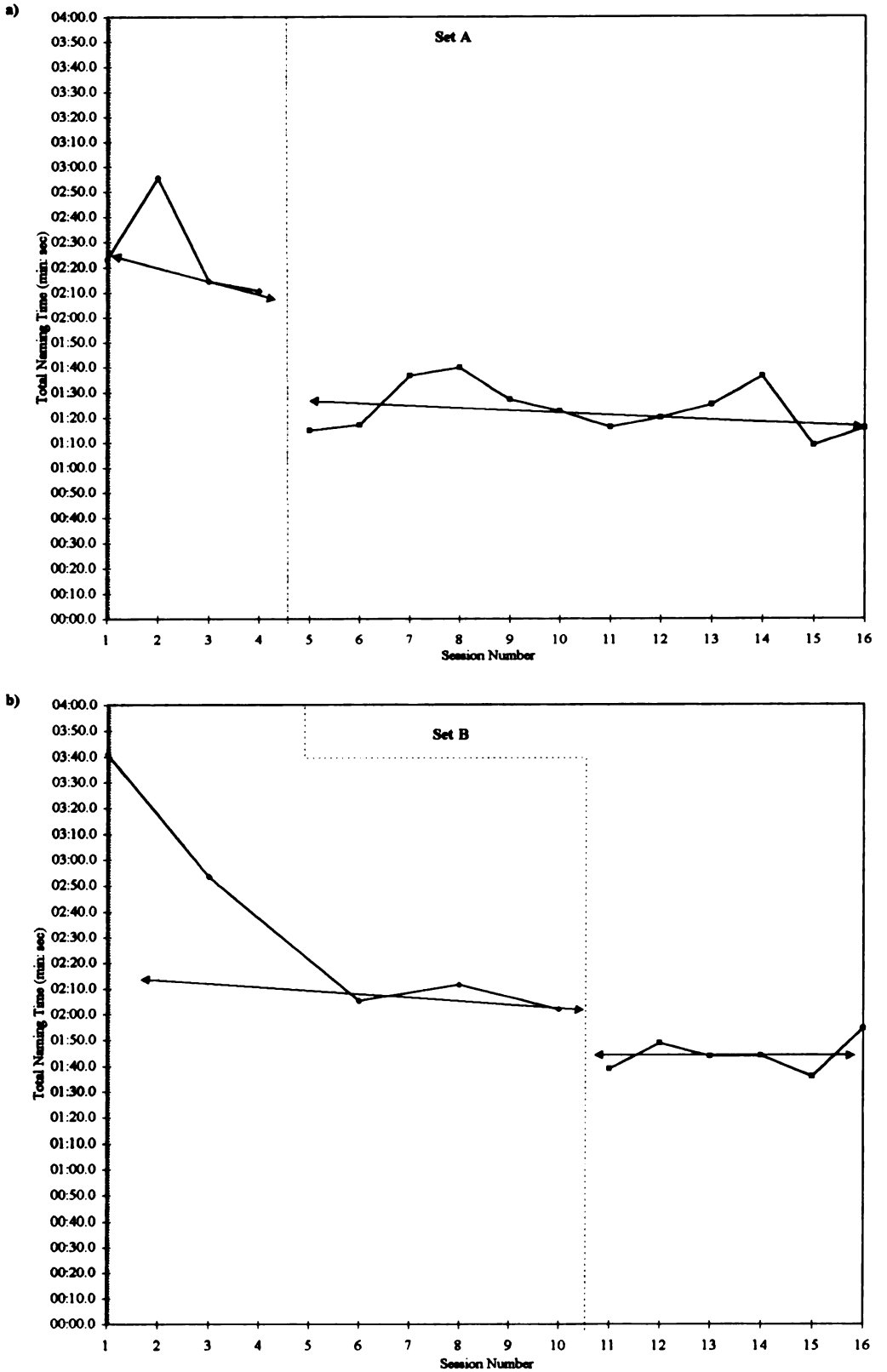


Figure 3. D.R.'s Total Naming Time Data with Celeration Lines

Statistical inference.

D.R.'s total naming time data shown with celeration lines for set A and B are in Figures 5a,b. For D.R.'s set A (Figure 3a), the slope in the baseline phase was 1.116 with level of 2:09 (minutes, seconds) in the last baseline session. The slope in the treatment phase was 1.158 with a level of 1:28 in the initial treatment session. The change in slope from baseline to treatment was 1.038 and the change in level was 1.466.

The total naming time of set B is displayed in Figure 3b. The slope in the baseline phase was 1.082 with an ending level time of 2:02 (minutes, seconds). As for the treatment phase, the slope was 1.019 with a level of 1:45 in the initial treatment session. The change in slope from baseline to treatment was 1.062 while the change in level was 1.162.

Under the binomial test, set A total naming time data revealed a $p = .019$, which was a significant difference in the treatment phase. However, D.R.'s total naming time for set B revealed a non-significant change with $p = .109$.

A.H's Naming Accuracy

Visual inspection.

Figure 4 displays A.H.'s naming accuracy for sets A and B collected during the baseline and treatment phases. For set A (Figure 4a), a ***positive*** trend was found in naming accuracy data when phases were compared. The slope of this trend from baseline to treatment was judged as ***steep***. For set A, the level of A.H.'s naming accuracy data demonstrated an ***increase*** from the initial baseline observation to the endpoint of

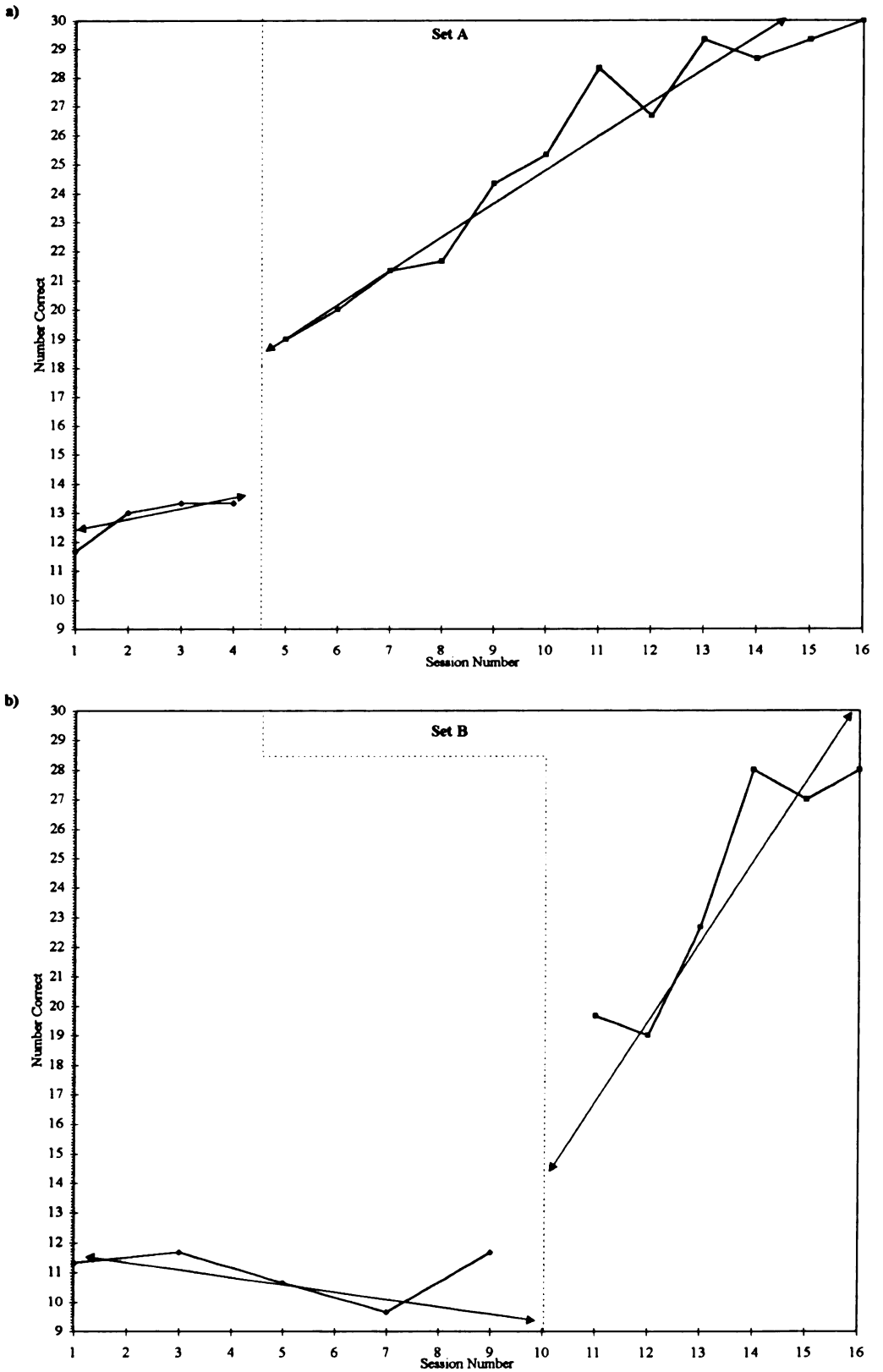


Figure 4. A.H.'s Naming Accuracy Data with Celeration Lines

treatment. All set A data points in A.H.'s treatment phase were above baseline scores.

For set B naming accuracy (Figure 4b), a ***positive*** trend was found from baseline to treatment. A ***steep*** slope was also observed in this trend. The overall level of A.H.'s naming accuracy data in set B also demonstrated an increase from the initial baseline observation to the final treatment observation. As was the case for set A, all data points for set B in the treatment phase were above baseline levels. From visual inspection, improvement in naming accuracy was illustrated for both set A and B.

Statistical inference.

The split-middle technique was used to statistically describe the slope and level behaviors of these data sets. Figures 7a and 7b display the celeration lines for A.H.'s naming accuracy for set A and B. For A.H.'s set A (Figure 4a), the slope in the baseline phase was 1.097 with level of 13.6 in the last baseline session. The slope in A.H.'s treatment phase was 1.706 with a level of 18.7 in the initial treatment session. Change in slope from baseline to treatment was 1.555 and the change in level was 1.375.

For the naming accuracy of set B (Figure 4b), the slope in the baseline phase was 1.144 with an ending level of 10.4. As for the treatment phase, A.H.'s slope was 1.826 with a level of 16.7 in the initial treatment session. The change in slope from baseline to treatment was 1.596 while the change in level was 1.606.

The statistical significance was calculated using the binomial test. For A.H.'s set A naming accuracy, the significance of the change in treatment was calculated as $p<.001$, demonstrating a significant change. For set B, calculations revealed $p = .016$, which also was significant.

A.H.'s Total Naming Time

Visual inspection.

A.H.'s total naming time for set A collected during baseline and treatment is displayed in Figure 5a. A ***negative*** trend was found in total naming time data when phases were compared. The slope of this trend from baseline to treatment was judged as ***gentle***. The level of A.H.'s total naming time for set A demonstrated a ***decrease*** from the initial baseline observation to the endpoint of treatment.

Total naming time for set B is displayed in Figure 5b. A ***neutral*** trend was found from baseline to treatment. Also, a ***flat*** slope was observed in this trend. The level of A.H.'s naming accuracy data in set B demonstrated a ***decrease*** from the initial baseline observation to the final treatment observation.

Statistical inference.

A.H.'s total naming time data displayed with celeration lines for set A and B are in Figures 9a,b. For A.H.'s set A (Figure 5a), the slope in the baseline phase was 1.184 with level of 1:56 (minutes, seconds) in the last baseline session. A.H.'s slope in the treatment phase was 1.163 with a level of 1:47 in the initial treatment session. Change in slope from baseline to treatment was calculated as 1.018 while the change in level was calculated as 1.084.

For set B, the total naming time is displayed in Figure 5b. The slope in the baseline phase was 1.168 with an ending level time of 1:59 (minutes, seconds). For the treatment phase, the slope was 1.423 with a level of 2:38 in the initial treatment session. The change in slope from baseline to treatment was 1.218 while the change in level was 1.328.

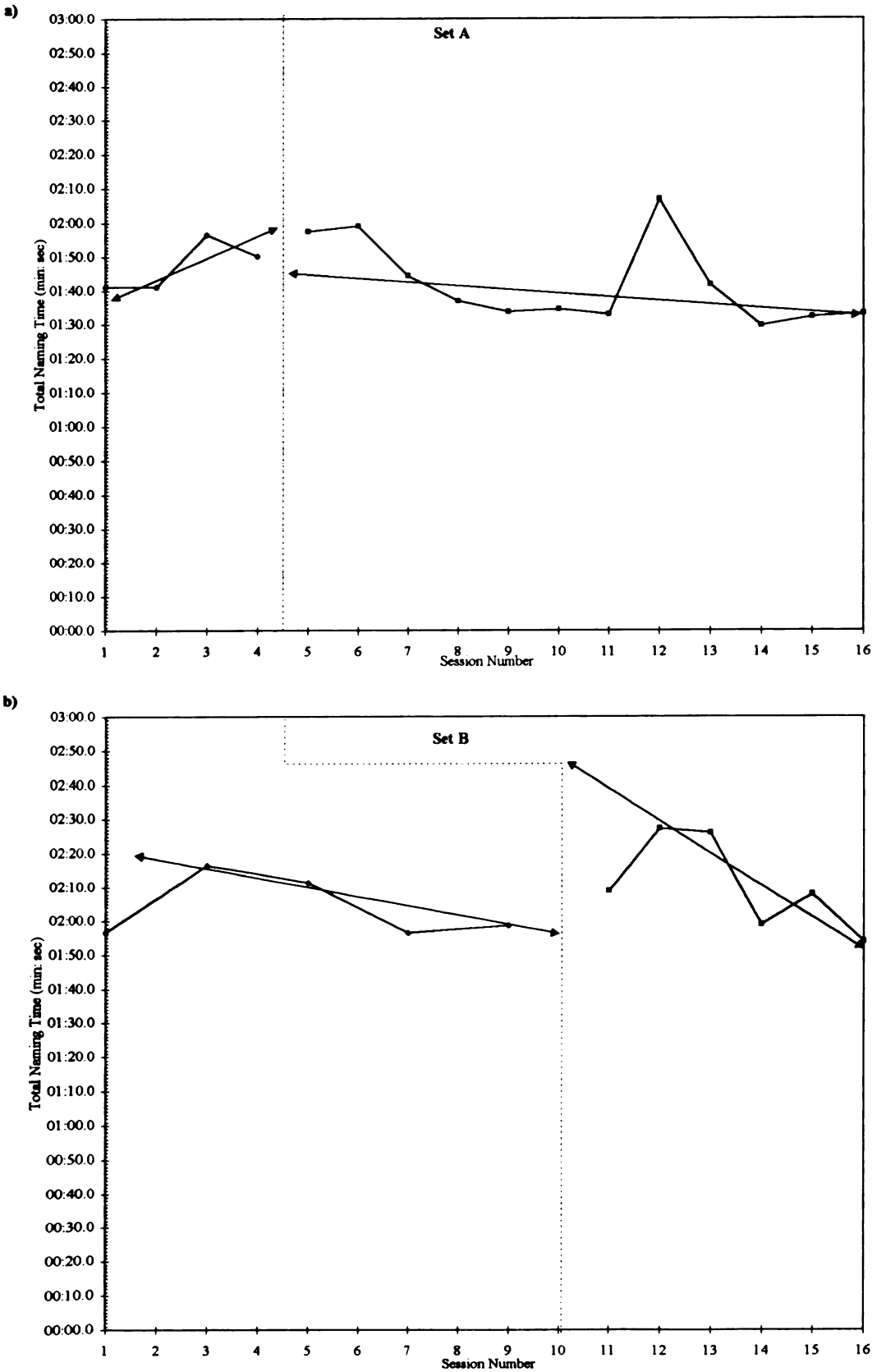


Figure 5. A.H.'s Total Naming Time Data with Celeration Lines

Using the binomial test, the change from baseline to treatment in A.H.'s total naming time data for set A was judged to be significant at $p < .001$. However, there was no change in set B. In fact, total naming time for treatment was higher than baseline.

Discourse Data

Four types of discourse samples were elicited from each participant. The samples included a picture description sample, a monologue sample, a storytelling sample, and a conversation sample. The samples were elicited pre-treatment, mid-treatment, and post-treatment. They were then orthographically transcribed by the experimenter and analyzed according to the previously stated methods. The following sections will discuss the results of the discourse analyses for both D.R. and A.H.

D.R.'s Discourse Data

Picture description.

Data from D.R.'s three picture description samples are included in Table 3. Data will be reported in chronological order for pre-treatment, mid-treatment, and post-treatment data. The number of correct target pictures named was 3/10, 9/10, and 10/10. Number of pauses greater than 2 seconds was 11, 10, and 7. The number of total paraphasias was 8, 4, and 2. These paraphasias were also categorized according to type, with the only neologism occurring at mid-treatment. Phonemic paraphasias were measured as 5, 3, and 1, while verbal paraphasias were 3, 0, and 1. Instances of word retrieval failure also

changed from 9 to 7 to 2. The instances of indefinite reference changed from 4 during pre-and mid-treatment to 2 at post-treatment. Mean length of utterance increased from 4.52, 5.08, and 5.67. In addition, the total number of words was counted as 268, 255, and 304. Type-token ratio was calculated at .39 for all three samples, while the number of circumlocutions decreased from 2 at

pre- and mid-treatment to 1 at post-treatment.

Monologue.

Table 3 includes D.R.'s data from the three monologue samples. The number of pauses greater than 2 seconds was 4, 1, and 6. The number of total paraphasias was 8, 5, and 1. As for the type of paraphasias, no neologisms occurred in any monologue samples. Phonemic paraphasias were 4, 1, and 1. D.R.'s verbal paraphasias decreased from 4 during pre- and mid-treatment to 0 at post-treatment. Instances of word retrieval failure also changed from 8 at pre-treatment to 5 at both mid- and post-treatment. The instances of indefinite reference increased from 3 during pre-treatment to 6 during mid-treatment to 7 at post-treatment. Mean length of utterance decreased from 6.69 to 5.60 to 5.71. In addition, the total number of words was counted as 383, 434, and 389. Type-token ratios were calculated as .42, .39, and .40. Number of circumlocutions was measured at 2, 0, and 1.

Storytelling.

D.R.'s discourse variables from the storytelling samples are reported in Table 3. The number of pauses greater than 2 seconds decreased from 15 at pre-treatment, 11 at mid-treatment, to 6 during the post-treatment sample. The number of paraphasias was 5, 3,

and 6. For types of paraphasias, no neologisms were noted during the three samples. Phonemic paraphasias changed from 5 at pre-treatment to 3 during mid-treatment to 5 at post-treatment. The only verbal paraphasia occurred during the post-treatment sample. Instances of word retrieval failure were 7, 4, and 6. As seen in Table 3, instances of indefinite reference decreased from 8 at pre-treatment to 1 and 3. Mean length of utterance was calculated as 6.49, 6.61, and 5.20. The total number of words was counted as 243, 219, and 196. Type-token ratio increased from .33 at pre-treatment to .42 at mid-treatment to .45 at post-treatment. Number of circumlocutions changed from 1 during pre- and mid-treatment samples to the post-treatment level of 2.

Conversation.

Data from D.R.'s three conversation samples are included in Table 3. The number of pauses greater than 2 seconds was 1, 2, and 2. The number of total paraphasias changed from 4 during pre-treatment to 7 at mid-treatment to 1 during post-treatment. These paraphasias were categorized according to type with no neologisms occurring. Phonemic paraphasias were 2, 4, and 0 while verbal paraphasias were 2, 3, and 1. Instances of word retrieval failure decreased from 9 to 8 to 1. The instances of indefinite reference changed from 1 during pre-treatment to 2 at mid- and post-treatment. Mean length of utterance increased from 4.95, 5.05, and 6.45. In addition, the total number of words was counted as 351, 313, and 476. Type-token ratio was .42 at pre-treatment, .43 at mid-treatment, and .34 at post-treatment. The number of circumlocutions was counted as 1, 2, and 2.

Table 3. D.R.'s Discourse Variables

		Picture Description Samples			Monologue Samples			Storytelling Samples			Conversation Samples		
		Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment
Discourse Variables	Number of Target Words Correct	3/10	9/10	10/10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Number of Pauses >2 Seconds	11	10	7	4	1	6	15	11	6	1	2	2
	Total Number of Paraphasias	8	4	2	8	5	1	5	3	6	4	7	1
	Neologisms	0	1	0	0	0	0	0	0	0	0	0	0
	Literal/Phonemic	5	3	1	4	1	1	5	3	5	2	4	0
	Verbal/Global	3	0	1	4	4	0	0	0	1	2	3	1
	Instances of Word Retrieval Failure	9	7	2	8	5	5	7	4	6	9	8	1
	Instances of Indefinite Reference	4	4	2	3	6	7	8	1	3	1	2	2
	Mean Length of Utterance	4.52	5.08	5.67	6.69	5.6	5.71	6.49	6.61	5.2	4.95	5.05	6.45
	Total Number of Words	268	255	304	383	434	389	243	219	196	351	313	476
	Type-Token Ratio	0.39	0.39	0.39	0.42	0.39	0.4	0.33	0.42	0.45	0.42	0.43	0.34
	Number of Circumlocutions	2	2	1	2	0	1	1	1	2	1	1	2

A.H.'s Discourse Data

Picture description.

Table 4 reports the data from A.H.'s three picture description samples. The number of correct pictures named increased from 1/10 at pre-treatment to 4/10 at mid-treatment to the post-treatment level of 10/10. Number of pauses greater than 2 seconds was 18, 19, and 15. The number of total paraphasias was 2, 3, and 1. As for the types of paraphasias, A.H. had no neologisms during the three samples and only 2 phonemic paraphasias, which both occurred in the mid-treatment sample. Verbal paraphasias were 2, 1, and 1. Instances of word retrieval failure also changed from 7 during pre- and mid-treatment to 1 at post-treatment. As for instances of indefinite reference, A.H. had only 1 instance that occurred in the mid-treatment sample. Mean length of utterance increased from 2.81 to 4.18 to 5.46. In addition, the total number of words was counted as 81, 105, and 134. Type-token ratio was calculated as .59, .42, and .43. A.H. had no circumlocutions during the picture description samples.

Monologue.

Table 4 includes A.H.'s data from the three monologue samples. The number of pauses greater than 2 seconds was 9, 14, and 15. The total number of paraphasias was 2, 1, and 2. As for the type of these paraphasias, no neologisms occurred in any monologue samples. Phonemic paraphasias were 2, 0, and 1, and verbal paraphasias were 1 in each of the three samples. Instances of word retrieval failure also changed from 4 at pre-treatment to 3 at mid-treatment to 2 during post-treatment. The instances of indefinite reference were 2, 3, and 1. Mean length of utterance increased from 3.22 to 4.50 to 5.40. In

addition, the total number of words was 143, 162, and 125. Type-token ratios were calculated as .48, .46, and .50. A.H. had 2 circumlocutions that were both measured during the mid-treatment sample.

Storytelling.

A.H.'s discourse variables from the storytelling samples are reported in Table 4. The number of pauses greater than 2 seconds decreased from 17 at pre-treatment, 15 at mid-treatment, to 12 during the post-treatment sample. The number of paraphasias was 2, 3, and 4. For types of paraphasias, no neologisms or phonemic paraphasias were noted during the three samples. Verbal paraphasias changed from 2 at pre-treatment to 3 during mid-treatment to 4 at post-treatment. Instances of word retrieval failure were counted as 2, 4, and 5. Two instances of indefinite reference were counted in the mid-treatment sample. Mean length of utterance was calculated as 3.70, 4.65, and 5.40. The total number of words was 105, 141, and 140. Type-token ratio increased from .39 at pre-treatment to .42 at mid-treatment to .49 at post-treatment. No circumlocutions were counted in the three storytelling samples.

Conversation.

Data from A.H.'s three conversation samples are included in Table 4. The number of pauses greater than 2 seconds was 9, 5, and 10. The number of total paraphasias changed from 1 during pre-treatment to 0 at mid-treatment to 2 during post-treatment. These paraphasias were also categorized according to type with no neologisms occurring. For A.H., 1 phonemic paraphasia was noted during the post-treatment sample. Verbal paraphasias were 1, 0, and 1. Instances of word retrieval failure were 1, 3, and 3. The

instances of indefinite reference changed from 0 during pre-treatment to 1 at mid- and post-treatment. Mean length of utterance was 3.23, 3.00, and 3.62. In addition, the total number of words was 89, 113, and 158. Type-token ratio was .66 at pre-treatment, .51 at mid-treatment, and .46 at post-treatment. No circumlocutions were noted during the three conversation samples.

Table 4. A. H.'s Discourse Variables

		Picture Description Samples			Monologue Samples			Storytelling Samples			Conversation Samples		
		Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment
Discourse Variables	Number of Target Words Correct	1/10	4/10	10/10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Number of Pauses >2 Seconds	18	19	15	9	14	15	17	15	12	9	5	10
	Total Number of Paraphasias	2	3	1	2	1	2	2	3	4	1	0	2
	Neologisms	0	0	0	0	0	0	0	0	0	0	0	0
	Literal/Phonemic	0	2	0	2	0	1	0	0	0	0	0	1
	Verbal/Global	2	1	1	1	1	1	2	3	4	1	0	1
	Instances of Word Retrieval Failure	7	7	1	4	3	2	2	4	5	1	3	3
	Instances of Indefinite Reference	0	1	0	2	3	1	0	2	0	0	1	1
	Mean Length of Utterance	2.81	4.18	5.46	3.22	4.5	5.4	3.7	4.65	5.4	3.23	3	3.62
	Total Number of Words	81	105	134	143	162	125	105	141	140	89	113	158
	Type-Token Ratio	0.59	0.42	0.43	0.48	0.46	0.5	0.39	0.42	0.49	0.66	0.51	0.46
	Number of Circumlocutions	0	0	0	0	2	0	0	0	0	0	0	0

Chapter V – Discussion

This study examined the effects of a semantic-based treatment protocol on the word-finding and discourse performance of two participants with aphasia. Both participants' aphasia was predominantly characterized by word-finding impairments. More specifically, the study investigated whether a semantic-based treatment protocol not only increased naming accuracy and decreased total naming time in a traditional picture-naming methodology, but also whether it generalized to improved discourse performance. A single-subject empirical design was used to demonstrate the effects of the treatment protocol across treatment sets for each subject. In addition, changes in discourse performance were measured through analysis of samples taken pre-treatment, mid-treatment, and post-treatment. The discourse variables were intended to measure the effectiveness of the treatment protocol in increasing efficiency of discourse performance.

The experimenter hypothesized that with the application of the treatment protocol, naming accuracy would increase and total naming time decrease. In addition, with the improved naming performance, the experimenter hypothesized that improvements in discourse performance would be evident. The results indicated the treatment protocol was effective in improving naming performance. However, the results for total naming time were equivocal. Results also demonstrated improvements in the effectiveness of discourse.

Naming Accuracy

One goal of the current study was to determine whether the participants would improve naming accuracy with application of the treatment protocol. The single-subject across treatment sets design was used to establish that the changes in naming accuracy were a result of the treatment protocol. Thus, while set A was in the treatment phase, set B was held in baseline without treatment to show consistent performance without the treatment. As hypothesized, changes in the naming accuracy for both participants moved in favorable directions.

For D.R., three pieces of evidence converge to support the conclusion that the semantic-based treatment protocol improved naming accuracy performance. First, the pattern of performance was similar for both treatment sets A and B (refer to Figure 2a and 2b). For both sets of treatment words, baseline performance was stable and flat (slope for set A = +1.019; slope for set B = -1.043). When the treatment protocol was applied, naming accuracy increased (slope for the treatment phase for set A = +1.322; slope for treatment phase for set B = +1.463). Second, naming accuracy performance was under experimental control. Performance improved only when treatment was applied, and for treatment set B, baseline performance remained stable in the presence of performance change for set A, which was in the treatment phase (see Figure 2, sessions 5 to 10). This pattern suggests that application of the treatment protocol was responsible for behavioral change. Finally, the level of change (the difference between the last data point in a baseline phase and the first data point in a treatment phase) was greater in set B than in set

A (see Figure 2a, session 4 and 5, level = +1.465; Figure 2b, sessions 10 and 11, level = +1.593). This suggests that D.R. had perhaps strengthened access routines during treatment of set A that were rapidly applied at the outset of treatment set B. That is, D.R. appeared to generalize across treatment sets.

A.H. showed the same performance patterns as D.R. First, A.H.'s naming accuracy performance pattern (see Figure 4a and 4b) showed a stable baseline (slope for set A = +1.097, slope for set B = -1.144) and increasing accuracy during treatment (slope for set A = 1.155, slope for set B = 1.826). Second, naming accuracy in the baseline phase for set B remained stable in the presence of improvement on the treatment set A (see Figure 4, sessions 5 to 10). Finally, similar to D.R., the level of change was greater in set B than in set A (see Figure 4; set A = 1.555, set B = 1.606). Further support for the significance of naming accuracy performance changes for both A.H. and D.R. is derived from statistical significance of the probability of achieving the distribution of data points in the treatment phase (that is, all treatment phase data points were above the extended baseline slope lines).

The results of this study are interpreted as clear evidence in support of a semantic-based treatment protocol for persons with word-finding impairments as a result of a deficit in the semantic system (see Figure 1). Learning, in the form of development of successful lexical access strategies or strengthening of semantic network associations, was empirically demonstrated across participants and treatment stimulus sets. While these data do no address the underlying cognitive or neural mechanisms that support the behavioral change, the locus of change is thought to be the lexicon itself. Generalization of learning

was also shown in these data. Both participants showed performance change with the application of the treatment protocol, however, the change was more immediate in set B (trained after set A for both participants) than in set A. This suggests that the learning that occurred in the treatment sessions for set A was generalizeable and not item-specific. Had the learned behavior been item-specific, one would expect the slopes of the treatment phase celeration lines, as well as the levels of change, to be equal across treatment sets A and B, and they were not.

A parallel finding of interest emerged from these data. Both D.R. and A.H. made maximum improvement in both treatment sets A and B after six or seven sessions (see Figures 3 and 7), with minimal or no change in subsequent sessions (see sessions 8 to 12 for set A). This suggests that perhaps the treatment effects were maximized before the ending of the research study. If we view one's linguistic performance from a resource allocation perspective, this particular finding becomes important. If one's communicative rehabilitation is bound by limited resources, then apportionment of those resources is vital. Perhaps the treatment plan would have been more effective by focusing the limited linguistic resources on generalizing the improvements to discourse in some manner. With the limited therapeutic resources available today, findings of a maximum treatment effect should be investigated further in future research.

The results also support the use of a cognitive-neuropsychological model (Raymer et al., 1997), to guide treatment. Research and clinical practice in aphasia rehabilitation have utilized models to identify an individual's level of linguistic breakdown and then to provide the treatment that addresses that level of breakdown (Hillis, 1993; Raymer, Rothi, &

Greenwald, 1995). The current project used the model following Raymer et al. (1997) to determine that the level of breakdown was in the semantic system. The results of pre-experimental linguistic testing (refer to Table 2) showed that both D.R. and A.H. had semantic deficits underlying their word-finding impairments. Semantic treatment was applied, and the unequivocal improvements in both participants' naming accuracy demonstrated the effectiveness of matching the level of breakdown (semantic deficit) and the treatment approach (semantic-based treatment).

The data from this project add to the foundation supporting the efficacy of semantic-based therapy for treatment of word-finding impairment (Marshall et al., 1990; Nickels & Best, 1996a; Ochipa et al., 1998). The challenge for future research in this area will be to specify best practices for administering semantic-based treatment to achieve effective results in an efficient manner. Semantic-based treatment targets the impairment level of disablement (ICIDH-2, 1999). An additional challenge for future research will be to determine how treatment at the impairment level translates to behavior change at the participation level.

Total Naming Time

Total naming time performance data were less clear cut than were data from naming accuracy performance. D.R. showed similar performance patterns across both treatment sets A and B. Total naming time decreased from baseline to treatment in both sets A and B (see Figure 3a and 3b), however was significantly different only for set A. While it is

tempting to suggest that the application of the treatment protocol produced this change, visual inspection of the baseline and treatment phase celeration lines, and calculation of celeration line slopes modify this conclusion. Baseline slope for sets A and B were negative and steeper than the treatment phase slopes, which were flat. The opposite pattern would be expected to confirm the positive effects of treatment. One explanation for the result is that D.R. developed a self-determined strategy to decrease total naming time and immediately applied the strategy during the baseline phase and during the first treatment session, but not beyond that time.

An important point to note about D.R.'s total naming time performance is that all of the data points in the treatment phase are below the final baseline data point. This indicates a functional decrease in D.R.'s total naming time for set A with the application of the treatment protocol, meaning a small change was evident and remained consistent throughout the treatment phase. D.R.'s final total naming time measure in baseline was 2 minutes and 11 seconds while the highest data point in the treatment phase was 1 minute and 40 seconds. The average total naming time in D.R.'s baseline phase was 2 minutes and 27 seconds compared with the average in the treatment phase, which was 1 minute and 23 seconds. The total naming time data for set A demonstrated a functional effect on performance that can, with caution, be attributed to the treatment protocol.

With D.R.'s set B total naming time, an initial decrease occurred in the first two sessions, but a baseline level was not established. Total naming time stabilized in the final three baseline sessions. The initial decrease in total naming time was possibly due to the fact that while treatment was being withheld on set B, D.R. did not attempt to name

pictures that he had consistent difficulty naming. In the early baseline sessions, D.R. attempted to name most of the pictures, which increased his total naming time. As he learned which pictures he consistently could not name, the total time required to name the pictures decreased simply by D.R.'s lack of naming attempts. Eventually, a baseline was established.

Considering the naming accuracy data and total naming time data together, it appears that D.R. showed a speed-accuracy tradeoff, perhaps as a result of different patterns of allocation of effort. Baseline slopes for both treatment sets A and B were stable for naming accuracy and declining for speed. In contrast, treatment phase slopes for naming accuracy increased while total naming time slopes were stable. This suggests that D.R.'s early efforts may have been aimed at decreasing speed, but when accuracy criteria were introduced in the treatment phase, his efforts to further reduce speed were abandoned in favor of increasing naming accuracy. This conclusion is speculative and the cognitive or neurological mechanisms supporting this behavior are unknown.

In contrast to D.R., A.H. showed no consistent pattern of performance in total naming time across treatment sets. The slope of the baseline celeration line for set A showed an increase in total naming time, while the baseline slope for set B showed a decrease. The slope of the treatment phase celeration line for set A showed a slight decrease, while the slope for treatment set B showed a sharp decrease. No consistent change occurred which could be, even tentatively, attributed to application of the treatment protocol.

Similar to D.R., evidence of a possible speed-accuracy tradeoff is shown with A.H.'s data, possibly pointing to a pattern of effort allocation. However, unlike D.R., perhaps

A.H.'s resources were solely focused on increasing naming accuracy with a result of little improvement in total naming time. Whereas D.R.'s performance pattern demonstrated a period of declining total naming time, A.H.'s total naming time never decreased significantly from baseline levels. From a resource allocation perspective, the results suggest that A.H. utilized all linguistic resources toward accuracy of naming and not toward speed of naming. Again the conclusion is speculative and the underlying mechanisms involved are unknown.

Discourse Data

The discourse analyses were intended to measure the changes in discourse that resulted from the word-finding treatment protocol. The second research question was whether an increase in accuracy of naming and a decrease in total naming time would result in an increase in efficiency of discourse performance. The data demonstrated that the semantic-based treatment was effective in increasing accuracy but ineffective in decreasing total naming time. As to the final research question, the experimenter hypothesized that more efficient discourse performances would result from initiation of the semantic-based treatment.

The discourse variables utilized in the analyses were intended to measure both accuracy and timing effects of the semantic-based treatment. The results varied across participants and discourse types. However, some patterns emerged within each participant as well as across both participants. The pattern of results indicates the semantic-based treatment

protocol was effective in increasing discourse effectiveness during a closely related discourse task, however the pattern did not extend across discourse samples.

The experimenter hypothesized that the improvements in word finding that resulted from the semantic-based treatment would also be evident in discourse performance in the form of fewer word-finding difficulties, and improvements on other measures of discourse efficiency. The anticipated performance pattern was evident in the picture description discourse task but no other discourse task.

The performance of both participants during the initial discourse samples was characterized by several pauses, paraphasic errors, and instances of word retrieval failure (refer to Tables 3 and 4). Instances of other discourse variables (indefinite reference and circumlocutions) were not sufficient to warrant interpretation. The pattern of change in mean length of utterance, total number of words, and type-token ratio varied across participants, discourse tasks, and sampling occasions.

Analysis of the discourse variables (pause, paraphasic errors, and word retrieval failure) shows improvement in these measures during the picture description task, while not in other discourse tasks. Two pieces of evidence converge to support the conclusion that the semantic-based treatment protocol improved picture description performance (refer to Tables 3 and 4). First, a positive treatment effect is evident with improved naming accuracy of target words from 30% in pre-treatment to 100% accuracy during the post-treatment sample for D.R., and from 10% to 100% for A.H. Second, improvement in other performance variables in both participants' picture description data. Increased effectiveness of performance from pre-treatment to post-treatment is evident in 11 of the

12 variables calculated from the samples. Taken together, these data lend support to the conclusion that the positive effects of the semantic-based treatment protocol on naming accuracy extended beyond the treatment task (picture naming) to a task with greater linguistic and communicative requirements (picture description discourse). Further, they support the generalization of naming accuracy performance across linguistic tasks (picture naming and picture description). These observations allow the speculation that linguistic and cognitive resources that had previously been directed to word-finding efforts may have been released, following the treatment protocol, to serve other linguistic requirements of discourse production. Thus, the result is improved performance on a discourse task closely related to the treatment task. This transfer was not observed for discourse tasks less closely related to the treatment task.

The data do not support the generalization to the other discourse tasks of monologue, storytelling, and conversation. Changes were noted for other selected performance variables in these discourse tasks, however not pattern emerged that would lend evidence to suggest that improvement and naming accuracy on the treatment task contributed to these changes. That is, it does not appear that improvement in naming accuracy facilitates improvement in discourse tasks that do not use a common set of target items (i.e. treatment target words).

For both D.R. and A.H., the discourse data are evidence of generalized improvement from the picture-naming task to the picture description discourse task, supporting the utility of semantic-based treatment tasks beyond the narrow confines of a treatment session. The similarity between the picture-naming treatment and the picture description

task possibly facilitated generalization, perhaps because of the obligatory context of the target words. In the discourse tasks in which the target words were not obligatory, improved discourse performance did not occur. It appears that the closer the relationship between the treatment task and the discourse task has an impact on generalization of performance, although this is conjectural.

Clinical Implications

Several clinical implications emerge from this research project. First, the results of this study confirm the utility of model-driven treatment as best practice for clinicians and researchers. This research project utilized a model of the lexical processes involved in naming to guide assessment and treatment choices (see Figure 1). The model suggested evaluative tasks that in turn specified the level of deficit, in this case, in oral and written naming. The model further suggested the type of treatment tasks that would be expected to target the locus of deficit. In this study of word-finding impairments, the model served as a framework for the treatment choices between phonological and semantic approaches. In the current health care climate, determining the most effective distribution of limited therapeutic resources is critical, and use of model-driven assessment and treatment is one method of approaching this task.

Second, the data from the current study provide evidence that a semantic-based treatment can be effective in improving word-finding accuracy. This conclusion adds to previous research documenting the effectiveness of a semantic-based treatment (Howard

et al., 1985; LeDorze et al., 1994; Marshall et al., 1990; Pring et al., 1993). In addition, this project sought to investigate modifications to the prototypical semantic-based treatment, by placing time constraints on participants' responses in an effort to increase automaticity of response. The data empirically demonstrated the effectiveness of applying a semantic-based treatment protocol to a word-finding deficit with locus of impairment in the semantic system. The data did not, however, demonstrate that the semantic-based treatment protocol was effective in decreasing each participant's total naming time. That is, it did not appear that participant's increased naming accuracy and at the same time decreased time to respond. This suggests that participants perhaps made a speed-accuracy tradeoff, and that the underlying mechanisms involved in accuracy and speed of naming are not as related as was hypothesized. Future research may continue this line of inquiry, addressing the relationship between speed and accuracy in word-finding activities, and also the impact they may have on discourse production skills.

Third, an important result for clinicians from this research project is the evidence of a possible maximum treatment effect on naming accuracy, in this case, after approximately six sessions. Further investigation to document this observation will speak to the efficacious delineation of limited therapeutic resources. Because of resource limitations, particularly restricted amounts of treatment, and patients' multiple communication impairments, clinical choices of allocation of treatment are vital. Further research should investigate the potential for a maximum treatment effect of word-finding therapy and the relationship to both the number of target words per treatment set and the number of treatment sets included in the therapy plan. Preliminary evidence indicates that six

sessions might be the most efficient amount, but this is supposed at this juncture.

Fourth, a primary goal of the current study is to provide objective findings demonstrating a relationship between empirical and functional performance; that is, demonstrating improvements in naming accuracy during treatment tasks and during discourse tasks. The findings that emerge support a link between empirical and functional performance only in the picture description discourse task. The improvement in word-finding performance generalized only to the picture description task but not to any other discourse tasks.

The vital factor in the generalized improved picture description performance is possibly the obligatory context of the target words. It was hypothesized that lexical entries in the semantic system are related, thus promoting the likelihood of generalization of word-finding skills. In the current study, participants showed improved lexical access following treatment and improved discourse production in a closely related discourse task. It is possible that semantic-based treatment for word finding will only support generalization to closely related discourse tasks. This research study did not support the notion of generalization across discourse tasks. Two plausible reasons exist. First, maybe the improvements did not generalize to tasks in which the target word was not obligatory. If this is the case, word-finding treatment that targets the impairment level of functioning can have little impact on the participation level of functioning. Alternatively, the number of treated words might have been too limited to sufficiently judge generalization of strengthened access routines in other discourse tasks in which the target words were not obligatory. By increasing the number of treated words, the chances of measuring

generalization of improved word finding in other discourse performances might increase. Future research should address the number of words to treat in an attempt to demonstrate a generalized treatment effect across several types of discourse.

An additional suggestion for future research methodologies concerns picture description tasks involving pictures that are within-category members of target words. With this methodology, the experimenter might assess generalization of improved word finding in discourse performance in a controlled experimental paradigm

In summary, the current study showed the positive effects of a semantic-based treatment protocol on naming accuracy performance on individuals with aphasia. The adaptation of the semantic-based treatment to decrease naming time was not successful. However, a link between empirical and functional performance was achieved, but only in the picture description task. The findings support the utility of model-driven treatment choices in persons with word-finding impairments.

APPENDICES

APPENDIX A

APPENDIX A

Subject Profile Form

Name _____ Experimental Initials _____

DOB _____ Age _____

Medical Diagnosis _____

Post-Onset Duration _____ Handedness _____

Native speaker of English: Y or N

High school education or equivalent: Y or N

History of mental illness/substance abuse: Y or N

Current SLP treatment: Y or N

Pre-experimental assessment

Tasks for Assessing Motor Speech Programming Capacity--

Rating: _____

Rating Scale Form for Deviant Speech Characteristics--

Rating: _____

Yes-No Questions: _____

Identification of common household items: _____/12

Hearing screening: Pass or Fail

Severity rating scale from BDAE: _____

Boston Naming Test: _____/60

Appendix A (cont'd).

PALPA--

Auditory Word Picture Matching: _____

Written Word Picture Matching: _____

Oral Reading: _____

Writing to Dictation: _____

Picture naming--

Oral naming: _____/25

Written naming: _____/25

Error classification: _____

Auditory definitions--

Oral naming: _____/25

Written naming: _____/25

Error classification: _____

APPENDIX B

APPENDIX B

Data Collection Form - Treatment Protocol															
	Target Words														
Auditory-Picture Matching															
Presentation #1															
Presentation #2															
Presentation #3															
Written Word-Picture Matching															
Presentation #1															
Presentation #2															
Presentation #3															
Yes-No Question															
Presentation #1															
Presentation #2															
Presentation #3															

APPENDIX C

APPENDIX C

	Data Collection Form--Generalization and Discourse Variables			
		Pre-treatment	**Mid-treatment**	**Post-treatment**
	Accuracy of Untrained Set			
Discourse Variables	**# of Pauses >2 Seconds**			
	# of Paraphasias			
	Neologisms			
	Literal/Phonemic			
	Verbal/Global			
	Instances of Word Retrieval Failure			
	Instances of Indefinite Reference			
	MLU			
	Total Words			
	Number of Target Words Correct			
	Type-Token Ratio			
	Circumlocutions			

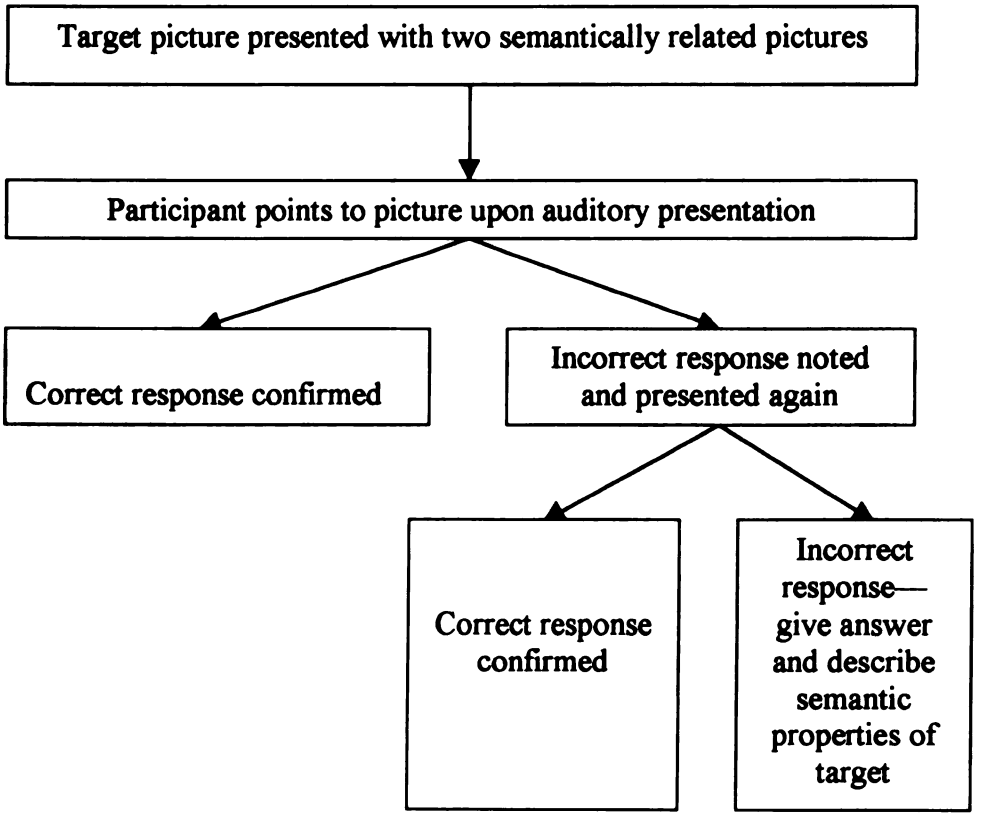
APPENDIX D

APPENDIX D

Summary of Session Activities

(1) Treatment protocol consists of three semantic tasks. Fifteen of the 30 trained words are targeted for treatment in each session. For each target word, all three semantic tasks are performed randomly. A flow chart of the treatment protocol follows:

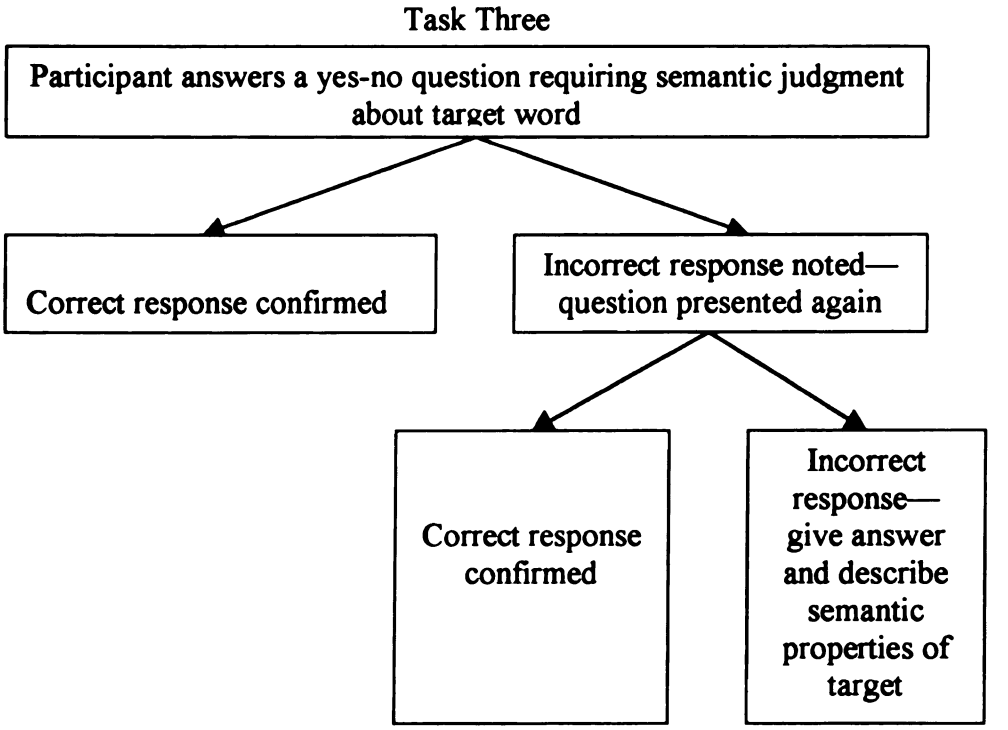
Task One



Task Two

Follow the above flow chart with written word instead of spoken word stimulus.

Appendix D (cont'd).



(2) Participant names 30 words of the trained set per trial arranged in a 6 x 5 matrix. Three trials per training set are performed. Accuracy and total naming time are recorded.

APPENDIX E

Appendix E

D.R./Pre-Treatment/Picture Description Sample

Language Sample Orthographic Transcription:

Museum
There it is museum
But I don't know quite
What is this
To walk behind or something
So I'd say they're looking at the pictures
Having a Coke
This person
I would have thought it might be movie there
But similar I guess
Why does he have a cane
You want some of these things
This this
This one is a yoey or some word like that
The kid
I can't
No
I can't say the word right now
And the momma has got her purse
Lookin' at the pictures
And this one is a
Is a painter
with his painting
I guess this is his paints
His paints here
And then I didn't see some of these other ones like
The uh water
Water somethin' or other
God I can't say the word right now
And uh
Like a bee or close to it
And uh
A picture of
Baby
Baby buggy
Baby buggy
And uh

D.R./Pre-Treatment/Picture Description Sample cont'd.:

What do you call that
Picture of
Ash tray
Ash tray
And
And another picture
I can't say it now
C'mon
It's a
I want to say bulb but that isn't it
I can't get that and I should get it too
I see the
The man with the tickets
He's got a beard and he's got uh
A br-bl-boke
What do you call it
Bow-k tie
Bow tie
Is that right
And the lady has one of these
I can't even remember what that is now
And I guess he probably is
Is a
With his cane and
With uh
With uh
Pictures that he's trying to look at or something there
I don't know
I guess it's like uh

D

L

A
A
I
A
A
A
C
W
W
P
C
W
W
I c
Th
Th
Sc
Th
A
A
It
A
A
Y
Th
I c
A
Is
V
Li
It
I c
I c
A
I c
I c
I g
Th
Th
W
Co

D.R./Mid-Treatment/Picture Description Sample

Language Sample Orthographic Transcription:

And a baby carriage
And a fruit
I always can't get which fruit it is and
A kite
And this is a
A watering pan I think it is
Or can I guess
Water can
Watering can
Pan
Can I guess
Watering can I guess
What else is there
I don't know exactly what you call that
They can't go by that or something huh
Then I guess you would hurt the pictures or something
So they're isolated or some word like that
This is a
A exit
And a booth
I think I said where they start over here
And this is a
A leasel
Yeasel
This
I can't say the word
And I should say that too
Is it a
Vase
Like a vase he's painting
I think
I don't know much what else
I don't know what this is supposed to be
A cigmarette or some word
I can't say the word
I don't know if I could tell that
I guess so
They're not
They're it
Whaddya call it
Contansering

D.R./Mid-Treatment/Picture Description Sample cont'd.:

Can't say the word
Looking hard I'm trying to say but I
Can't say the word I want
They're not s-smiling exactly
He looks like he's quite nice
But I think they're ka
There it is
Concentrating
They're concentrating I'd say
He's young yet I think
And uh
He's probably had some kind of trouble with his cane
I don't know whether he
Looks like he might have a b-beard here too but I can't tell for sure
And he's got
Uh glasses
But that isn't unusual
Mmm what else

D.R./Post-Treatment/Picture Description Sample

Language Sample Orthographic Transcription:

A man with a cane
Looking at these pictures I guess
And
I think maybe he has a beard
Although I can't tell for sure
I don't know what he's supposed to mean exactly but
And then there's a
Uh painter
With uh with a
Gee uh
Vase
I guess I'm trying to say
Vase
With his paint and his beard and
I don't know if this is his hair or what is that
I don't know for sure
And then there's a lot of pictures
And I guess this is to
So they don't get into it
So they can just see it
And these people
I guess are looking at the pictures
The exit thing is here and
Pictures of
Flies and
Balloon
And watering can
And uh peach
And baby carriage
There's suitcases
A suitcase anyway
And a needle
And a
Plug plug
And a guitar
And an ashtray
I don't know what else you want me to say
I
This one worr-
Not worries me but I don't know what it's supposed to be
I guess it's just an older man with a cane

D.R./Post-Treatment/Picture Description Sample cont'd.:

Probably looking at the
Looking about the pictures
It's what
He can learn about probably
And
Maybe that that he isn't really looking at the painter
It doesn't look like
And this lady is looking at the pictures
She she looks like she's a nice person
Best I can tell
And the kid probably doesn't really care about it right today
It look like
Too too young maybe
Or wants to do something else
Use a top
And this one I don't know exactly what she's lookin' at
I can't quite catch
Probably
She'd rather do something else
I don't know what she's showing there
He looks like a nice person
I think I said that
I don't see much else

D.R./Pre-Treatment/Monologue Sample

Language Sample Orthographic Transcription:

A ta teeve no no it's a
Does
Where the doctor works
Is a clinic and he's the tech for x-ray
There it is
X-ray tech
And then he does does another josh job with
Another doctor
So he has has to do two jobs which is a lot
So he hardly
So it was the first time he'd ever gone to Michigan and he hardly ever gets time to go to the games unless he
TV watched
Anyway the the boy
The doctor that I'm with loves to do this with these kids and he didn't even know these
But he knew the father
So he took them and he got them
Uh shh not shoes but
What do you call it
Shirts shirts for the game
That was thirty-two who's Michigan's running back
So they gotta
They all had seventy
They had thirty-two on their thing
For Michigan
And then even the father I think he happened to have one on
It was uh the away one so his was the the same thirty-two but a different color
Or whatever you call it
For Michigan
When they would've been out
I think he just happened to have it
So that was kinda cute
And then they said they had the best game best time they'd ever seen which is probably true
'Cuz they
Then the wife had did all the food
But the fa sad part
Was they s-stopped at
We were to pick them up at
McDaniel's Mc

D.R./Pre-Treatment/Monologue Sample cont'd.:

I'm not saying it right
Where everybody goes to
Br-breakfast
And so they didn't think they would be eating I guess
So they didn't eat as much as they
They should've
'Cuz they had all that damn stuff first
But anyway they had a great time and they got to
But then the game itself
It wasn't very good but I don't think they cared
'Cuz they they even got some uh
Uh autographs on the players
They got them as they were coming in
And one of them even was from Rice
They didn't know the difference
Well I did mostly watch the
The uh tennis
'Cuz I was into that
And they had
They had the the uh
The tennis
For the doubles
For the the two black girls and the
The
It was a French girl and
Another black girl

D.R./Mid-Treatment/Monologue Sample

Language Sample Orthographic Transcription:

Six years
I think
Literally six years
And then then he came into
to uh
to uh
Monroe
and more or less he's been there
And his
I I probably told ya
His boy
I
we
I have more with them because they're the only ones here but
You know I could spend a lot of time on that
And maybe some of the others
One is in
He's in E. R.
And he ended up
Because his wife was
She went into pedia-pediatrics
And then
I think I told you that they had too many kids and then she left in derm
And so that was when they came in Arizona
And he likes it so they're staying
And so I think she'd kinda like to go home
But I don't think she's going to
But it works out
And it's quite nice
And it's uh
One of my friends was talking about how nice it is the other day
and it is nice that's for sure
Um and then I have a boy
Who's the second oldest boy
That is in uh
In uh California
And he's a bone and joint man
And he took uh
He's
He did all his stuff in Michigan
And then he stayed for an extra year in

D.R./Mid-Treatment/Monologue Sample cont'd.:

Dallas
No not Dallas
Houston
There it is Houston
Which is very good good to go
And then he went in and he practices in
Near Stanford in
On trauma
That's what he does
And he has
Now he has boys
He has just boys
Three little boys
And they're quite nice
And one of them is left-handed
And hits pretty good but he can't do some of the other things yet
He's pretty young yet
Not into about eight
Something like that
I think literally eight
But he can hit the little thing
Boy
So it's kinda cute
And he's quite big that one
That boy is quite big too
And the
And the boy is quite strong
More than most of them
But the next one is the littlest one you can imagine
I don't know how they got one
His wife's probably five six or seven
He's seven
Not seven
Six two probably
And here's this little kid who's
She's
He
It's a g-boy
Is so little I can't believe it
But he does well and runs
And that sort of thing
But he's not going to be big for sure
And then the other one is a little one and he's

D.R./Mid-Treatment/Monologue Sample cont'd.:

Gonna be more normal
But this one is so little it kinda scares you
But there's nothing wrong with him
I guess
I

D.R./Post-Treatment/Monologue Sample

Language Sample Orthographic Transcription:

And unfortunately
It did and so did the mother
So we lost both of them
And it was a lot of work trying to keep her going
And so on
And so we didn't know for sure what would happen 'cuz not very much of that had ever happened
'Cuz they were little kids usually not the mother having so much um
And we had uh
I think I told you about
Three hundred
Four hundred I think it was
Four hundred polio things
I remember that
A lot of time on that
And one of my friends
Is
Was helped with me
I was ahead and he was younger behind me
And now he recently just died himself from um
From uh
Hepatitis
Which is a number three I think they call it
I'm not saying it right
Kind of a strange one of hepatitis
It took him
They didn't
Maybe a year or two or three ago
He didn't even know they had the damn thing
But they
It took him right out
And uh
That was
I could tell other things about him
He was a nice friend
Um what else do I want to say
And then uh
There are other interesting things from then
I had one
One that had uh
Whaddya call it gawd darn it

D.R./Post-Treatment/Monologue Sample cont'd.:

I can't get the words um
Lock-jaw
Had lock-jaw
Had walked in
I remember that like it was
I can remember that better than I can the other thing you're asking um
And when you saw him as a little kid
I don't know
Five or six or seven
He wasn't old
And uh
You walk in and you thought he was fine
And then suddenly he'd get that lock
Ya know
They just get so into it they can't even move and they're
The uh
Whaddya call it the
The uh
I can't say the word I want
Anyway it was very impressive
And then he got worse and worse and then gradually he got better
And we tried to do things to help him and then he got through it
Ya know
They didn't all die in those days
The uh
The uh
The thing from the from the
The uh
Oh shit I can't say the words um
Lock-jaw from the
The word I want to say
I can't say the word
It's uh
The tessen
Not tension but
It's almost like a toxin

D.R./Pre-Treatment/Storytelling Sample

Language Sample Orthographic Transcription:

No
I guess
I don't remember it very well
I hadn't thought of it
Well I'm getting it
Kind of
Screwy in what I'm thinking I guess
It's
There's a witch
There it is
A witch
And then there's a
She's a pretty gal or she at certain times she
Is
Like a
I wanna say a princess but something like that
And then there's a w-w-wolf or something in there
I can't quite catch all of it
Um
And she's supposed to go with a certain time or
At the end she
It's all over or some damn thing
I can't catch some of it I guess
Yea there's s...
I just am not catching very much but some of that I kind of remember
Um
Some of them are kinda nasty or something and
I can't catch it very much
I think
Not not not as I should I think
Between my not catching and
I kind kinda got a little flurry of it but I can't
Quite quite catch it I don't think
She
She she's a certain time that she can't go or some damn thing
But I just can't quite
To the ball or something but I can't remember it
I don't think
Is is there a a s-s-slipper there too or something
I just can't remember all of it I guess
I know there's
There's a time but I can't quite catch that

D.R./Pre-Treatment/Storytelling Sample cont'd.:

She's supposed to what with the fl-slippers

D.R./Mid-Treatment/Storytelling Sample

Language Sample Orthographic Transcription:

I kinda get it out of my mind in the sense of
It seems like the
There's a
She gets
She gets uh
In a situation
I can't say the word I want um
And she has to leave
I'm
I'm putting it at the end I think um
And she's not a princess or whatever then
I don't know what else really
But I'm kinda getting it in my mind which one is which
I guess
She uh
I just can't remember very well I don't think
I can't get the words I want um
There's some of the other people
I just can't quite catch it but
Which was which or whatever
So I'm not very good at it I think
I kinda catch with her
Slipper and
But I just can't remember it very well
That's it I just can't quite catch it
I'm not good at those kind of things for some reason
Well I was thinking of that
Rob Robbing Hid
I used to like that but I don't remember it anymore
And then I went to
I
I used to like the one where he was in the
Whaddya call it
He's a
He's lost I guess you could call it
R-Robinson Crusoe or whatever
But I don't remember it very much
But if I tried to get little kids

D.R./Post-Treatment/Storytelling Sample

Language Sample Orthographic Transcription:

The man the man was
Kinda quick
And I can remember his name even
But I can't quite get it
He's like a
Like a
Lion
Or something I think he was
Something like that
Wasn't that
Um
And the other man was a famous si uh
Singer
Not singer
Dancer
I don't know how I
That I knew him as being a good dancer
Well I was trying to say that she had these friends that were fun for them
But I I just can't remember very well
The the uh
One
The one was a great dancer out of real life
I can't think
Think of his name right now
I can't really think of that
Um I just can't remember very well
Tin tin tin tant
Or whatever you call it
Tine tin tin
I can't say that word I guess um
A dancer
Not very well
I'm thinking about Tom Harmon for Michigan
When he went into the junkles
Not the junkles
Whaddya call it the
The jungle
There it is the jungle
Did you know about that
He was a famous Michigan player that a
Back in the the thirties
And then he was in the war

D.R./Post-Treatment/Storytelling Sample cont'd.:

And then he was

D.R./Pre-Treatment/Conversation Sample

Language Sample Orthographic Transcription:

C: My father-in-law is a retired D.O. What are the basic differences between
D. R.: Not much anymore
C: No
D. R.: No
They they were more into the bones and that sort of thing
And and
Well you can hardly tell any difference anymore to be honest with ya
So it's
A lot of them are together
You probably know that
C: Yea yea
D. R.: So it's
But they have
The f- the first is to
Probably if I could talk
I can't talk well enough to
C: No you're fine
D. R.: The the man uh
Years and years ago was a D. O.
And he had a lot of different ideas and he
And like most things some of them were probably good
And and then then kind of
He was over here and everybody was here
So it's kind of gradually
And now it isn't much different ya know
C: There's not many schools though are there
D. R.: They're small
C: Yea
D. R.: So that that some of them if like they want to go into the the hh-
Like the hh-
What do you call it
The hh-heart and those kind of things
Usually end up going the bigger places
C: uh-huh
D. R.: Otherwise you won't see as much so a lot of them
So there the heart ones are
A lot of them dee
Uh D.O.'s and
They get together
Ya know
C: Mmm

D.R./Pre-Treatment/Conversation Sample cont'd.:

D. R.: They more or less
Once in a while it's uh
It's like
Whaddya say
Like koli
Politics is what I'm trying to say
Is sometimes it's more
Kinda keeping things together and then gradually everybody's kinda forgetting it
C: Mmhmm
D. R.: So it's
And they they have the two here
You know that probably
C: Yea both schools
D. R.: But they there's some ta-together now too
Ya know
C: Yea
D. R.: So that's kinda helped and
I I know the
W-well
I guess he's out of it now
He's probably
Re-retired but I've I've known him for a long time
He's my kind of
My kind of work too
He's uh
Uh pediatrician
Basically
C: Now did you take a lot of residents to train
D. R.: Where where where I was
Did I
Did I
C: Did you ever train residents
D. R. Yes
Quite a bit here
We did
Quite a bit
C: Where were you at? A private practice?
D. R.: Yes
Here
Yes yes
C: Where was that?
D. R. : Right here
C: In East Lansing?

D.R./Pre-Treatment/Conversation Sample cont'd.:

D. R.: Well in between I guess
It's uh
It's a big uh
Well shoot what do you call it
Um our
Our uh
Resident
Our wa wa
What do I want to say
My
Our building
I guess I'm trying to say
C: Mmhm
D. R.: Was between the two
So there's uh

D.R./Mid-Treatment/Conversation Sample

Language Sample Orthographic Transcription:

D. R.: Damn I can't get it
Scholis scholar scholar thing
Scholar thing
For high school to go there
C: Oh
D. R.: What's the word for that
Can't say it
Anyway she got
C: Oh a scholarship
D. R.: Scholarship
That's what I'm trying to say
So she was there and that's I think how she got there
She liked it though
And she's had a lot of friends from
Not a lot but uh
Close ones you know
Nice people
C: Oh you're saying for her education she went to Kalamazoo College
D. R.: First two years
C: And then went to Michigan
D. R.: And then Michigan
And then
C: That's where you met
D. R.: That's where we met
Right
I was a
I was soon to be a senior in in Michi uh
Medical school
C: Oh
D. R.: So
But
Then she went to uh
Uh Mount Clemons I tried to say
That's where
And she was a teacher there
C: In high school
D. R.: Mmhm right
In uh shh
Whaddya call it
Soc-social studies
I think ya call it

D.R./Mid-Treatment/Conversation Sample cont'd.:

That's kinda her
She's not into
Into medicine at all
Anyway not
But anyways she did a good job with the kids I think
So
C: Now my wife when she applied to school she applied to Kalamazoo College
D. R.: So you know about that
C: Michigan
D. R.: It's not far from
You're really not far from them are you
C: No not really about forty minutes
D. R.: Yeah right
No it's not too far
C: University of Michigan and then Michigan State. She really liked K-College but it was more because I was coming here to come to this program and University of Michigan doesn't have a speech pathology program and Western Michigan did but I wanted to come here so she came here
D. R.: Oh so that's kinda the way it worked out
She liked it though
C: Yea she liked it
D.R.: Well it's nice I think too
It's been nice
I've we've got friends
Not a lot of them
But they're nice people
But they
Ya know keep that way
Some of them are dead now
They
What else was I going to say
I lost the thought I was gonna say
C: Did you know out of high school you wanted to go to med school
D.R.: Yea for some reason
Well the the wo
The wo ah war was part of it
So when I was a senior
And I was still pretty young
Ah the war was there
So I left to home right then
And then
But I I I guess I knew even at that time that I would
Then then I was a pilot but none amounts to anything 'cuz it alls stopped

D.R./Mid-Treatment/Conversation Sample cont'd.:

The war stopped
And I was still in Pensacola

D.R./Post-Treatment/Conversation Sample

Language Sample Orthographic Transcription:

D. R.: Years there anyway
I think he was all four with Michigan
But I can't get the damn name right now
Come to me
I'll get it in the middle of the night probably
C: Is he
D. R.: He's very nice
But I I think he's
He's young enough
He's probably a year or two ago from Michigan now
C: Oh OK 'cuz I was
D. R.: He's he's six
C: Thinking Roy Tarpley or something
D. R.: No not that old
He's uh
It just won't come to me
And he was a very good rebound
But he's very skinny
But he was good though
And I imagine he
C: It wasn't Voskuil was it?
D.R.: No
No it was
It was new-newer than that
He's just a year or two ago
Or two or three times that
And I think he stayed the whole way as far as I can remember
Who else was with them
Sometimes it just won't come anymore
Um I can't think of his name
He was a nice kid
And I I don't see them
And I just happened to see him and I said boy
I saw him in the thing
And I was going up
And I said
Of course he's so damn big
You can't miss him
Six nine I think
C: Yea. Well I saw where we were talking about that earlier
D.R.: What was his name

D.R./Post-Treatment/Conversation Sample cont'd.:

There was another one
The one I was in
But I probably can't tell you well enough
He
He himself was a great player
Not famous but in the pros
And he was gonna go to work with Bing
The famous man in Detroit
C: Oh Dave Bing yea
D. R.: Mmhm
Ya know he
And he's a black man
And he played
I don't know
A number of years
And I can't
Most of it won't come to me now
But anyway I was sitting in the Michigan
Stands
And he was he was
It was his first time
And I and I got talking with him
And I realized who who he was or he was telling me
And he was there to
To uh scout
And like for the pros
And let's see
And they were
they were interesting two places
And I can't remember who else they were interested in
But he
He didn't know much of this man that I'm telling you
And I said God you ought to watch him 'cuz he's good
I
And and
C: Mmhm
D. R.: But I can't say his damn name now
And and he was doing this for Seattle
Becau-
In other words he come to with Bing
C: Oh
D. R.: And then he had uh probably another side to do this too
C: Right

D.R./Post-Treatment/Conversation Sample cont'd.:

D. R.: You know
Get some money for himself I suppose
C: Right
D. R.: Then it was kinda fun to listen to him
And then he was more interested in knowing ss-
'Cuz he didn't know any of this crap that I
That I knew about it
Been through with him
I said geez you ought to look at him
And so anyway I imagine he watched it
But I can't even think of his name now

A.H./Pre-Treatment/Picture Description Sample

Language Sample Orthographic Transcription:

That um
Is reading a book
And he has a cane
And uh
And that's all for um
That guy
And the other uh man uh
Is painting a picture
Of uh flowers
And uh
He just about done um
And the uh
Little boy
The uh
Little girl uh
A yo-yo
And um
And she is playing with it
And and nev or no
And she uh
Is bored
Because uh
Her mother is looking around all the pictures
Now the pictures are um
Lamp
A horn
A uh pitcher
A
A coat um
Teapot
A uh
A bucket

A.H./Mid-Treatment/Picture Description Sample

Language Sample Orthographic Transcription:

'Cuz he is uh
Or she is uh um um
Playing with her yo-yo
And the woman is looking around um
The pictures
And the uh uh
The man is uh ra-reading a book
Of uh
And uh
And he has a cane
And uh
He looks like he is walking out of the door
The uh
The ma- the man that uh uh um
Looking at all the er-
Well the man is uh um um
The uh
Um the man is um
Looking at a picture
I don't know what one he looking at
He is uh uh
He is looking at a picture of a vase and a flowers on a table
And um
He is uh
He uh
He has a brush and a
And a um um um
A paint uh thing

A.H./Post-Treatment/Picture Description Sample

Language Sample Orthographic Transcription:

Are looking at the pictures um
The other man that uh um
Is an artist and he is uh painting a picture of a uh
Vase and flowers on it uh um
And uh
He has a cap and a
A handkerchief across his neck
And uh he's painting
The picture
Now the other man that uh
He has is a um um
Has a book and and is reading
And and the uh
He has a uh a goatee and a cane uh
The um um
Woman is looking at the pictures and the uh
The little girl is uh holding her hand and uh um
Has a yo-yo on her finger to uh
Pass the time away uh
And then the the uh
The girl that's by herself has a a Coke and long hair
And uh is uh looking at the pictures
The uh
The pictures are um a jacket
A uh a sheep
A kettle
A uh uh pitcher
A uh pepper

A.H./Pre-Treatment/Monologue Sample

Language Sample Orthographic Transcription:

Stuff that he has um
And and ya know
Uh helicopters and stuff like that um
And uh
And we we watched a uh a film of
Of uh uh um
A uh
A house had been moved from another place to another place and uh
And we watched that um
Because uh
Chris uh uh
Was uh
Good uh friends with with him
And uh
He had um
He um
He asked him if he would take uh
Movies of that because uh
They uh uh
Would uh be in court ya know
'Cuz uh
This guy had been um um um
Going to court and uh
Fighting that uh
The uh uh
St. John's Hospital
Ya know where where that is
It's uh right behind him
And uh
And uh um
Right behind him and
And uh
They uh
Put a wall all around the per-per-property um
And uh
Ya know and uh
Left it there ya know and uh
And uh
The people come in and uh say what
What's this uh
Ya know uh

A.H./Pre-Treatment/Monologue Sample cont'd.:

We want to uh
Say uh
The hospital said that no
He uh no

A.H./Mid-Treatment/Monologue Sample

Language Sample Orthographic Transcription:

Um and then um um
We come home to uh
Uh Cindy's house and uh
Played uh
God I I can't remember the name
But uh um
A dice game
Ya know
And uh we all play
And we playing and and uh
And then uh
Her uh sister-in-law from um um
Her brother had a uh
A wife
And he she come over and um
And then uh
Another friend of uh Cindy's come over and we uh played uh uh
The same game
And then um
And then about um nine o'clock uh
We went home to my father's house and um um
We uh um
I don't
I don't er
I uh sat down and watched TV but my wife uh
Picked up and stuff like that
All the stuff and
And uh we went about uh
About uh
Ten thirty I think
And then we uh went home
And then we got
It was uh twelve o'clock
I bet before we got here
Or longer
Yea it's about um
Oh twelve thirty or something like that and uh
And um
And uh Shelly was home here and uh we talked for a little bit
And then we uh went to bed

A.H./Post-Treatment/Monologue Sample

Language Sample Orthographic Transcription:

And uh um
We don't know what we going to do about that because uh um
Terry the uh
The owner of the place
She he and uh
Is going to clean the place up um
'Til we get back
Ya know um
Then we'll decide what we want to do ya know
What we gonna do um
So that's up in the air too you know
So uh um
Well they have uh two girls that are alive today and uh
And my father-in-law is sick
So they they they uh um
The only two that uh um um
That are alive today
Ya know I guess and uh
Sherry is the execulor executor of the will and stuff and then uh um
Ya know probably when we get uh uh
Rid of Michelle
We or no
We don't know what we gonna do
But uh
Cindy uh um

A.H./Pre-Treatment/Storytelling Sample

Language Sample Orthographic Transcription:

There's a uh er uh
Woman that lives there uh
Or no
A young girl that lives there uh
Was that uh uh uh
The three uh women that uh uh
Ya know when she lived
Ya know when she uh lived there
There was uh three women
That uh
Went to the ball ya know and uh
And um uh
Was that the
The story or um
Okay
The three women went to the the ball
And uh
And the young girl that uh um
Went to the ball um um
Went to the ball
And then she uh
Danced with the uh the princess and uh lost her shoe
And then uh
He uh said uh uh
I don't know about then
Yea
And uh
Well he
Ya know got her um
Got her home

A.H./Mid-Treatment/Storytelling Sample

Language Sample Orthographic Transcription:

And the girls that uh
Are going to the ball are getting dressed and everything
And uh
The uh woman says uh um
Why don't you go to the ball and uh
Or something or another
And uh
She went to the ball and uh
And uh went to the ball and uh
She uh danced with the prince
And the uh
And then the uh
And then the uh
The shoe fell off and then
He said uh
You um um
This shoe belonged to you and uh
And she was walking out because um
He she um was going to um
Be cursed with a um
A uh
Another um
No
Perse- you know uh
Cursed with the guy that uh
Er a man maybe um
He er she did
Er she didn't go home until er um midnight
And then um she was going home er
And uh
And then when he come over to the next day um
She was um
Sweeping the floors and stuff and then uh
The uh three girls

A.H./Post-Treatment/Storytelling Sample

Language Sample Orthographic Transcription:

The man says that uh
Well you gotta get home by twelve o'clock
Or your dress and shoes will um um uh
The um this uh
Distwingwish and then uh
And she uh goes to the ball and uh
And then there's a the princess um uh um
Who danced danced with her
And uh
And then uh
And then he he says um
The uh four girls um
Why don't you dance with me and then uh
And then the one that uh um
Dances with me uh
I'll see if um you're the best dancer
And uh
So it's all
Ya know
The three girls um danced with him and then the fourth one uh
Danced with him
And they
He liked it and uh um
Ya know and uh
Then it was uh time to go and uh
And she uh
Said I'll see you later
And then uh the uh shoe dropped off and uh
And then uh uh she come home and uh
Then the uh the princess said who's this um shoe belong to

A.H./Pre-Treatment/Conversation Sample

Language Sample Orthographic Transcription:

A. H.: Fourteen fifteen
Fifteen years I think
C: Where in Missouri?
A. H.: St. Louis
C: Oh really
A. H.: Mmhm
C: How's that? Never been. Did you like it?
A. H.: I I liked it but I uh
Was gone all the time
I was uh uh
Working and uh
And uh
But uh
My uh wife liked it
But uh
She uh misses home
Ya know so
C: So you came back
A. H.: Yep
C: That's my dilemma--whether we're gonna move. I'd like to live out West personally but
A. H.: Mmhm
C: I have all my family in Michigan
A. H.: Oh yea
C: And so does my wife so I don't know. I'm close to my family too but I like hiking
A. H.: Oh I see yea
C: And skiing and all that stuff. You can do a lot in Michigan, I'll say that but the mountains
A. H.: Well you can do a lot in Colorado too
C: Yea you can yea
A. H.: Yea
C: Have you ever been out there on trips
A. H.: Ah I went uh um
Boulder uh
Denver mmm
I think that that's all um
But uh but there on jobs
Ya know on
C: Oh you went for work
A. H.: For work yea
C: So in Missouri--how far is it to there? Probably not that far--do you know?

A.H./Pre-Treatment/Conversation Sample cont'd.:

A. H.: Um yea it's uh
Eight hours
Or no
It was uh
I'd say uh
Mmm about uh three hours of uh plane ride

A.H./Mid-Treatment/Conversation Sample

Language Sample Orthographic Transcription:

C: His dad's kind of a big mouth I guess
A. H.: Yea
Oh geez
C: I don't know. Seems like it could have been handled better and I don't know how a guy like that who's so close to breaking the
A. H.: The
Walter Payton's uh
Uh record
C: Yea. He would have done it easy this year I think
A. H.: Well he he has uh uh
A thousand
A thousand something yards to go yet
C: Yea I think it's like fourteen hundred or something like that
A. H.: Oh okay yea okay
C: So yea. And he gets that every year and last year he got . . . what did he get last year
A. H.: Oh um two thousand at least
C: Yea. He broke the two thousand barrier . . . so I don't know. I guess he doesn't realize what a great life he has or
A. H.: Oh yea
C: Maybe he doesn't appreciate football as much as other people do
A. H.: Oh yea that's true
Yea that's true
C: Most of those guys you can't get off until they can't walk or they have five concussions and they might have serious damage. I don't know why he hates the Lions that much
A. H.: Well I think uh um
When he was uh um going to uh
What was that guy
Barry or uh
Favre Farr
C: Yea
A. H.: Farr
I don't know what the coach's name was
C: Oh oh oh
A. H.: Barry
C: Not Favre from the Packers . . .
A. H.: No
Oh yea that's right
C: You're talking about uh oh the other coach
A. H.: Yea
C: It started with an "F"
A. H.: Yea

A.H./Mid-Treatment/Conversation Sample cont'd.:

C: He actually played at Michigan State I think
A. H.: Yep
C: Fontes right
A. H.: Fontes yep
And uh
He uh
Ya know he went
Ya know
He went there
But uh he didn't like um
Who the other guy is right now um
C: Oh the new coach right
A. H.: Yea
What's his name
C: Bobby . . . Bobby Ross
A. H.: R-R-Ross
Yea
Yep
He don't like him
I don't think
C: No
A. H.: I don't think

A.H./Post-Treatment/Conversation Sample

Language Sample Orthographic Transcription:

C: Oh a brother-in-law . . . is that what you meant
A. H.: Brother-in-law
Yea yea
C: You said son-in-law so I was thinking . . .
A. H.: Oh
C: It was someone married to one of your daughters
A. H.: Yea
C: Oh I see what you're saying
A. H.: Yea yea oops
C: So how is your father-in-law . . . has anything changed or . . .
A. H.: He is on the uh respirator and uh
He uh um
And pneumonia
Ya know this thing
You know and uh
And and not changed either because uh
He uh
The um
The uh control
Or is uh
This man or woman or whoever it is come in and and change his uh
Bu-biot-biotics
C: Oh his uh
A. H.: They change
C: Antibiotics
A. H.: Yea antibiotics um
To another one
Ya know so
We can er
We can er um
It can see what it can do with
Ya know um
With his health ya know
C: So why . . . is his primary problem the pneumonia or is there
A. H.: No
Yea it is
C: Why did he go in originally . . . pneumonia
A. H.: Yea
C: Oh okay
A. H.: Well he was uh uh
Talking um real funny ya know

A.H./Post-Treatment/Conversation Sample cont'd.:

Like he was uh dizzy
Ya know what I mean
And uh
And and uh
And she says
Ya know uh
My sister-in-law uh um
Ya know said that well
Ya know uh
We uh gotta go to the hospital
Or no to the uh the doctor's on uh Monday
Ya know
And uh
And she uh said that uh
I just called one nine-one-one and uh
Meet her over there ya know

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