CHANGES IN GRAMMATICAL ASPECTS OF APHASIC DISCOURSE AFTER CONTRASTING TREATMENTS

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract of Thesis Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Master of Arts

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The aim of the current study is to compare the effects of two treatments on the production of discourse of speakers with aphasia using grammatical analysis that quantifies changes in the production of various grammatical units and forms before and after treatment. Discourse analysis is an important method for studying the language system because it provides a view of the language system in its natural setting of conversation. There are several reasons for using discourse analysis as an outcome measure of aphasia treatments. Most importantly is that impairment of discourse is the most notable deficit and most troubling for the patient with aphasia. In addition, the goal of any aphasia treatment should be improved discourse production; thus, the effect of treatment on discourse is key to establishing successful treatments. Analyses of the current study included word classes, sentence types, and information units. Analyses are conducted to compare the two treatment types, the two conditions, and each condition within each treatment type. Discourse data are taken from pre- and post- treatment measures of two naming treatments. Participants were assigned to either the semantic-

phonologic treatment or the compensatory gestural-verbal treatment for aphasia; within each treatment, participants were trained on noun access or verb access. Results indicate greater increases in production of various word classes, sentence types, and information units in the participants of the gestural + verbal treatment with verb training. A new measure of information is introduced and compared to current information measures used in discourse analysis. The significance of mazes is discussed in reference to a possible link to lexical access. Implications for future discourse analysis are discussed.

CHAPTER 1
INTRODUCTION

Aphasia and Discourse

Aphasia is a language disorder resulting from damage to the brain significantly affecting all levels of language production: form, content, and use. Deficits are observed through errors of word retrieval, phonological processing, grammar, and syntax (Duffy, 1995). In the clinical and research setting, it has been very common to use standardized tests to measure changes after treatment. However, the tasks involved in these measures, repeating sentences, naming pictures, and following verbal directions, are not tasks performed in everyday conversations (Boles, 1998). In Elizabeth Armstrong's (2000) review of aphasic discourse analysis, she points out that discourse analysis is an important method for studying the language system because it provides a view of the language system in its natural setting of conversation compared to language tasks such as naming.

There are several reasons for using discourse analysis as an outcome measure. Most importantly is that impairment of discourse is the most notable deficit and most troubling for the patient. Studying the effects of aphasia on discourse is also fundamental to classifying the type of aphasia and developing a treatment plan, as improved conversational skills should be the goal of any treatment. Furthermore, discourse analysis is important from a theoretical view because all linguistic levels of language interact in discourse providing an opportunity for developing and testing models of

normal language production, and patterns of impaired discourse can support or disprove current models (Armstrong, 2000; Prins & Bastiaanse, 2004).

As discourse analysis has come to the forefront of aphasia research, many different theoretical views and methods of analysis have been developed. Through the years limitations and challenges in the use of discourse have been discussed, such as clearly defining discourse, identifying the components of discourse to measure, and developing elicitation techniques that yield relatively natural language samples (Armstrong, 2000).

Discourse Analysis

Elizabeth Armstrong (2000) identifies the key questions researchers aim to answer through discourse analysis. These questions concern identification of the following: the kinds of meanings conveyed by speakers with aphasia, the lexical and grammatical resources used to convey meaning and identifying when meanings are no longer clear due to lexical and grammatical deficits in aphasia. Armstrong (2000) identifies two theoretical frameworks for defining and analyzing discourse to answer these questions: structuralist-oriented and functionalist-oriented.

Theoretical framework

The functionalist-oriented perspective, defines discourse as language in use (Goffman, 1981; Halliday, 1985a, 1985b). This framework is focused on the meaning of discourse within its context. Functionalist analysis is concerned with the macrostructure of discourse such as topic maintenance, turn-taking, appropriateness to the situation or topic, and the ability to organize and convey meaning. Several researchers have found that speakers with mild to moderate aphasia are able to employ the structural principles of discourse used by normal speakers such as setting, complicating action, and resolution in a narrative, and obligatory elements of procedural discourse, although optional elements

of procedural discourse are most often omitted (Glosser & Desser 1990; Ulatowska, Freedman-Stern, Doyle, Macaluso-Haynes, & North, 1983; Ulatowska, North, & Macaluso-Haynes, 1981). As the structuralist framework will be employed for the current study, the functionalist framework will not be discussed in further detail here.

The structuralist-oriented framework defines discourse as a component of language above the sentence (Grimes, 1975; Harris, 1963, 1988). In this framework, discourse is analyzed through its structural and lexical components, sentences, phrases, and words, commonly called microstructure. Lexical components have been studied from a semantic perspective, measuring occurrence of paraphasias and non-specific lexical items, and from a grammatical perspective, measuring types of word classes produced (Armstrong, 2000). Syntactic analysis has focused on grammatical complexity of sentences, syntactic errors, and clause argument structure (Bird and Franklin, 1996; Brenneise-Sarshad, Nicholas, & Brookshire, 1991; Goodglass, Christiansen, & Gallagher, 1993; Schwartz, Saffran, Bloch, & Dell, 1994; Miceli, Silveri, Romani, & Caramazza, 1989; Roberts & Wertz 1989; Saffran, Sloan-Berndt, & Schwartz 1989;).

Word class analysis focused on the structural difficulty in discourse of speakers with agrammatic aphasia has found production of more nouns than verbs, and fewer closed class words and pronouns when compared to normal speakers. Syntactic analyses of discourse of speakers with agrammatic aphasia have found production of verbs with the simplest argument structure and omissions of several structures including subject, main verb, or required function words and inflections. Word class analysis of discourse of speakers with fluent aphasia found production of more verbs than nouns (Berko-Gleason et al., 1980). Syntactic analyses of the discourse from speakers with fluent

aphasia have found a decrease in syntactic complexity and the frequency and variety of verbs (Bastiaanse, Edwards, & Kiss, 1996; Edwards, 1995; Edwards and Bastiaanse, 1998). The structuralist framework is adopted in the current analysis of word classes, syntax, and information units.

Typical methods for eliciting discourse in the structuralist-oriented framework include single picture description, retelling stories in response to a series of pictures, retelling of previous accounts, retelling known fables, or monologues based on topics such as family, illness, or occupation. The current discourse samples were collected using several of these elicitation techniques.

Information analyses

An important aspect of discourse applicable to both of the above frameworks is content and efficiency of language production (Armstrong, 2000). Measuring content or the amount of information conveyed by the speaker, has been argued as the best measurement for successful discourse production (Shadden, 1998). Researchers have used several terms to refer to this unit of measurement, including ‘content units’ (Meyers, 1979; Yorkston & Beukelman, 1980); ‘themes’ (Berko-Gleason et al. 1980) ‘correct information units’ (Nicholas & Brookshire, 1993a), ‘main concepts’ (Nicholas & Brookshire, 1993b, 1995), ‘essential information units’(Cherney & Canter, 1993; Hier, Hagenlocker, & Shindler, 1985; Nicholas, Obler, Albert, & Helm-Estabrooks, 1985), ‘propositions’ (Ulatowska, North et al., 1981) ‘essential and optional steps’ (Terrell & Ripich, 1989; Ulatowska, Freedman-Stern et al., 1983; Ulatowska, North et al., 1981;), ‘target lexemes and thematic units’ (Gleason, Goodglass, Obler, Green, Hyde, & Weintraub, 1980), ‘unscorable or nonessential content’ (Tompkins, Boada, McGarry, Jones, Rahn, & Rainer, 1993; Trupe & Hillis, 1985) and ‘entire utterance’ (Arbuckle,

Gold, Frank, & Motard, 1989). Although all these terms refer to measures of information they are not equivalent.

In her chapter on information analyses, Shadden (1998) discusses the many differences among information measures. She begins with the two approaches, 'a priori' measurements and 'a posteriori' measurements. 'A priori' analysis refers to methods that measure pre-determined essential components of the discourse, as in Yorkston and Beukelman's content units (1980), and Nicholas and colleagues' essential information units (1985), both of which used descriptions of the Cookie Theft picture (Goodglass, Kaplan, & Barresi, 2000). An advantage to the a priori method is that results can be compared to normative data; however, these norms are only applicable to the particular picture used, and results cannot be generalized across pictures or across other elicitation tasks. 'A posteriori' analysis focuses on defining measures that can be applied across tasks and behaviors to develop computed measures with significance across these tasks. An example is Nicholas and Brookshire's correct information unit (1993a; Shadden, 1998). Although the number of words and number of CIUs can only be compared across identical tasks, words per minute, CIUs per minute, and percentage of CIUs can be compared across different tasks. Another difference Shadden discusses is the idea of measuring only the amount of information or including quality of information (1998). Quality of information can be included in a priori measures as Myers (1979) did with Yorkston and Beukelman's content units (1980) by dividing the content units for the Cookie Theft picture into literal and interpretive. A third difference in information analyses is the inclusion of efficiency in the measure. This can be done by calculating information over time (e.g., CIU per minute, Boyle, 2004; Shadden, 1998;), number of

language units (words or syllables) per information unit, or using rating scales (e.g., Trupe, & Hillis, 1985) (Shadden, 1998).

Past definitions of information measurement units have specified that information must be relevant to the topic, but have not required utterances to be coherent. Therefore, these measures only conveyed the amount of relevant words in the discourse and not the manner in which they were conveyed (Armstrong, 2000). For example, Nicholas and Brookshire (1993a) considered relevance when defining correct information units (CIU) but only in terms of the relevance of the individual words to the topic. This is problematic, as Hasan (1985) points out, because words can be relevant to the topic, but be incoherent in conveying information. The following utterances are given by Hasan (1985) to illustrate this limitation, "Girl bananas two spend shopkeeper/Apples own girls dollars grapes/Buy fifty sell cents shopkeepers/Girls fruit." Although these utterances are relevant to the topic of shopping, they are not coherent and, therefore, are not useful for describing the difficulties speakers of aphasia have in conveying information (Armstrong, 2000). CIUs are scored per word and not per utterance allowing each word conveying information to be measured including auxiliary verbs, determiners, conjunctions and other function words. However, due to differences in utterance length or number of words produced in aphasia types, CIUs cannot be compared across aphasia types. These scores are inflated for fluent aphasia and depressed for non-fluent aphasia, even if the amount of information is similar. In the current study the information measure will be referred to as 'utterances with new information' or UNIs, a measure created by the Discourse Group at the University of Florida Language over the Lifespan Lab, and defined as a coherent utterance providing information not previously given in the

conversation. An utterance did not have to be a grammatical sentence or include more than one word to be counted as a UNI; the only criteria was that it provided new information that was semantically coherent with the preceding context. The UNI is scored at the utterance level allowing for comparison across aphasia type, unlike the CIU. However, the UNI may be limited in detecting small increases in information as it does not measure each word providing new information, and an utterance may include more than one piece of new information.

Elicitation methods

Researchers have elicited various types of discourse ranging from descriptive narrative, procedural discourse, or even role-play using a variety of methods: single picture description, picture sequence description, retelling of a story read to the speaker, retelling of well-known stories, recounting a memorable experience, or talking about personal events and family members (Armstrong, 2000). Procedural discourse requires given topics such as brushing teeth or going grocery shopping (Armstrong, 2000). Although all of the above methods result in conversation-like verbal production, unlike reading aloud, word or sentence repetition, or picture naming, they are not to be considered equal in the discourse they produce and in fact produce different 'genres' of discourse (Armstrong, 2000; Ulatowska et. al., 1981, 1990; Williams et al., 1994). Within a genre, differences in definition have been found, such as in the narrative genre, the most commonly used in research (Armstrong, 2000). Studies referring to their data as narratives have included participants discussing family members, single picture description, and retellings of personal events, fictional narrative, and known narratives such as 'Cinderella' (Glosser & Deser, 1990). These types of language samples differ

with respect to their inclusion of the defining elements of narrative: orientation, precipitating action and resolution (Armstrong, 2000).

In their review of discourse research, Prins and Bastiaanse (2004) make the following divisions in defining and eliciting discourse: (1) semi-spontaneous speech from situational pictures (e.g., Cookie Theft) or retelling a known story (e.g., Cinderella), (2) semi-spontaneous speech elicited by role-playing, (3) spontaneous speech in a conversation or dialogue (e.g., between patient and spouse, therapist or other person familiar to the patient), and (4) spontaneous speech elicited through interview with open-ended questions in an informal, natural conversational setting giving the patient ample time to talk. These divisions may eliminate some of the differences Armstrong (2000) points out, although even these divisions group potentially different genres together, such as discourse from pictures and retelling a known story. Glosser, Weiner, & Kaplan (1988), found pictures elicited less verbal complexity than spontaneous production without pictures. However, Doyle et al. (1998), found no significant differences between story retelling with or without pictures for measures of verbal productivity, information content, grammatical complexity, verbal disruption, and quality of grammatical form. Another explanation for these genre differences could be the instructions given to the speakers. Olness (2005) suggested that the common instructions given for picture descriptions, “Tell me everything you see going on in this picture” does not specifically ask for temporal organization. In her study contrasting instruction type, she found speakers more likely to produce narratives when asked for temporal sequencing, “Make up your own story about what happened, with a beginning, a middle, and an end.” As Armstrong (2000) states, the issue of defining discourse and matching genres with

elicitation techniques remains to be resolved and finer distinction may help profile the way speaker's with aphasia use language skills in various settings.

Methodologies

Prins and Bastiaanse (2004) review the current methods of discourse analysis and outline the advantages and disadvantages of such analyses. They identify two methods of analysis: (1) rating features of the language produced on a pre-determined number of scales, such as phrase length and grammatical forms, and (2) quantifying linguistic variables, such as mean length of utterance, and content/function words ratio. They advocate the use of linguistic or grammatical analysis as they view aphasia as a linguistic disorder. They state that any macrostructure impairments or pragmatic difficulties in discourse of speakers with aphasia are most likely due to linguistic impairments. Prins and Bastiaanse (2004) point out that discourse can be analyzed using either qualitative or quantitative methodology.

Qualitative linguistic analyses use rating scales such as the Rating Scale Profile of Speech Characteristics (RSPSC) and the Aphasia Severity Rating Scale (ASRS) both used in the Boston Diagnostic Aphasia Examination (BDAE; Goodglass et al., 2000; Prins & Bastiaanse, 2004) to classify aphasia type. The spontaneous speech portion of the BDAE presents questions such as, "How are you today?" and "Tell me what happened to bring you to the hospital?" and then provides the Cookie Theft picture for the patient to describe (Goodglass et al., 2000). The rating scales are used to analyze the patient's responses to the questions and picture description. The RSPSC uses a 7-point scale to measure melody, phrase length, articulatory agility, grammatical form, paraphasias, and word finding. Based on ratings on the RSPSC, a patient's aphasia type

can be identified (Prins & Bastiaanse, 2004). The ASRS is a 5-point scale measuring the speaker's ability for verbal communication.

Quantitative analyses can be elicited from various stimuli as previously discussed, such as story retell or picture description. A commonly used method is the Quantitative Analysis of Agrammatic Production (QAAP; Saffran, Berndt, & Schwartz, 1989). This approach measures variables such as proportion of closed class words, verb inflections, well-formed sentences, and embedding index. Rochon, Saffran, Sloan-Berndt, and Schwartz (2000) conducted reliability testing of these measures and found test-retest variability ranging from .66 to .92 for the proportion well-formed sentences. Prins and Bastiaanse (2004) suggest this finding is not due to instability of the QAAP, but to instability in the performance of agrammatic speakers themselves. They also suggest that the findings indicate a need for caution when using the QAAP to measure changes in agrammatic speech. Thompson, Lange, Schneider, and Shapiro (1997), offer another method of quantitative analysis of agrammatic speech, in which they analyzed verb-argument structures. Based on their results, they conclude that agrammatic speakers produce fewer verbs in general and produce verbs with simpler argument structure when compared to non-brain-damaged speakers. Although this study added to the knowledge of the underlying disorder in Broca's aphasia, it has yet to be replicated in speakers with other aphasias. Consequently, it is not possible at this time to determine the broad clinical implications of this finding (Prins & Bastiaanse, 2004).

Limitations and deficiencies in current research

Prins and Bastiaanse (2004) note that a primary limitation in the value and generalizability of discourse analysis for aphasia research is the speaker with aphasia. The stability of the production of aphasic discourse across repeated testing is unknown;

therefore, the value of language samples as representations of the speaker's ability or as treatment outcomes is unknown. Prins and Bastiaanse (2004) present the need for more group studies to develop norms for statistically reliable improvement, so that individual studies could be better interpreted. In addition, as in the case of the method proposed by Thompson et al. (1997), analyses need to be applied to various types of aphasia to determine if research findings provide a method applicable in clinical settings.

A significant reason for the limited research available on grammatical analysis is the nature of such analysis. It is time-consuming and demanding of resources, skills, and knowledge not always available in clinical or academic settings. Researchers must have significant knowledge of linguistics and aphasiology to conduct the requisite grammatical analyses and apply the results to clinical practice (Prins & Bastiaanse, 2004).

Despite these limitations in the use of quantitative analysis, Prins and Bastiaanse (2004) consider it an important method for investigating discourse. Like Armstrong (2000), they advocate using discourse analysis for developing theoretical models, designing therapy and measuring its efficacy, because it provides the best information on a patient's everyday use of language.

Purpose

The aim of the current study is to compare the effects of two treatments on the production of discourse using grammatical analysis that quantifies changes in the production of various grammatical units and forms before and after treatment. Analyses address changes at the word, sentence, and information levels. Analyses will be conducted to compare the two treatment types, the two conditions, and each condition within each treatment type. Participants (Raymer, Ciampitti et al., in press; Raymer, Singletary et al., in press) were assigned to either the semantic-phonologic treatment or

the compensatory gestural-verbal treatment for aphasia; within each treatment, participants were trained on noun access or verb access.

Research question 1

Will gestural verbal treatment have a greater effect on the production of discourse than semantic-phonological treatment? It was hypothesized that changes in discourse measures will be higher in the compensatory gestural-verbal treatment than the semantic-phonologic treatment.

Research question 2

Will training one word type (e.g., nouns or verbs) lead to increased production of that word type? It was hypothesized that word-type trained will result in increased production of that word type.

Research question 3

Will increasing noun and verb production correlate with increases in information? It was hypothesized that increased noun and verb production will correlate with increases in UNIs.

Research question 4

Will production of ‘good sentences’ correlate with increased information? It was hypothesized that increased production of ‘good sentences’ will correlate with increases in UNIs.

CHAPTER 2
METHODS

Participants

Seventeen individuals with aphasia between the ages of 38 and 81 participated in this study. Their demographic information is shown in Table 1. All participants completed an experimental treatment study by Raymer, Ciampitti et al., (in press) and Raymer, Singletary et al., (in press), contrasting a semantic-phonologic treatment (SP) and a compensatory gestural and verbal treatment (GV). Each treatment was divided into a noun or verb based treatment. Discourse samples elicited pre- and post- treatment were available from five participants from the semantic-phonologic treatment and twelve participants from the verbal-gestural treatment.

Eligibility for the treatment study was based on diagnosis of a unilateral left hemisphere cerebrovascular accident (CVA) confirmed by structural MRIs. The CVA must have caused aphasia that continued for more than four months prior to participation in the current study. All participants had to demonstrate a word retrieval impairment of less than 75% accuracy for nouns and verbs as measured by the Western Aphasia Battery (WAB; Kertesz, 1982), the Boston Naming Test (BNT; Kaplan Goodglass, & Weintraub, 2001) and the Action Naming Test (ANT; Obler, & Albert, 1986). In addition, participants could not have motor speech impairments greater than moderate severity, determined by scores greater than 2.0 on the WAB repetition subtest. Participants represented a variety of aphasia types and severity as noted on the WAB. All participants spoke English as a first language.

In addition to these measures, participants receiving the gestural and verbal treatment were given the Florida Apraxia Screening Test-Revised (Rothi, Raymer, & Heilman, 1997). Results of this test showed that all participants had mild to moderate limb apraxia except one who demonstrated a severe limb apraxia. The table below describes the order of treatment for each participant, word type, and demographic characteristics.

Table 1. Participant Demographics

Participant	Treatment	Word Type	Age	Education	Aphasia Type	WAB Score
1	Semantic	Noun	38	12	Nonfluent	53.9
2	Semantic	Noun	68	14	Nonfluent	44
3	Semantic	Verb	74	18	Nonfluent	59.9
4	Semantic	Verb	66	14	Fluent	77
5	Semantic	Noun	81	12	Nonfluent	74.5
6	Gestural	Verb	56	10	Nonfluent	31.6
7	Gestural	Noun	70	10	Nonfluent	33
8	Gestural	Noun	69	8	Nonfluent	54.5
9	Gestural	Verb	73	14	Fluent	78.2
10	Gestural	Noun	67	12	Nonfluent	68.7
11	Gestural	Verb	40	16	Nonfluent	45
12	Gestural	Verb	64	12	Fluent	58.5
13	Gestural	Verb	49	12	Nonfluent	58
14	Gestural	Verb	50	14	Nonfluent	38
15	Gestural	Noun	70	14	Fluent	21.3
16	Gestural	Verb	52	12	Fluent	43.4
17	Gestural	Noun	51	12	Nonfluent	65.2

From: Raymer, Ciampitti et al., in press; Raymer, Singletary et al., in press

Procedures for Semantic-Phonologic Treatment and Gestural + Verbal Treatment

The treatment followed a multiple baseline design across participants and stimulus sets. Training took place 2-4 times per week for a total of 10 sessions. Daily probes were administered in 8-10 sessions. SP training sessions consisted of a word retrieval treatment in which the examiner introduced the target picture and provided the name for the participant to repeat three times. With the picture displayed, the examiner asked four yes/no questions, two about semantic characteristics and two about phonologic

characteristics of the target word. This procedure was used to aid the participants in developing a strategy that follows the normal word retrieval process.

GV training sessions consisted of four steps for each of the 20 treatment stimuli. The treatment began with the clinician presenting the picture and verbally modeling the target word and gesture matching the picture. The participant then repeated the target word and gesture three times. The clinician then performed the gesture without the word and the participant imitated three times. If necessary, the clinician aided the participant in manipulation of the limbs. The third step required the clinician to display the target verb and the participant to verbally repeat it three times. Then the clinician repeated the word again, syllable by syllable if necessary. After pausing for five seconds, the clinician prompted the participant to say the name and perform the gesture. If correct, the participant was reinforced; if the participant was incorrect, the correct model was given. In total, the participants attempted each target nine times per training session.

Grammatical Analysis

Sample

As part of the treatment study described above, participants produced conversational samples in response to scripted questions before beginning treatment and after completion. The questions between the caregiver and participant were about food, events, and hobbies; questions between the clinician and participant focused on a set of pictures of family members, famous people, and historic events. Conversations were videotaped and transcribed by an examiner blind to the treatment condition.

Scoring

Conversational samples were analyzed using Systematic Analyses of Language Transcripts (SALT; Miller & Chapman, 1991). In addition, the QAAP (Saffran, Berndt,

& Schwartz, 1989) was used to guide the choice of syntactic structures for coding. The table below provides the word-classes and sentence types coded in this analysis.

Table 2. Word Classes and Sentence Type Codes

Word Level	Code	Sentence Level	Code
Nouns Produced	[NP]	Minimal Sentence	[SM]
Pronouns Produced	[PRO]	Good Sentence	[SG]
Modifiers Produced	[MP]	Elliptical	[SEL]
Modifying Noun	[MN]	One Word Response	[S1]
Modifying Verb	[MV]	Question	[SQ]
Verbs Produced	[VP]	Irrelevant Response	[RI]
Word Level	Code	Sentence Level	Code
Auxiliary Verbs	[VA]	New Information	[IN]
Verb Infinitive	[VN]		
Intransitive Verb	[VI]		
Transitive Verb	[VT]		
Ditransitive Verb	[VDI]		
Automatic Speech	[AS]		
Phonological Error	[EPH]		
Semantic Error on Verb	[EV]		
Semantic Error on Noun	[EN]		

Dialectal differences such as the personal pronoun “I” pronounced as the southern “ah” and transcribed as “ah” were coded appropriately. Contracted words such as “wanna”, “dunno”, and “gonna” were coded for each word. For example “dunno” was coded as [va][vp][vt] for “don’t know.” As part of the SALT program, utterances identified as mazes were placed in parenthesis and not coded or used for word or utterance count. Mazes include repetitions, self-corrections, incoherent words strings, and filled pauses such as “um” and “uh.” “You know” and “like” were also considered mazes if not relevant to the ongoing statement or question. For example when “you know” did not mean “understand” and “like” did not mean “preference” or have semantic content. Repetitions included self-repetitions and repeating the examiner or caregiver. Self-corrections were defined as any repetition of a phrase or word with a change. For

repetitions and self-corrections, only the last iteration of the phrase or word was coded (Miller & Chapman, 1993).

Discourse was also scrutinized for utterances with new information (UNI), defined as a coherent utterance providing information not previously given in the conversation. This was used as a sentence level code but did not indicate the entire sentence as new information. For example, a participant may have previously stated he had a son and then stated he had a son and a daughter.

Good sentences included the following structures: noun +main verb, noun + copula + adjective, noun + verb + noun, and noun + copula + prepositional phrase (preposition and noun phrase). Minimal sentences were those missing an obligatory word or inflection, but semantically qualifying as a sentence (Saffran, Berndt, & Schwartz, 1989). Elliptical sentences were those judged to be appropriate answers in conversation but missing a major component; for example, “To the mall” as a response to a question, “Where did you go yesterday?” One-word responses were any one word direct answer to a question such as “yes”, “okay”, or “vanilla.” Questions were defined as any request for information that was not a repetition of a question asked by the examiner or caregiver. Irrelevant responses were those not related to the question or topic of discussion including neologisms. This sentence level code most often accompanied the “automatic speech” word-level code used for statements commonly used by a participant in response to any question or statement. “Automatic speech” could be an isolated statement or part of a statement with relevant information. All counts were based on number of instances per utterance, in order to control for differences in discourse length between samples.

Reliability

Reliability was conducted during development of the coding system and initial implementation. The coding system was developed by the Discourse Group at the University of Florida Language over the Lifespan Lab, consisting of a linguist, two speech pathologists, and a speech pathology undergraduate student. Transcripts were independently coded by all members. Afterward, the group discussed the current codes, the application of codes, and any changes that were necessary until a complete coding system with agreed upon definitions was complete. Reliability of the transcript scoring is currently in progress.

Statistical Analysis

SPSS was used to analyze the coded transcripts. Separate analyses were conducted for treatment type (semantic-phonologic versus gestural + verbal), trained word type (nouns versus verbs) and trained word type within each treatment (gestural + verbal noun versus gestural + verbal verb). Means, standard deviation, and standard error of mean were calculated. Changes in performances were tested using the Wilcoxon Signed Ranks Test. Correlations between change scores (e.g., post-score minus pre-score) were also calculated.

CHAPTER 3
RESULTS

The results of the discourse analyses are reported in three ways, by the percent of people who changed on a given measure, illustrated in Figures 1-3, using Wilcoxon Sign Rank statistics and correlations of change scores. In many of the treatments, the number of patients was very small, so findings with *p*-values of .25 and below are reported.

Treatment Type: SP versus GV

Word Level

Both SP and GV treatments had positive effects on the number of nouns per utterance, as shown in Figure 1. Among participants from the SP treatment, 3 of 5 participants produced more nouns after treatment; however, this did not reach significance, ($Z = -.674$; $p > .50$). Among participants in the GV treatment, 8 of 12 produced more nouns post treatment which was marginally significant, ($Z = -1.804$, $p < .08$).

Only recipients of the GV treatment showed an increase post treatment in the number of modifiers produced per utterance with 10 of 12 participants showing this increase, ($Z = -1.833$; $p = .06$). In contrast, only 1 of 5 participants receiving the SP treatment increased on this measure, ($Z < 1$). See Figure 1.

There were no other significant changes due to treatment type in other word level measures: pronouns per utterance, verbs per utterance, or automatic statements per utterance.

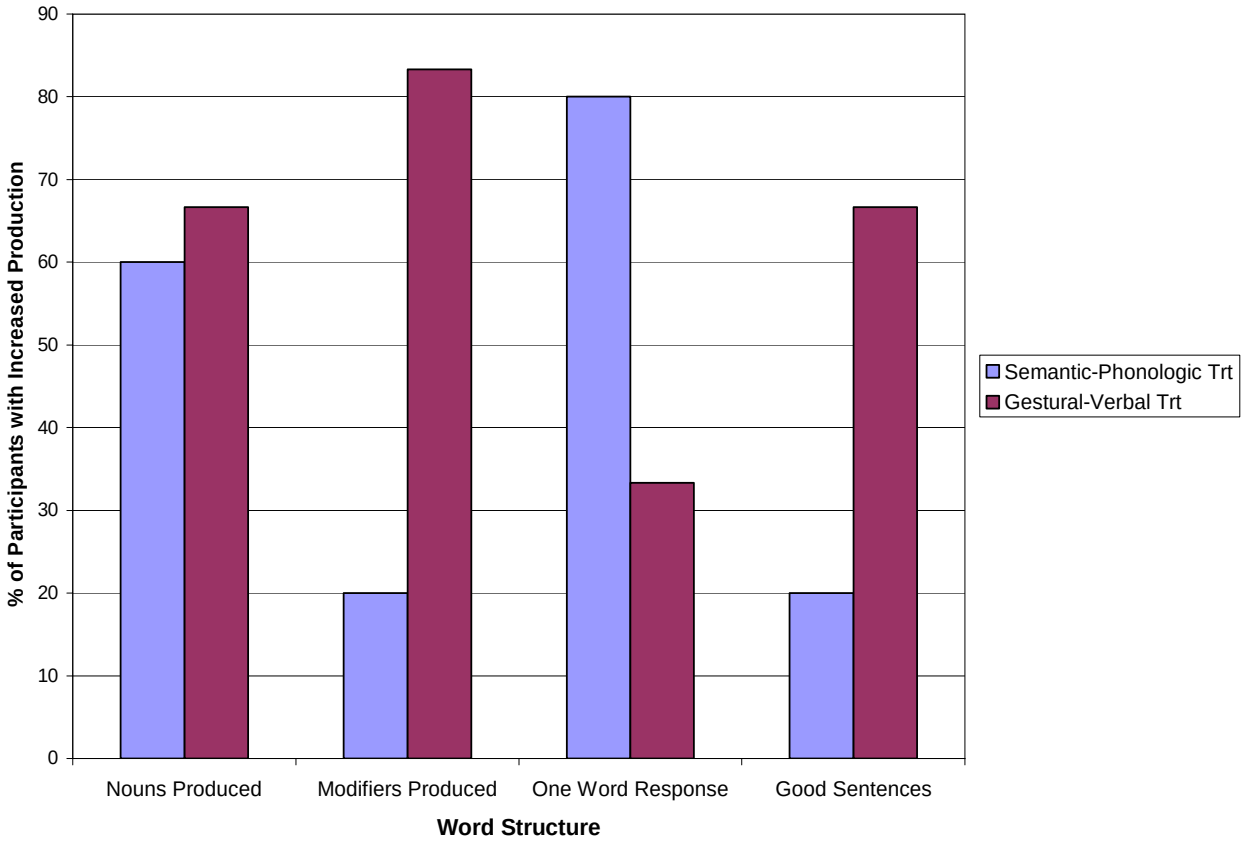

Figure 1. Treatment Type: A comparison of the percentage of participants with increased production of measures with significant increases.

Sentence Level

The SP treatment increased one-word responses in 4 of 5 participants, with a trend toward significance, (Z = -1.483; p < .20). The GV treatment decreased one-word responses in 8 of 12 participants, with marginal significance, (Z = -1.647; p < .10). The GV treatment increased number of good sentences for 8 of 12 participants, however it was not significant (Z = -1.098; p = .272). The SP treatment increased number of good sentences for only 1 of 5 participants, (Z <1). See Figure 1.

There were no other significant changes due to treatment type in other sentence level measures: number of elliptical sentences per utterance, number of good sentences

per utterance, number of questions per utterance, or number of irrelevant responses per utterance.

Information Level

There were no significant changes attributable to differences in treatment type in information measures: mean length of utterance in words, type token ratio, percent maze words, or UNIs per utterance.

Word Trained: Noun or Verb

Word Level

Noun and verb based treatments had positive effects on the number of nouns and modifiers produced in discourse, as shown in Figure 2. Noun-based treatment (SP or GV) increased noun production for 5 of 8 participants with marginal significance, (Z = -1.660; p = .093). Verb based treatment increased noun production for 6 of 9 participants, but it was not significant, ($Z < 1$).

Production of modifiers increased for 5 of 8 participants of the noun-based treatments with a trend toward significance, (Z = -1.260; p = .208). Verb based treatments increased production of modifiers for 6 of 9 participants, but it was not significant, ($Z < 1$). See figure 2.

There were no other significant changes due to treated word type in other word level measures: pronouns per utterance, verbs per utterance, or automatic statements per utterance.

Sentence Level

There were no significant changes due to treated word type in sentence level measures: number of one-word responses per utterance, number of elliptical sentences per utterance, number of good sentences per utterance, number of questions per utterance,

or number of irrelevant responses per utterance. However, when looking at all acceptable responses per utterance (good sentences, one-word responses, plus elliptical sentences), noun-based treatments increased these responses in 6 of 8 participants with a trend toward significance, (Z = -1.260; p = .20). This is in contrast to verb-based treatments in which acceptable responses increased in only 3 of 9 participants, (Z = 1.007; p >.20). See Figure 2.

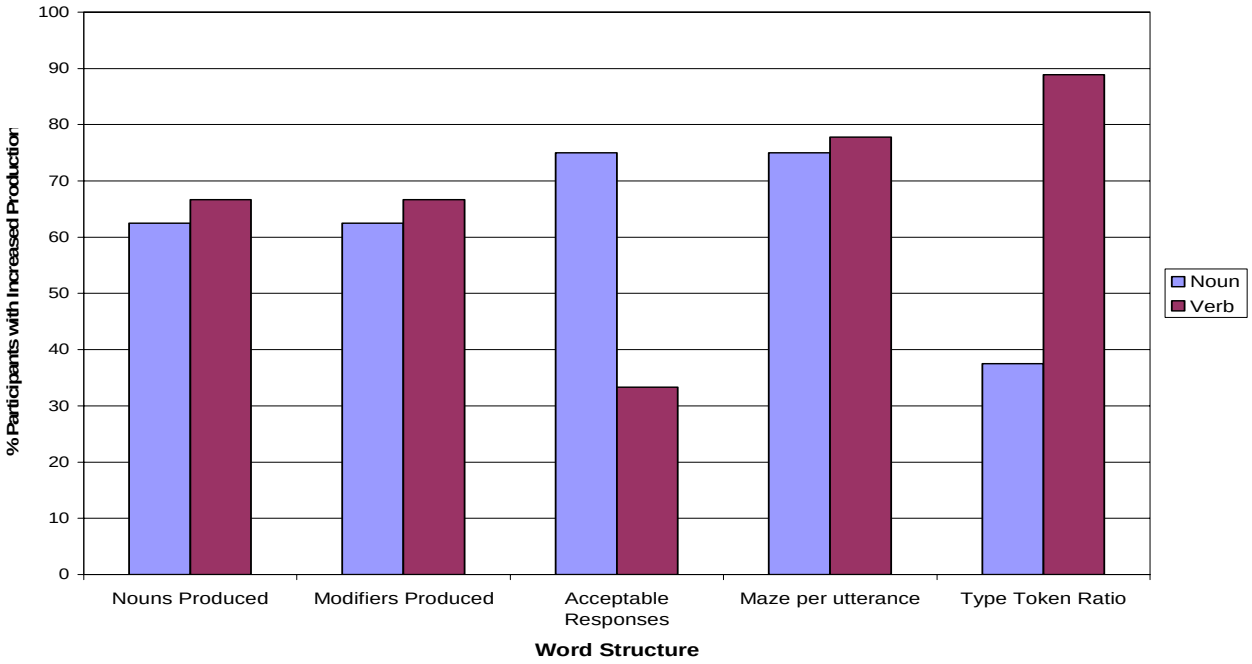

Figure 2. Word-Type Trained: A comparison of the percentage of participants with increased production of measures with significant increases.

Information Level

Verb based treatment increased type-token ratio and percent maze words. Noun based treatment also increased percent maze words but not type-token ratio, as shown in Figure 2. Participants receiving verb-based treatment showed a significant increase in type-token ratio affecting 8 of 9 participants, (Z = -2.084; p < .04). In contrast, only 3 of 8 participants of the noun-based treatments increased in type-token ratio, (Z < 1).

Percent of maze words increased for 6 of 9 participants of the noun based treatment with marginal significance, (Z = -1.859; p = .063). Verb based treatment increased percent of maze words for 7 of 9 participants, but it was not significant, (Z = -1.011; p > .20). See Figure 2.

There were no other significant changes attributable to differences in treated word type in information measures: mean length of utterance in words or proportion of utterances with UNIs.

Gestural-Verbal Treatment: N versus V

Word Level

The GV treatment, when treating nouns or verbs, had positive effects on the number of verbs and modifiers produced in discourse, as shown in Figure 3. Verb production increased for 6 of 7 participants of verb GV treatment, with a trend toward significance, (Z = -1.352; p = .176). Noun based GV treatment increased production of verbs for 3 of 5 participants, but this was not significant, (Z < 1). See Figure 3.

Treating verbs increased production of modifiers for 6 of 7 participants with a trend toward significance, (Z = -1.352; p = .176). Treating nouns increased production of modifiers for 4 of 5 participants with a trend toward significance, (Z = -1.483; p = .138).

There were no other significant changes due to treated word type in the GV treatment for other word level measures: pronouns per utterance, nouns per utterance, or automatic statements per utterance.

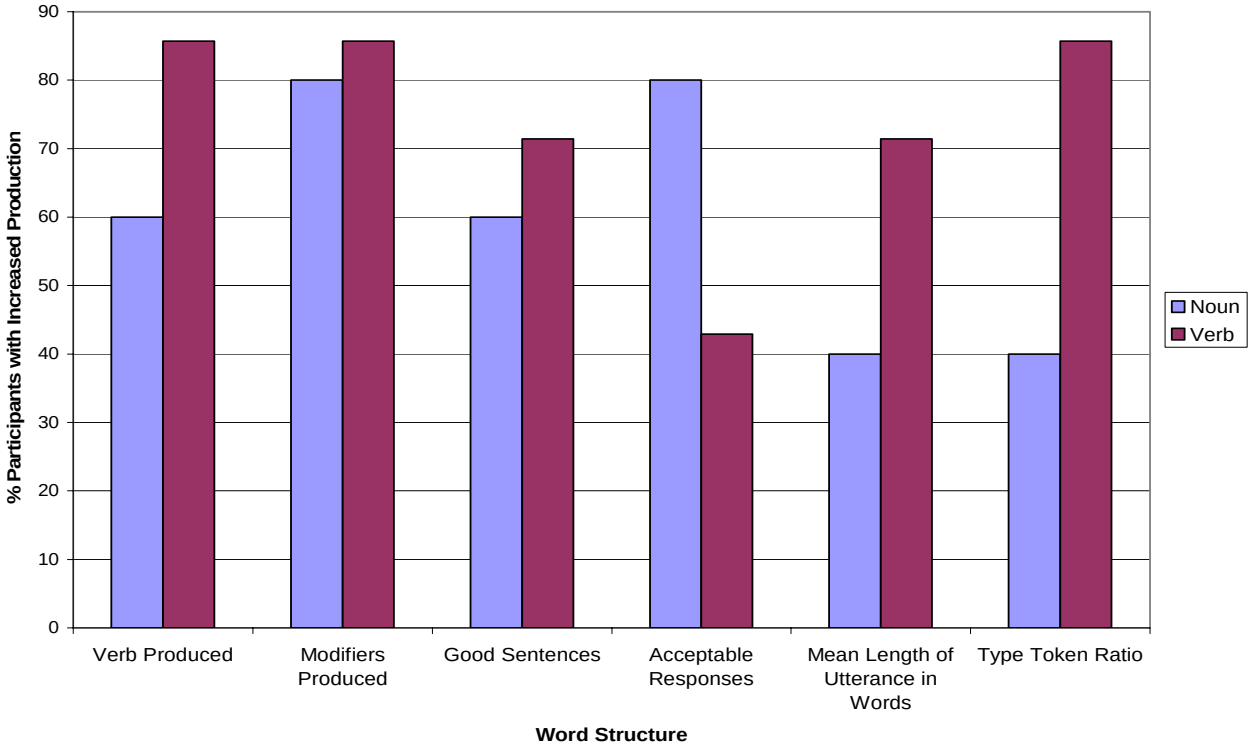

Figure 3. Gestural-Verbal Treatment: A comparison of the percentage of participants with increased production of measures with significant increases.

Sentence Level

There were no significant changes due to treated word type in the GV treatment for sentence level measures: number of one-word responses per utterance, number of elliptical sentences per utterance, number of good sentences per utterance, number of questions per utterance, or number of irrelevant responses per utterance.

Verb based GV treatment increased production of good sentences for 5 of 7 participants but it was not significant, ($Z = -1.183$; $p = .237$). Noun based GV treatment also increased production of good sentences for 3 of 5 participants, this also was not significant, ($Z < 1$). See Figure 3.

Acceptable responses per utterance (good sentences, one-word responses, elliptical sentences), increased with noun-based GV treatment in 4 of 5 participants, but it was not

significant, (Z = -1.214; p = .225). Verb-based GV treatment increased acceptable responses in only 3 of 7 participants, (Z < 1).

Information Level

Treating verbs in the GV treatment had positive effects on mean length of utterance in words and type-token ratio, as shown in Figure 3. Mean length of utterance in words increased for 5 of 7 participants of the GV verb treatment with a trend toward significance, (Z = -1.352; p = .176). In contrast, noun based GV treatment increase mean length of utterance in words for only 2 of 5 participants, (Z < 1).

Type-token ratio increased for 6 of 7 participants of the verb based GV treatment with marginal significance, (Z = -1.614; p = .10). In contrast, noun based GV treatment increased type token ratio for only 2 of 5 participants, (Z < 1).

There were no other significant changes attributable to differences in treated word type in the GV treatment for information measures: percent maze words or proportion of utterances with UNIs.

SP N versus V

Word Level

There were no significant changes for either of the two participants of the verb based SP treatment or for any of the three participants of the nouns based SP treatment, attributable to treated word type in the SP treatment for word level measures: nouns per utterance, pronouns per utterance, modifiers per utterance, verbs per utterance, or automatic statements per utterance.

Noun based SP treatment increased noun production for 2 of 3 participants, however; it was not significant, (Z = -1.069; p = .285).

Sentence Level

Verb-based SP treatment did not increase production of good sentences or acceptable responses for either of the two participants. Noun-based SP treatment increased production of good sentences in 1 of 3 participants,,(Z <1) and increased acceptable responses in 2 of 3 participants,(Z = -1.069; p = .285) however, these were not significant.

There were no other significant changes due to treated word type in the SP treatment for sentence level measures: number of one-word responses per utterance, number of elliptical sentences per utterance, number of questions per utterance, or number of irrelevant responses per utterance.

Information Level

Verb based SP treatment had positive effects on type token ratio and percent maze words. Noun based SP treatment was associated with the percent of maze words produced. Noun based SP treatment increased percent maze words for 3 of 3 participants with a trend toward significance, (Z = -1.604; p = .109). Verb based SP treatment also increased percent maze words for 2 of 2 participants, (Z = -1.342; p < .20).

Verb based SP treatment increased type token ratio for 2 of 2 participants with a trend toward significance, (Z = -1.342; p < 2.0). In contrast, noun based SP treatment increased type token ratio for only 1 of 3 participants, (Z < 1).

There were no other significant changes attributable to differences in treatment type in information measures: mean length of utterance in words or proportion of utterances with UNIs.

Noun based SP treatment increased proportion of utterances with UNIs for 2 of 3 participants, however; it was not significant, (Z >1).

Correlations

Correlations were calculated for changes scores in the number of nouns produced, number of verbs produced, number of modifiers produced, UNIs produced, and number of acceptable responses produced.

SP Treatment

Change score of the number of nouns produced was significantly correlated with change scores of UNIs (p = .01), verbs (p = .06), modifiers (p = .10), and acceptable responses (p = .15). As the number of nouns per utterance increased so did the number of UNIs, modifiers, and acceptable responses. However, the number of verbs per utterance decreased as the number of nouns increased.

Change score of the number of verbs produced was significantly correlated with change score of nouns and UNIs (p = .20). As the number of nouns and UNIs increased the number of verbs decreased. Change score of the number of verbs produced was not significantly correlated with other change scores: modifiers and acceptable responses.

Change score of the number of modifiers produced was significantly correlated with change scores of nouns, acceptable responses (p = .03), and UNIs (p = .03). As the number of modifiers per utterance increased so did the number of nouns, acceptable responses, and UNIs. Change score of the number of modifiers produced was not significantly correlated with other change scores: verbs.

Change score of the number of acceptable responses produced was significantly correlated with change scores of nouns, modifiers, and UNIs (p = .096). As the number of acceptable responses increased, so did the number of nouns, modifiers, and UNIs. Change score of the number of acceptable responses was not significantly correlated with other change scores: verbs.

GV Treatment

Change score of the number of nouns produced was not significantly correlated with other change scores: verbs, modifiers, UNIs, acceptable responses.

Change scores of the number of verbs produced was significantly correlated with change score of acceptable responses (p = .02). As the number of verbs per utterance increased, so did the number of acceptable responses. There were no other significant correlations between the change score of number of verbs produced and other change scores: nouns, modifiers, and UNIs.

Change scores of the number of modifiers produced was significantly correlated with change scores of verbs (p =.04) and the correlation with acceptable responses approached significance (p = .075). As the number of modifiers per utterance increased, so did the number of verbs and acceptable responses. There were no other significant correlations between the change score of number of modifiers produced and other change scores: nouns and UNIs.

CHAPTER 4
DISCUSSION

This study tested the hypothesis that naming treatments for aphasia would lead to quantifiable changes in discourse measures. More specifically, the purpose of this study was to compare the effects of two aphasia treatments conducted by Raymer, Ciampitti, et al.(in press) and Raymer, Singletary, et al. (in press), on production of grammatical and lexical aspects of discourse. There were four research predictions. First, it was predicted that changes in grammatical units and forms would be higher in the compensatory gestural-verbal treatment than the semantic-phonologic treatment; results of the treatment type analysis support this hypothesis. Second, it was predicted that there would be increases in the use of the particular word type that was trained. This effect was found in the GV verb treatment with a trend toward significance and in the SP noun treatment which was not significant. The third prediction was that increased noun and verb production would correlate with increases in UNIs. This correlation was significant in the SP treatment condition and but not in the GV treatment. The fourth and final prediction was that increased production of 'good sentences' would correlate with increases in UNIs. This finding was present in both GV treatments, although neither effect was significant.

Treatment Type

Comparison of GV and SP treatment revealed more significant changes in the discourse of the participants of the GV treatment. Participants receiving the GV treatment increased production of both nouns and verbs; whereas, those receiving the SP

treatment only increased production of nouns. This is consistent with previous findings from gestural therapies and in the literature. Hadar, Wenkert-Olenik, Krauss, and Soroker, (1998) found that speakers with aphasia produced a higher number of gestures when word finding decreased. They concluded that gestures increased lexical retrieval. Rauscher, Krauss, and Chen (1996) found that when speakers without neurological impairment were not allowed to use gestures, word retrieval decreased. Thus, both of these studies provided evidence for gestures facilitating word retrieval. Treatment studies have also found this relationship between gestures and word retrieval. Pashek (1997) found that verbal plus gestural treatment significantly increased naming compared to the effects of verbal-only treatment. Miranda Rose and Jacinta Douglas (2001) found iconic gestures significantly improved object naming in participants with phonologic impairments, but not in participants with semantic impairments. They concluded that iconic gestures prime impaired phonological access, storage, and encoding processes, but not impaired semantic storage. Rose and Douglas state that this finding is in support of Krauss and Hadar's (as cited in Rose & Douglas, 2001) theory of lexical gesture and speech production. In this theory, gestures facilitate lexical access by activating gesturally represented features of the message. Krauss and Hadar state that this activation occurs before articulation of the word, in Levelt's (as cited in Rose & Douglas, 2001) formulation stage. Krauss and Hadar (as cited in Rose & Douglas, 2001) imply that priming occurs from the kinesic monitor to the formulator level which contains the grammatical encoder and phonological encoder (Rose, Douglas, & Matyas, 2002). However, Rose and Douglas (2001) state that the precise level at which priming occurs is not clear in Krauss and Hadar's model. Based their findings that gestures only

facilitated speakers with phonological impairments, Rose and Douglas (2001) concluded that gesture-related information enters the speech production system at the phonological level. However, they also point out that gestures may facilitate word retrieval at both the phonological and lemma level. While it is more intuitive to suggest gestures facilitating at the lemma level or even before the formulator level at the conceptualizer, facilitation at the phonological level explains how the GV treatment increased nouns and verbs.

Applying Rose and Douglas's theory to the current findings may explain why the GV treatment increased nouns and verbs and the SP treatment only increased nouns. Following Rose and Douglas's conclusions, the GV treatment activated the phonological processes in producing nouns and verbs and not the semantic processes of nouns and verbs that might lead to differential activation of word classes as seen in the SP treatment. Alternately, the GV treatment may have increased production of verbs in addition to nouns simply because the speakers were 'acting out' the verb. Performing a physical action associated with the word may have been enough to activate retrieval of the verb. In addition to increasing nouns and verbs, the GV treatment increased modifiers. Similar to the possible effect on verbs, performing gestures that describe the object or verb may have activated associated modifiers by spreading activation. As modifiers provide more information about the topic, increased production of modifiers may have contributed to the increase in UNIs. However, the impact of modifiers on increased production of UNIs may not be significant, because the SP treatment also increased UNIs but not modifiers.

The SP treatment had a higher percentage of participants increase in one-word responses. It is arguable whether this is an improvement. While it is not a quantitative improvement as 4 of 5 participants were nonfluent, there may be a qualitative

improvement. As discussed below, the SP noun condition did increase production of UNIs. It may be that although the participants were using more one-word responses, the response was correct and relevant and provided more information than before treatment.

Trained-Word Type

Comparison of noun-based to verb-based treatments showed that higher percentages of participants in the verb-based treatments increased their production of nouns, verbs, modifiers, TTR, mazes per utterance, and UNIs. However, of all of these measures, only the increase in TTR was significantly higher post treatment. Training verbs may have increased TTR more than training nouns because verbs have been found to be more difficult for speakers with aphasia to retrieve (Berndt, Burton, Haendiges, & Mitchum, 2002; Marshall, Pring, & Chiat, 1998). In addition, Thompson et al. (1997) found that speakers with agrammatic aphasia have been found to produce verbs with simple argument structure. Based on the results of their study, Thompson et al. concluded that verb argument structure is important for verb retrieval. Thus, in the current study increasing verbs provided the speakers with access to a class of words and argument structures that was previously difficult to retrieve, increasing the lexical diversity of their discourse.

In the verb condition, UNIs increased as did production of nouns, verbs, modifiers, and TTR. Thus, participants were able to increase production of content words and convey more information using a greater variety of words. Percentage of maze words also increased in the verb condition. This may have been due to an increased availability of words which, in turn, led to increased attempts at verbal responses.

Trained-Word Type within Treatment Type

SP Noun vs. Verb

Results of comparing trained-word type within the SP treatment are based on three participants in the noun condition and two participants in the verb condition, making it difficult to achieve statistical significance for any measure. Training nouns increased nouns, acceptable responses, and UNIs. All of these participants were nonfluent; thus, as they were able to produce more nouns they were able to produce different types of words, leading to production of more acceptable responses with more UNIs, but not significantly more. However, as they were able to access more nouns and types of words, they made more mistakes resulting in an increased percentage of maze words. It should be emphasized that acceptable responses include one-word and elliptical responses as well as good sentences; thus, the finding that noun training increased acceptable responses is not necessarily contradictory to the findings stated below, which demonstrate that verb training increases sentence production (Berndt et al., 2002; Marshall et al., 1998).

Similar to the effect in the noun condition, participants in this condition also produced an increased percentage of maze words, presumably as a result of increases in overall word availability, leading to more lexical intrusions. These were again accompanied by increases in TTR, supporting the idea that there was an overall increase in lexical availability. The increased lexical availability may have overloaded the sentence production mechanism by providing more activated words to choose from and organize into a sentence, thus resulting in more mistakes and mazes. Crockford (1991) offers another explanation for finding increases in ‘repair turns’ accompanied by increased functional communication in a patient with aphasia. That study revealed that the patient’s wife did not need to offer as much help during ‘repair turns’ because of the

patient's increased communication ability. This phenomenon was also observed in several participants in the current study. Post-treatment transcripts contained fewer utterances from the caregivers than pre-treatment transcripts.

Significant gains in SP noun treatment were offset by a very small N (i.e., three participants), making any kind of statistical inference impossible. In addition, participants of the SP noun treatment were the farthest post onset at 75, 93, and 120 months post, (average 96 months) versus the rest of the participant population who were 5 to 62 months post onset (average 24.7 months). Therefore, the lack of effects may be the result of the generalization effects of naming treatment to discourse being limited to a specific time period after the onset of aphasia, rather than to inadequacy of the treatment.

In summary, noun based and verb based SP treatments increased percent maze words in all participants. This finding may be attributable to increased attempts caused by an increase in the availability of words. Crockford's (1991) explanation of decreased help in 'repair turns' by the spouse can also apply in this condition. Although percent maze words increased in all participants of SP treatment, it is difficult to identify the cause of this effect, as only five people participated in this treatment.

GV Noun vs. Verb

Within the GV treatment, the verb condition resulted in the highest number of gains as well as the most significant gains. The verb condition had a significantly greater effect on production of verbs, MLU in words, and TTR. The verb condition also had higher increases in modifiers and good sentences produced, though these were not significantly higher than the analogous increases in the noun condition.

Increased production of good sentences in the verb condition is consistent with findings from several studies linking verb retrieval and sentence production. Berndt,

Burton, Haendiges, and Mitchum (2002), found that speakers with greater impairment in verb retrieval than noun retrieval also had more impaired sentence production. It follows then that improving verb retrieval would improve sentence production (Berndt et al., 2000; Berndt, et. al, 2002; Marshall et. al, 1998). However, there have been cases that do not support a connection between verb retrieval and sentence production, as demonstrated by the patient described in Berndt, Haendiges, and Wozniak (1997) who had severe anomia characterized by significantly higher verb retrieval than noun retrieval but impaired sentence comprehension and production. GV verb treatment also was associated with increased MLU in words and TTR; in other words, the GV verb condition increased the production of good sentences, the length of utterances in words, and the lexical diversity of utterances . However, this treatment did not increase maze production, as did both variations of the SP treatment. These findings suggest that the participants were able to retrieve the correct words in the correct order the first time and did not need several attempts. The process of gesturing may have strengthened the neural connections in the representations of verbs enough to decrease the need for multiple attempts to produce the correct verb. This may have occurred because gestures do not result in the same extent of spread of activation in the semantic system if gestures facilitate lexical access at a post-semantic stage. This is an important observation as participants in this treatment would then be more efficient speakers. Interestingly, although maze production was not increased, UNIs did not increase in either GV treatment condition either. Thus, the speakers used more types of words, had longer responses, with increased modifiers, verbs, and good sentences, but they did not produce more utterances with new information. The relationship between increases in the production of nouns and

verbs and increases in UNIs is difficult to clearly establish due to methodological issues. UNIs were an utterance level code, with only one allowed per utterance; consequently, if there were several pieces of new information in an utterance this would have been missed. This presents the need for a more quantitative information measure combining aspects of the UNI and CIU.

The only measure in which GV noun condition had greater effect was acceptable responses. This coincides with the treated-word type results in which noun conditions led to greater gains than verb conditions in acceptable responses. Acceptable responses included one-word responses but not UNIs, as a result, this measure is not particularly indicative of improved discourse. However, an increase in acceptable responses does indicate the discourse is easier to understand for the communication partner even if the amount of information conveyed has not increased.

Mazes

Production of mazes increased in noun and verb conditions in the SP and GV treatments, but was only significant in SP noun and verb conditions. Increases of maze production were associated with increases in TTR in GV and SP verb conditions suggesting a link between increased lexical availability and maze production. All but one SP participant was nonfluent; therefore, any increase in lexical access would provide the speaker with more words to retrieve and organize into sentence form, possibly overburdening the sentence production mechanism, leading to more mistakes or mazes. Mazes are typically not included in analyses such as QAAP (Saffran, Berndt, & Schwartz, 1989) and SALT (Miller & Chapman, 1991). Based on the findings of the current study mazes should be considered in future analyses to investigate lexical access and sentence formulation.

Limitations

In general, there were few significant gains ($p < .05$) due to the small N in each treatment. When comparing treatment type, statistics were run on 12 participants in the GV treatment and 5 participants in the SP treatment. All participants who completed the GV treatment and all but one of the participants who completed the SP treatment were analyzed in this study. When comparing trained-word type within each treatment, statistical analysis was further compromised by even smaller groups: SP verb treatment had two participants and SP noun treatment had three participants, while GV verb treatment had seven participants and GV noun treatment five participants. Due to the variability within and between the discourse productions of speakers with aphasia, it is difficult to make generalizations from a small sample of speakers (Prins & Bastiaanse, 2004).

A second limitation of the treatment design was the mixture of aphasia types included. In each treatment and condition there were participants with fluent and nonfluent aphasia. Because nonfluent and fluent aphasias arise from different lesion sites and result in different type and level of impairment, this may have contributed to the lack of significant findings in the study. Specifically, analysis was completed on groups and not individuals; thus, the mixture of aphasia types may have affected the results. The discourse production of a speaker with nonfluent aphasia is typically characterized by one-word responses or short phrases. The discourse of a speaker with fluent aphasia is characterized by longer utterances with minimal information. Thus, combined analysis of grammatical components of the discourse of nonfluent and fluent speakers may have obscured the true treatment effects present.

A third limitation of the treatment design was the mixed genres of discourse used as stimuli. Participants discussed favorite foods and hobbies, people and events in family pictures, and pictures of famous people or events. Although it has not been discussed in past studies or reviews, differences in discourse production may arise when using family pictures and pictures of famous people not personally known to the speaker. As Armstrong (2000) notes, some research suggests there are differences in the discourse elicited by various stimuli such as the ones in the current study, picture description, opened-ended questions, and discussing family members and memories. In addition, pictures of people at an event in which the event is clear in the picture may elicit different discourse than a picture of a single person or group of people not in an obvious setting or event. Armstrong (2000) notes that single picture stimuli may not elicit a narrative with orientation, precipitating action, and resolution, but elicit description of a situation. In their categorization of discourse types, Prins and Bastiaanse (2004) separate discourse from situational pictures and discourse elicited through interview with open-ended questions. Differences previously found between discourse with and without picture stimuli include: less verbal complexity with pictures (Glosser, Weiner, & Kaplan, 1998), higher efficiency scores without pictures (Doyle et al. 1995), and higher cohesive harmony without pictures (Armstrong, 1988). Thus, our analysis might have benefited from being limited to one of the three discourse types used.

Summary

Despite the limitations and few significant findings of the current study, it offers several important contributions to aphasia discourse research. The relationships among word classes, sentence structure, and units of information found provide a strong argument for grammatical analysis as a viable method of measuring changes in discourse.

Measuring changes in information is particularly important whether it be through use of the UNI presented in this study or other similar measures. A comparison of the UNI and CIU should be conducted in the future to clearly identify differences and ideal uses for each. Mazes should be considered as part of future discourse analyses. The current study found increases in mazes when word retrieval increased. This is important theoretically in regards to theories of lexical access and activation. Future research should continue to investigate the various components necessary for conveying information such as topic relevancy and coherence. Findings of the current study also point to a need for further research elucidating the differential effects of training nouns and verbs and of the methods of training. As seen here, adding a component used by many speakers in daily conversation, gestures, increased verbal output and improved communication. Although the changes in discourse found in the current study were not, for the most part, statistically significant, this study does provide evidence that naming treatments can lead to changes in discourse. This is highly important as improved discourse or communication should always be the ultimate goal of any aphasia treatment.

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BIOGRAPHICAL SKETCH

Christina del Toro is a graduating master's student in the University of Florida department of Communication Sciences and Disorders. During her master's program she completed a master's thesis on aphasia under the mentorship of Lori Altmann, Ph.D. Ms. del Toro received her B.A. in Communication Sciences and Disorders from the University of Florida in May 2004. In her senior year she completed a senior honors thesis on aphasia with Diane Kendall, Ph.D., which was accepted as a poster presentation at the 14th NIDCD-sponsored Research Symposium. Over her four years of college she was honored with membership into Phi Eta Sigma honor society, Golden Key honor society, Phi Sigma Theta honor society, and Tau Sigma transfer student honor society. She has also been on the Dean's and President's List for her GPA. While attending UF full-time, she has worked as research assistant at the VA Brain Rehabilitation Research Center in Gainesville, Florida. Her duties have included collecting reliability data, developing screening forms using the Autodata software program, and most recently study coordinator for a mild aphasia assessment protocol developed by Anna Moore, Ph.D. In August 2006, Ms. del Toro will begin her doctoral degree in Communication Sciences and Disorders at the University of Florida under the mentorship of Diane Kendall, Ph.D.