COHESION IN WRITTEN DISCOURSE IN NORMAL AND BRAIN-INJURED ADULTS

By

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The following text is a study of language skills in normal adults and adults with brain injury. It is the first step in a larger study which is intended to develop a normative database to which speech-language pathologists can refer when evaluating and establishing therapy goals for adults who have incurred some type of brain injury as a result of trauma, stroke, or some other neurological disturbance. I hope that it will also be the first step in a lifetime of applying the education I have received and the knowledge I have acquired to helping people who struggle with the devastating effects of brain injury.

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CHAPTER I

INTRODUCTION

Language deficits resulting from traumatic brain injury (TBI) are often both subtle and diverse in nature and, therefore, are difficult to assess (Coelho, Liles, & Duffy 1991a; Coelho, Liles, & Duffy, 1991c; Liles, Coelho, Duffy, & Zalagens, 1989). Performance by higher level TBI patients on standardized language batteries may demonstrate only minor difficulties completing complex tasks resulting in overestimated communication abilities (Coelho et al., 1991c). For example, many of the difficulties exhibited following TBI are in the area of discourse which includes such things as participating in a conversation, producing a well-organized oral or written narrative, or adequately describing the procedure to complete a particular task. It is agreed that traditional assessment tools fail to precisely delineate discourse skills (Coelho, Liles, & Duffy, 1991a; Coelho, Liles, & Duffy, 1991c; Liles, Coelho, Duffy, & Zalagens, 1989; Snow, Douglas, & Ponsford, 1995; Yorkston, Jaffe, Polissar, Liao, & Fay, 1996), particularly those skills which are fundamental in everyday communication (Coelho et al., 1991a). Although standardized language batteries are an essential primary procedure when evaluating TBI patients (Coelho et al., 1991c), a comprehensive evaluation of communication following TBI should include functional assessment of discourse as it applies to daily communication activities (Coelho et al., 1991a).

Concerned that aphasia batteries simply cannot detect the subtle and diffuse types of language deficits demonstrated by TBI patients, researchers have begun to investigate narrative discourse as a measure of assessment for this population (Coelho et al, 1991c). In addition, formalized communication assessment for brain injury also may not identify subtle language deficits. According to Coelho, Liles, and Duffy (1994), the nature of formalized testing may overestimate the patient's executive cognitive functioning. Executive functions, as described by Ylvisaker and Szekeres (1989), include such skills as planning, self-directing, self-monitoring, self-evaluation and self-correcting; these skills are fundamental components of language discourse ability. Formalized testing provides executive skills structure for patients; however, the same patients may be unable to perform as well in the absence of such structure (Coelho, Liles, & Duffy, 1994; Ylvisaker & Szekeres, 1989) as might be seen on discourse tasks. For this reason, it is important to transcend standardized language batteries and evaluate functional communication, such as discourse abilities, when assessing the communication of those patients who have incurred a head injury (Coelho, Liles, & Duffy 1991a).

Although some research on the effect of TBI on oral discourse has been completed, there is a lack of research available for reference regarding discourse in normal young adult populations (Hartley & Jensen, 1991; Snow et al., 1995), of which males ages 17 to 30 are the most frequent to incur a brain injury (Snow et al., 1995). This lack of normative data negatively impacts the interpretation of discourse evaluations following TBI (Mentis & Prutting, 1987; Snow et al., 1995) because there is no normal model for comparison.

Considering that there are even fewer studies which specifically focus on written language production following TBI (Yorkston et al., 1996), the problem with analysis is especially evident when interpreting written discourse assessments in the TBI population. Although certain aspects of oral and written language are comparable, they are not identical. For example, Yorkston, Jaffe, Polissar, Liao and Fay (1996) identified three significant differences between written and oral discourse production. First, written discourse lacks extra-linguistic attributions, such as facial expression and gestures, which are important to comprehension during oral communication. Second, oral communication employs interaction between and among communication partners, thus facilitating the speaker's linguistic intent. The third difference identified by Yorkston et al. is that written discourse demands a higher level of planning and organization of information on the part of the writer.

The assessment of written language abilities following TBI often includes the completion of simple tasks, such as copying letters and forms, or writing words, phrases and sentences to dictation (Yorkston et al. 1996). Correct completion of these simple tasks masks the difficulties TBI patients have with higher-level discourse tasks. Levin, Grossman, Rose, and Teasdale (1979) found that only patients with severe head injuries demonstrated difficulty when simple writing tasks, such as writing to dictation and copying sentences from flashcards, were used for assessment. However, it is possible that written language deficits may have been noted in less severely injured patients had they been asked to complete a more difficult written task such as a written narrative (Yorkston et al., 1996).

A survey done by Jacobs (1988) demonstrated that as long as six years post injury, TBI patients were not able to complete difficult writing tasks independently. The production of written language facilitates an interaction between and among the abilities of information organization, attention to task, short- and long-term memory, and language skills such as syntax, grammar and semantics (Yorkston et al, 1996). As a result, written discourse production provides a way for speech-language pathologists to assess the higher-level language skills of TBI patients. In addition, Yorkston et al. (1996) noted that because writing may be used as a tool for organization, it may be a critical compensatory strategy for deficits in memory commonly caused by TBI; therefore, written language is important to the rehabilitation of those who incur a TBI.

Oral and written discourse is composed of many intricate components, each of which can be analyzed individually. Cohesion, or the way in which meaning relations are established between and among sentences (Liles, 1985), is particularly significant because it cannot be achieved without the complex integration of syntax and semantics (Mentis & Prutting, 1987). The inability to produce a cohesive narrative, oral or written, may indicate language deficits more functionally compromising to activities of daily life than merely the inability to create a story from a picture stimulus (Coelho, Liles, & Duffy, 1994).

It is documented that individuals who have incurred some type of TBI demonstrate difficulty organizing cohesive oral discourse (Hartley & Jensen, 1991; Liles, Coelho, Duffy, & Zalagens, 1989; Mentis & Prutting, 1987). Studies done by Hartley and Jensen (1991), Liles, Coelho, Duffy, and Zalagens (1989), and Mentis and Prutting (1987) employed the measures of cohesion in discourse outlined by Halliday and Hasan

(1976). This model by Halliday & Hasan (1976) theorized that speakers establish structural integration within discourse by using linguistic ties (e.g.: reference, substitution, ellipsis, conjunctives) to conjoin meaning between and among sentences. Considering that each of the different genres of discourse (e.g.: conversation, story generation, procedural description) requires a different type of linguistic cohesion, speakers vary their use of the cohesive ties in order to meet the demands of the type of discourse being produced.

In addition to Halliday and Hasan's (1976) measures of cohesion, Liles (1985) proposed an additional measure, that of "cohesive adequacy". Unlike Halliday and Hasan (1976), Liles' (1985) model contains categories (e.g.: incomplete ties, erroneous ties) for cohesive ties whose meanings are not clearly or adequately defined by the discourse text.

Studies which have employed the measures defined by Halliday and Hasan (1976) and Liles (1985) demonstrate a difference in the patterns of cohesion used by normal and brain-injured subjects in oral discourse (Hartley & Jensen, 1991; Liles, Coelho, Duffy, & Zalagens, 1989; Mentis & Prutting, 1987). Hartley and Jensen (1991) studied cohesion in verbal narrative and procedural discourse of 11 subjects with TBI, specifically, closed head-injured (CHI) adults and 21 normal adults with a mean age of 26 years. Two narrative tasks, story retelling and story generation, and one procedural task, explaining how to buy groceries, were employed. The CHI subjects demonstrated significant impairments in cohesion. In addition to producing fewer cohesive ties, the CHI subjects produced a greater number of incomplete or ambiguous ties as compared to the normal

subjects. Hartley and Jensen (1991) concluded that the production of discourse following brain injury is limited in efficiency, accurate content, and semantic connectivity.

Liles et al. (1989) studied intersentential cohesion (i.e., cohesive ties between sentences) in verbal story retelling and story generation tasks in 23 normal adults, ages 18 to 22 years, and 4 CHI adults, ages 20 to 29 years. Although the normal and CHI subjects demonstrated similar results on the story retelling task, the CHI subjects used a greater number of incomplete ties than the normal subjects on the story generation task. The results of this study demonstrated that both the normal and CHI subjects' performance was influenced by the type of task; however, the CHI subjects differed in their cohesive organization and adequacy.

Demonstrating the importance of studying language abilities of brain-injured adults in the context of discourse, Mentis and Prutting (1987) studied cohesion in 3 normal and 3 head-injured adults in verbal narrative and conversation tasks. The subjects ranged in age from 11 to 23 years of age. Each subject participated in 10 minutes of unstructured conversation with a communication partner trained by the examiner, and completed a narrative sample that consisted of one descriptive and two procedural narratives. This study demonstrated that head-injured subjects used different patterns of cohesion in narrative and conversational tasks. In both conditions, the CHI subjects used fewer cohesive ties as well as different proportions of the types of cohesive ties. The CHI subjects used a higher percentage of elliptical ties in the narrative condition and a higher percentage of lexical ties in both the narrative and conversational tasks as compared to the normal subjects. Unlike the normal subjects, the CHI subjects also used incomplete ties.

In summary, compared to normal subjects, it has been noted that brain-injured subjects employed fewer cohesive ties during narrative tasks (Hartley & Jensen, 1991; Mentis & Prutting, 1987) and a decrease in complete ties during story generation tasks (Liles, Coelho, Duffy, & Zalagens, 1989). Brain-injured subjects also use more incomplete and erroneous ties than do normal subjects (Hartley & Jensen, 1991; Liles, Coelho, Duffy, & Zalagens, 1989; Mentis & Prutting, 1987) and fewer types of cohesion than normal subjects (Hartley & Jensen, 1991; Liles, Coelho, Duffy, & Zalagens, 1989; Mentis & Prutting, 1987). Therefore, it can be concluded that brain-injured subjects demonstrate a reduction in the ability to establish semantic and syntactic integration which is necessary for the creation of cohesive discourse (Mentis & Prutting, 1987) when completing oral language tasks.

At the present time, there is a lack of information related to normal adults to which speech-language pathologists can refer when assessing the oral and written discourse capabilities of brain-injured patients. Even though studies have been completed on brain-injured patients, the data base for spoken language is limited. The research on written language in brain-injured adults is even further limited. The purpose of the present study was to initiate a normative data base for written discourse, specifically for description of sequences and procedures, in adults 18 to 30 years of age. In addition, the performance of subjects who have incurred some type of brain injury will be compared to this normative data in order to demonstrate differences in performance. This data base is significant to the assessment of the language abilities of brain-injured individuals and can be conducive to establishing realistic therapy goals for these patients in the hospital and rehabilitation settings.

Cohesion, as compared to other possible measures, is a meaningful measure of cognitive competence. The ability to form a cohesive narrative demonstrates an integration of executive skills, such as planning, self-directing, self-monitoring, self-evaluation, self-correcting; and language skills, such as syntax, grammar, and semantics. These skills form the foundation of functional communication; therefore the inability to produce a cohesive written narrative reflects functional deficits which should be targeted during the rehabilitation of those who incur a brain injury.

CHAPTER II

METHODS

Subjects

Normal Subjects

Twenty-four volunteer subjects, 18-30 years of age (Appendix A) were recruited from the community in Stillwater, Oklahoma, to participate in this study. The subjects were allocated into two groups of 12 subjects. Each group was also divided evenly by gender. Subjects placed in Group 1 were college educated, but not beyond the Bachelor's level, had achieved at least a 2.0 grade point average, and English was not their primary field of study. Subjects in Group 2 were non-college educated with a high school education to at least the tenth grade and had no more than two years of vocational training. All of the subjects had taken at least one class equivalent to high school English Composition I.

All of the subjects were native speakers of American English. Qualification for inclusion in both groups required passing a hearing screening at 20 decibels (dB) at 500, 1000, and 2000 Hertz (Hz), and completion of a subject questionnaire (Appendix B). Volunteers were not able to participate in this study if they reported a history of any of the following: hearing loss, psychological or cognitive disorders, head injury

including loss of consciousness, treatment for alcohol or drug abuse, or treatment for a language delay or disorder. The data on the normal subjects used in this study was collected at the Oklahoma State University Speech-Language & Hearing Clinic.

Brain-Injured Subjects

In addition to the normal subjects described above, three current or former patients of Kaiser Rehabilitation Center in Tulsa, Oklahoma, were selected to participate in this study (Appendix C). These subjects were involved in some type of accident resulting in a traumatic brain injury (TBI) and were of ages comparable to the normal subjects used in this study. The TBI subjects were selected on the basis of their language functioning and their ability to perform written tasks as determined by a rating of 4 to 7 on the Functional Independence Measure (the FIM Instrument) (Appendix D). Gender was not a factor in subject selection. Level of education was not a factor in subject selection, but was reported in the description provided of each TBI subject. The TBI subjects performed the same language tasks as the normal subjects and their performances were compared to that of the normal subjects.

TBI Subject 1 was a 36-year-old male with a high school education who had been involved in an alcohol related motor vehicle accident. He had been employed as a welder when the accident occurred. Following his rehabilitation, it was expected that he would be cared for at home by his mother. He was seven months post-onset of injury and had been receiving speech and language therapy for two months when the discourse samples were collected. He had a FIM score of four in auditory comprehension, verbal expression, reading, and writing at the time of testing. Although this subject had a

history of alcohol use, there was inconclusive information to determine whether or not his use of alcohol could be considered "abuse"; therefore, he was not precluded from participating in this case study analysis.

TBI Subject 2 was a 20-year-old male with an eleventh grade education who had been the victim of an assault. He had been repeatedly hit in the head and had also hit his head on the concrete resulting in a closed head injury. He had been employed in the dietary department of a local hospital when the incident occurred. Following his rehabilitation, it was expected that he would be cared for at home by his mother. He was 18 days post-onset and had been receiving speech and language therapy for 10 days when the discourse samples were collected. He had a FIM score of four in auditory comprehension, verbal expression, reading, and writing at the time of testing.

TBI Subject 3 was a 29-year-old male with a high school education who had been involved in a motor vehicle accident. He had been employed as a groundskeeper at a local country club when the accident occurred. He was three years and eight months post-onset when the discourse samples were collected. He had received speech and language therapy for approximately one year following his injury. At the time of testing he was living on his own and was in the process of enrolling for college courses. He had a FIM score of seven in auditory comprehension, verbal expression, reading, and writing at the time of testing.

The information on TBI subjects used in this study was collected at Kaiser Rehabilitation Center. For those subjects being treated at the rehabilitation center at the time of the data collection, this information was collected as part of routine assessment and treatment procedures. All of the data on TBI subjects was collected by the researcher

with the primary speech-language pathologist (SLP) present during the session. The collection of data was audio-taped. These audio-recordings were evaluated by a trained assistant to ensure reliability in the presentation of the stimulus materials and directions to the subjects.

Procedures

Tasks

All of the subjects participating in this study completed the same tasks; data was collected from each subject on an individual basis. Data was collected on both oral and written discourse as a part of a larger research project; however, only the written discourse was analyzed for the purpose of this thesis.

In order to ensure that each subject received the same set of instructions, directions for completion of the required tasks were read aloud by the examiner from a pre-prepared type-written copy (Appendix E). In addition, directions for each task were made available in a visual format as a reference for subjects. Completion of the tasks took approximately 60 minutes for the normal subjects and approximately 45 minutes for the brain-injured subjects.

Narrative Discourse Procedures. Each subject was asked to complete three narrative discourse tasks. One six-frame picture sequence taken from a picture book (Mayer, 1967) was used as a practice stimulus item. The practice picture sequence involved a boy and his dog who meet an unruly frog at the pond. Two six-frame picture sequences (1993, Nicholas & Brookshire) (Appendix F) were used as stimulus items for

this study. The first picture sequence involved two characters - a husband and his wife having an argument. The second picture sequence contained three characters - a man and a woman who stop their car by the side of the road to ask a farmer for directions. The picture sequences were presented individually. Each sequence was approximately 11 x 14 inches and was laminated for easy handling by the subjects. A title was not provided for any of the sequences.

Each subject was told that he or she would be shown three picture sequences, one practice sequence and two sequences which would be used in the study. The practice story was related only verbally and any questions the subjects had about the task were answered by the examiner during or after the practice task. It was explained that the subjects could not ask the examiner questions about the stimulus material during the experimental tasks; therefore, additional instructions were provided on an as-needed-basis until the subjects understood the task. During the verbal experimental task, the examiner was allowed to give the subjects prompts such as, "Is that all you can tell me?" or, "Can you tell me a little more?" when the subjects failed to address all six frames of the picture sequence.

Following the practice task, the subjects were shown the husband/wife picture sequence and were asked to explain it verbally in as much detail as possible. Then, the subjects were shown the farmer story and asked to write a detailed explanation of what was happening in the pictures. The verbal narratives were audio-taped using a General Electric cassette recorder model number 3-5368A and Maxell Professional Industrial Communicator Series cassette tapes, and were orthographically transcribed verbatim for completion of the various analyses at a later date.

Procedural Discourse Procedures. Following the narrative tasks, each subject was asked to explain three procedures. The first procedure was practice in order to familiarize the subjects with the task. The subjects then produced two other procedural explanations, one written and one verbal, on topics provided by the examiner. Each subject was asked to be as detailed as possible and to explain the procedure as if it were something the examiner had never done.

First, the subjects were asked to practice the task by explaining verbally all of the steps involved in buying groceries. It was explained that the subjects could not ask the examiner questions during the experimental tasks; therefore additional instructions were provided on an as-needed-basis until the subjects understood the task. Following the practice task, the subjects were asked to explain verbally, in as much detail as possible, all of the steps involved in planning a vacation. Then, the subjects were asked to write, in as much detail as possible, an explanation of all of the steps involved in planning an elaborate surprise party for a friend or family member. The verbal procedural descriptions were audio-taped using a General Electric cassette recorder model number 3-5368A and Maxell Professional Industrial Communicator Series cassette tapes, and were orthographically transcribed verbatim for completion of the various analyses at a later date.

Measures

As noted previously, written samples were analyzed for frequency and adequacy of cohesive ties. This included 5 categories of cohesion outlined by Halliday and Hasan (1976) and one measure described by Liles (1985a). It must be taken into consideration

that the discourse analyzed in this thesis was comparable to, but not the same as, the discourse analyzed by Halliday and Hasan (1976). The samples used here were spontaneous, casual, and there was an assumed common knowledge between the writer and the reader. The samples used by Halliday and Hasan (1976) are of a different discourse genre. That is, in many cases, the samples used by Halliday and Hasan (1976) were professionally written, edited, and did not assume a common knowledge. As a result, due to the highly variable nature of spontaneous language and the stylistic differences in completing the tasks selected for this study, the measures of cohesion used in this study have been narrowly defined as compared to the way in which they are defined by Halliday and Hasan (1976).

It is also important to note that, unlike the cohesive texts used for analysis by Halliday and Hasan (1976), the discourse samples used in this study were a result of a forced-choice of topics. This further limited the way in which they could be analyzed. Therefore, the following general rules were applied when analyzing the cohesive devices used in the written discourse samples collected for this study, (1) only examples of cohesion across sentence boundaries, or intersentential cohesive devices, were counted because this is the type of cohesion which is significant in distinguishing one text from another (Halliday & Hasan, 1976), (2) only the anaphoric type of reference (i.e., referring back to something which has gone before) was counted since it is anaphoric reference that provides a link between sentences, (3) generalized personal references to "we," "one," and "you" (e.g., "First, you must set a date and time for the party.") were not counted in the analyses because, as used in the above example, "we," "one," and "you" were not specific to the procedure being described (Halliday & Hasan, 1976), and

(4) in the procedural task, a common knowledge regarding topic and task was assumed between the writer and the reader; as a result, cohesive items were counted beginning with the first sentence unless the writer chose to include an introductory sentence (e.g., "In order to plan a surprise party for a friend or family member...").

In addition, the categories for cohesive analysis were limited to the following specific definitions:

1. Reference establishes a semantic relation in order for the listener/reader to retrieve from preceding text the information necessary to interpret a written or spoken message.

a. Personal Reference reveals the identity of a referent through the use of personal and possessive pronouns to represent a person, thing or happening (e.g., she, he, it, they, them). Example: If you see him, don't tell John about the party.

b. Demonstrative Reference occurs when a referent is specifically identified by its location in time or space (e.g., this, that, these, those). Example: Yesterday, I went to class. That was my first class of the school year.

2. Substitution establishes a grammatical relation of linguistic items which reveals the identity of a referent by substituting one word for another in order to prevent repetition among sentences.

a. Nominal the substitution of "one" or "ones" for a previously mentioned item. Example: These shoes are old. I need to buy new ones.

b. Verbal the substitution of "do" or a form of "do" such as "did" or "don't". Example: Fred does more at work than he used to do.

c. Clausal the substitution of an entire clause using the words "so" or "not" for that which is presupposed. Example: Is everyone coming to the party? I hope so.

3. Ellipsis when a sentence is purposely structured such that information can be omitted because some preceding item is the source of the missing information.

a. Nominal occurs when the information that is presupposed is nominal. Example: How were the dancers? A lot (of the dancers) were good, but not all.

b. Verbal occurs when the presupposed information is a verb. Example: Have you studied for the test? Yes, I have (studied).

c. Clausal occurs when an entire clause is presupposed. Example: What are you going to do? (I am going to) Read a magazine.

4. Conjunction the conjunction itself does not refer to specific information provided in a text, but assumes that two sentences or clauses contain related linguistic information.

a. Additive using an additive (and also, and) or a negative (nor, not) at the beginning of a new sentence in order to link two independent components. Example: Mary studied all night for that test. And all of her hard work paid off.

b. Adversative links contrasting information by using words that mean "to the contrary", such as "but, yet, however" at the beginning of a new

sentence. Example: Bill forgot his homework. But, he said he would bring it tomorrow.

c. Causal ties together information by distinguishing a reason or purpose for a particular result at the beginning of a new sentence. Example: The rain has stopped. Therefore, you won't be needing your umbrella.

d. Temporal relates two ideas by stating the sequence of time at the beginning of a new sentence. Example: Bill and I are going out to dinner. After that, we may go see a movie.

5. Lexical occurs when a referent is referred to by the same word or another word that means the same thing.

a. General Nouns when cohesion is achieved by using similar nominal items to refer back to information that has gone before. General nouns are words that are a part of the major noun classes "person", "place", or "thing". Example: I bought a new Honda. It's the best car I've ever owned.

A final cohesive measure described by Liles (1985a) will also be included:

Cohesive adequacy determines whether the cohesive tie provides enough information to accurately and adequately describe its referent.

a. Complete Tie occurs when the referent is easily determined. Example: Susie ate her lunch at the park. She had apple pie for dessert. In this example, the pronoun she in the second sentence clearly refers back to Susie in the first sentence.

b. Erroneous Tie occurs when the cohesive does not provide enough information to determine the referent. Example: Susie and Marie ate their lunch at the park. They had her favorite dessert. In this example, the pronoun her in the second sentence does not refer back to specific information in the first sentence and leaves the reader wondering whose favorite dessert the girls are eating.

Analysis

The written samples collected varied in length and the number of cohesive devices they contained. Sentences were analyzed separately for the frequency and adequacy of cohesive ties. For each tie identified, the cohesive item, its referent, its type of cohesion, and its adequacy were specified. For each narrative and procedural sample, the following dependent variables were obtained: (1) the total attempts at cohesive ties, (2) the number of cohesive ties used adequately, and (3) the number of sentences produced.

Due to the small sample size, group data were analyzed with a nonparametric Kruskal-Wallis, one-way analysis of variance (ANOVA) by ranks to determine if the two groups, college educated and non-college educated, came from a population with a common median.

Reliability

A second examiner, who was a graduate student in Communication Sciences and Disorders, repeated the analysis process for one third of the samples for both the

narrative and procedural tasks. This individual was provided with training on the analyses used in the study until she felt comfortable with her ability to analyze the data. This second examiner had also previously worked with analysis of cohesion in her academic coursework. Interexaminer reliability for the identification of cohesive ties for the narrative and procedural tasks was 94% and 74%, respectively.

Due to the difference in reliability between the examiners on the procedural task, a consensus coding, in which interexaminer agreement was obtained for the remainder of the samples, was performed. Interexaminer reliability for the remaining narrative and procedural samples was 95% and 94%, respectively. If a minimum of 80% agreement was not obtained on a particular measure, that segment was recoded by consensus until 100% agreement was reached.

It is believed that the discrepancies between examiners on the procedural task in the original reliability check originated from the need to more narrowly define the measures which were being used for this study. Once this was accomplished, the reliability between examiners for the procedural task increased significantly.

CHAPTER III

RESULTS

Narrative Task

The performances of the college educated and non-college educated groups were compared across narrative and procedural tasks. The descriptive statistics in Table 1 summarize the differences between the college educated and non-college educated groups for the number of cohesive ties used adequately on the narrative task. The mean number of total attempts at cohesive ties for the college educated group was 50.5 and the non-college group was 32.33. The means for correct cohesive ties were 50.17 for the college educated group and 31.17 for the non-college educated group.

The descriptive statistics in Table 2 summarize the performance levels of the college educated and non-college educated groups for the number of sentences produced. For the narrative task, the mean number of sentences for the college educated group was 15 and the non-college educated group was 9.75.

Due to the small sample size, a nonparametric Kruskal-Wallis statistical procedure was used to compare the two groups on the varying measures. For the narrative task, as seen in Table 3, these data demonstrated a difference that approached statistical significance on the number of total attempts at cohesive ties and a statistically significant difference on the number of correct attempts when using cohesive ties.

Table 1

Descriptive Statistics for Number of Cohesive Attempts by Task: Narrative Task

Measure	Total # of Attempts Narrative	# of Correct Attempts Narrative
College Educated		
Mean	50.5	50.17
Standard Deviation	26.939	26.713
Minimum	16	16
Maximum	98	98
Median	53.5	53.5
Non-College Educated		
Mean	32.33	31.17
Standard Deviation	19.085	18.963
Minimum	12	11
Maximum	67	67
Median	27	27

Table 2

Descriptive Statistics for Number of Sentences Produced: Narrative Task

Measure	# of Sentences Narrative
College Educated	
Mean	15
Standard Deviation	8.517
Minimum	6
Maximum	34
Median	14
Non-College Educated	
Mean	9.75
Standard Deviation	6.239
Minimum	3
Maximum	21
Median	8

Table 3

Kruskal-Wallis One-Way Analysis of Variance (ANOVA) for Use of Cohesion: Narrative Task

Measure	Total # Of Attempts	# of Correct Attempts
Rank Sum		
Group 1 (College Educated) n = 12	182.500	184.000
Group 2 (Non-College Educated) n = 12	117.500	116.000
Probability	0.060	0.049
df	1	1

The first nonparametric analysis examined the college educated and non-college educated groups for the dependent variable of total attempts at cohesive ties on the narrative task. The Kruskal-Wallis probability value of 0.060 approached statistical significance and is indicative of a trend toward a difference between the two groups.

A similar analysis was completed for the dependent variable of number of correct cohesive ties for the narrative task between the college and non-college educated groups. The Kruskal-Wallis probability value of 0.049 indicated a statistically significant difference between the two groups.

An analysis of the number of sentences produced by the college educated and non-college educated groups was also completed, as seen in Table 4. The Kruskal-Wallis statistical procedure yielded a probability value of 0.08, which is not statistically significant, for the narrative task.

Procedural Task

The descriptive statistics in Table 5 summarize the performances of the college educated and non-college educated groups for the total attempts at cohesive ties and the number of ties used adequately on the procedural task. The mean number of total attempts at cohesive ties for the college educated group was 51.92 and the non-college group was 23.08. The means for correct cohesive ties were 51.83 for the college educated group and 22.42 for the non-college educated group.

The descriptive statistics in Table 6 summarize the performance levels of the college educated and non-college educated groups for the number of sentences produced.

Table 4

Kruskal-Wallis One-Way Analysis of Variance (ANOVA) for Number of Sentences Produced: Narrative Task

Measure	# of Sentences Produced
Rank Sum	
Group 1 (College Educated) n = 12	180.000
Group 2 (Non-College Educated) n = 12	120.000
Probability	0.082
df	1

Table 5

Descriptive Statistics for Number of Cohesive Attempts by Task: Procedural Task

Measure	Total # of Attempts Procedure	# of Correct Attempts Procedure
College Educated		
Mean	51.92	51.83
Standard Deviation	25.57	25.519
Minimum	24	24
Maximum	117	117
Median	53	53
Non-College Educated		
Mean	23.08	22.42
Standard Deviation	9.922	9.904
Minimum	8	8
Maximum	40	39
Median	22.5	22.5

Table 6

Descriptive Statistics for Number of Sentences Produced: Procedural Task

Measure	# of Sentences Procedure
College Educated	
Mean	19.58
Standard Deviation	9.830
Minimum	7
Maximum	42
Median	17
Non-College Educated	
Mean	10.083
Standard Deviation	4.640
Minimum	4
Maximum	17
Median	11

For the procedural task, the mean number of sentences for the college educated group was 19.58 and the non-college group was 10.08.

The Kruskal-Wallis statistical procedure was also used to compare the differences between groups on the procedural task. These data, as seen in Table 7, indicated statistically significant differences between the college educated and non-college educated groups for both the number of cohesive ties attempted and the number of ties used correctly.

First, the dependent variable of total attempts at cohesive ties was analyzed between the college and non-college groups for the procedural task. This analysis yielded a Kruskal-Wallis probability value of 0.001 which demonstrated a statistically significant difference between the two groups.

Next, an analysis of the dependent variable of number of correct cohesive ties for the procedural task between the college educated and non-college educated groups was completed. Again, the Kruskal-Wallis probability was 0.001 which indicated a statistical significance between the groups.

An analysis of the number of sentences produced for the procedural task by the college educated and non-college educated groups (Table 8) was also completed. The Kruskal-Wallis statistical procedure yielded a probability value of 0.011, which indicated a statistically significant difference.

Additional Measures

One final measure, a review of the data by category and individual type of cohesion, indicated that the greater number of errors was in personal reference (i.e., using

Table 7

Kruskal-Wallis One-Way Analysis of Variance (ANOVA) for Use of Cohesion: Procedural Task

Measure	Total # Of Attempts	# of Correct Attempts
Rank Sum		
Group 1 (College Educated) n = 12	206.500	207.000
Group 2 (Non-College Educated) n = 12	93.500	93.000
Probability	0.001	0.001
df	1	1

Table 8

Kruskal-Wallis One-Way Analysis of Variance (ANOVA) for Number of Sentences Produced: Procedural Task

Measure	# of Sentences Produced
Rank Sum	
Group 1 (College Educated) n = 12	194.000
Group 2 (Non-College Educated) n = 12	106.000
Probability	0.011
df	1

a personal or possessive pronoun to represent a person, thing or happening) for both the college and non-college educated groups. However, these differences were not statistically significant ($p>.05$). Therefore, it appears that the errors for both groups are scattered across the different types of cohesive ties.

Case Studies

Three individuals with traumatic brain injury were administered the same tasks as the college and non-college educated groups. These subjects' performances (Table 9) were summarized and compared to the normative data on a case-by-case basis. Because statistical differences were found on some measures between the college educated and non-college educated groups, it was decided that it would be appropriate to compare the subjects with TBI to the group which represented their individual educational levels. None of the subjects with TBI had taken any college courses, thus, their performance levels were compared to that of the non-college educated subjects.

Narrative Task. Only one of the TBI subjects, Subject 3, approached the means for the non-college educated subjects for total cohesive attempts and correct cohesive attempts on the narrative task. TBI Subject 3 had 22 total attempts and 21 correct attempts which placed him within one standard deviation of the mean for both total cohesive attempts and number of correct cohesive attempts. TBI Subjects 1 and 2 did not match the performance of the non-college educated group. TBI Subject 1 had nine total attempts, of which seven were correct. TBI Subject 2 had nine total attempts, with only five correct attempts. Therefore, both TBI Subjects 1 and 2 scored between one and two

Table 9

Results for the Brain-Injured Subjects for the Narrative and Procedural Tasks

Group	Total Attempts	Correct Attempts	# of Sentences
Narrative Task			
TBI 1	9	7	6
TBI 2	9	5	4
TBI 3	22	21	4
Procedural Task			
TBI 1	0	0	1
TBI 2	1	0	4
TBI 3	18	18	5

standard deviations below the mean for both total number of attempts and correct cohesive attempts.

When comparing the number of sentences produced for the narrative task, all three of the TBI subjects were within one standard deviation of the mean for the non-college educated subjects. TBI Subject 1 had six sentences, TBI Subject 2 had four sentences, and TBI Subject 3 had five sentences.

Procedural Task. Only one of the TBI subjects, Subject 3, approached the means for the non-college educated subjects for total cohesive attempts and correct cohesive attempts on the procedural task. TBI Subject 3 had 18 total attempts and 18 correct attempts which placed him within one standard deviation of the mean for both total cohesive attempts and number of correct cohesive attempts. TBI Subjects 1 and 2 did not match the performance of the non-college educated group. TBI Subject 1 had no attempts for the procedural task, and TBI Subject 2 had only one attempt, which was erroneous. Thus, both TBI Subjects 1 and 2 scored between two and three standard deviations below the mean.

For the number of sentences produced for the procedural task, none of the TBI Subjects approached the means for the non-college educated subjects. TBI Subject 1 produced one sentence, TBI Subject 2 had four sentences, and TBI Subject 3 had five sentences. Therefore, all three TBI subjects placed between one and two standard deviations below the mean for the number of sentences produced.

CHAPTER IV

DISCUSSION

One purpose of the present study was to examine the use of cohesion in written discourse, specifically narrative and procedural discourse, by normal and brain-injured adults. The samples were analyzed for (a) the total attempts at cohesive ties, (b) the number of cohesive ties used adequately, and (c) the number of sentences produced.

When comparing the college educated and non-college educated subjects on the narrative task, the groups approached a statistically significant difference for the total number of cohesive attempts, and demonstrated a statistically significant difference for the number of cohesive ties used adequately. An examination of the average number of cohesive ties used adequately and the number of sentences produced did not indicate a statistically significant difference between the two groups. These results indicated that, even though the two groups did not differ on the total number of cohesive ties attempted and the number of sentences written, they did demonstrate a difference in cohesive adequacy.

When comparing the college educated and non-college educated subjects' performances on the procedural task, there was a statistically significant difference for the total number of cohesive ties attempted and the total number of correct cohesive ties. In addition, a statistically significant difference was demonstrated for the number of sentences produced. These results demonstrated that the non-college educated group

produced fewer sentences, and made fewer attempts at cohesion on the procedural task. In addition, the cohesive ties that were used on the procedural task were also used less adequately.

Generally, the non-college educated subjects wrote less on both tasks than the college educated subjects. As noted previously, this was a statistically significant difference for the procedural task. Therefore, it was concluded that there would possibly be fewer total attempts at cohesion on both tasks by the non-college educated group since they wrote fewer sentences. The findings from both the descriptive statistics and the Kruskal-Wallis statistical procedure support that conclusion.

Of particular interest, however, is the statistically significant difference found between the two groups for the number of correct cohesive ties on the narrative task even when the differences were not statistically significant for the number of sentences produced and the total number of cohesive ties attempted. These results demonstrate a difference in adequacy of the cohesive ties used by the college educated and non-college educated subjects on the narrative task even when a similar number of cohesive ties were attempted and a similar number of sentences were written.

Furthermore, if the non-college educated subjects generally wrote less, then they should have had fewer total attempts at cohesion, which they do. Therefore, the outstanding difference between the college educated and non-college educated subjects was that, on both the narrative and procedural tasks, the attempts at cohesion by the non-college educated subjects were not as adequate.

The non-college educated subjects' less adequate use of cohesion may be due in part to poor academic achievement, less carryover of skills learned in high school English

classes, and a lack of opportunity to use discourse skills on a daily basis as do the college educated subjects. Furthermore, these results demonstrated that continuing one's education to the college level may result in a refinement of higher level discourse skills such as thought organization, syntax, grammar, and semantics, all of which are an integral part of cohesion.

Considering the identifiable differences between the college and non-college educated groups, it appeared appropriate to compare the TBI subjects to the reference norms for his or her individual educational level. Thus, the three subjects with TBI used for this study were compared to the non-college educated group.

Only one of the brain-injured subjects, TBI Subject 3, demonstrated results which were comparable to the non-college educated group. Although TBI Subject 3 demonstrated abilities which approached those of the non-college educated group, his performance on both tasks was still less than that of the non-college educated subjects. It was of interest, though, that TBI Subject 3 also had the highest rating of independence according to the FIM Instrument. Considering that only three TBI subjects were involved in this study, it was difficult to draw conclusions regarding the relationship between FIM scores and performance; however, it seemed that the FIM scores reported on these brain-injured subjects were a reliable predictor of performance.

It was also important to note that TBI Subjects 1 and 2, who were not comparable to the non-college educated group, were receiving speech and language therapy at the time of testing and had short post-onset times, whereas TBI Subject 3 had a longer post-onset time, had received speech and language therapy for approximately one year, and had been dismissed from therapy more than a year before the testing for this study.

Although differences existed in frequency and adequacy of cohesion across all three groups for both the narrative and procedural tasks, it was interesting to note that similarities existed in all three groups for the types of cohesive ties used for both discourse tasks (Appendix G). For both the narrative and procedural tasks, the college educated and non-college educated groups used general noun lexical ties the most followed by demonstrative reference and personal reference ties, respectively. Similarly, the brain-injured subjects also used lexical ties the most; although, for the brain-injured group, the next prevalent types of cohesion were personal reference followed by demonstrative reference. Although the remainder of the ties used were spread across the other cohesive categories, none of the subjects used clausal substitution, verbal ellipsis, or clausal ellipsis in either of the discourse tasks.

An additional influence on the frequency and adequacy of types of cohesion used was the choice of stimuli used in this study. Although both tasks utilized a forced-choice topic, the narrative task was completed using picture stimuli which limited the creativity of the writer. Therefore, there was little variety in the narratives produced by each subject. However, for the procedural task, the subjects were able to be more spontaneous and creative. Like the narrative task, the procedural task was a forced-choice topic, but the subjects had no pictures to explain for the procedural task and, therefore, could create their own scenario with imagined characters, sequence of events, and scene as appropriate to the procedures they were describing. Thus, the procedural discourse samples collected varied in length, detail, and cohesive devices utilized.

The data on the use of cohesion in written discourse by individuals with a brain injury presented in this study demonstrated similarities to studies which examined the use

of cohesion in oral discourse. For example, Hartley and Jensen (1991) concluded that brain-injured subjects produced fewer cohesive ties, and a greater number of erroneous ties as compared to normal subjects. In addition, Mentis and Prutting (1987) determined that brain-injured subjects used fewer cohesive ties as well as erroneous ties. Although spoken and written discourse cannot be compared as equal, these similarities demonstrate a trend toward a difference between the normal and brain-injured populations.

Utilizing written samples as opposed to oral samples posed several unforeseen challenges. First, there are few studies that specifically address written language production following brain injury (Yorkston et al., 1996); therefore, there was little research on which to base the decisions made regarding the guidelines for analysis. Second, written language is extremely variable, it lacks extra-linguistic attributions, interaction between and among communication partners, and it demands a higher level of planning and organization on the part of the writer. All of these things may affect the style and extent of written language produced for forced-choice discourse tasks such as those utilized in this study. This variability in use of cohesion across samples collected contributed to the need for stringent guidelines for analysis. Third, unlike oral discourse, which can be easily broken into T-units (an independent clause plus any dependent clauses associated with it, Liles et al., 1989) for the analysis of cohesion, it appears that the ability to create sentence boundaries in written discourse is part of the ability to create a cohesive text (Haliday & Hasan, 1976). Therefore, the samples collected in this study were analyzed using sentence boundaries as created by the subjects

as opposed to T-units, again making it difficult to highlight similarities and differences to prior studies completed on oral discourse.

Another complication in the analysis of the discourse samples collected was the considerable size of Halliday and Hasan's (1976) model of cohesion. In retrospect, their model was far too detailed for the this study and further added to the complications that occurred during the analysis procedure. Taking this into account, one suggestion for future research might be to study a more limited number of cohesive measures and their subcategories at a time, possibly comparing the studies in a final review.

An additional purpose for conducting this study was to establish the beginning of a normative data base to which speech-language pathologists can refer when assessing the oral and written discourse capabilities of brain-injured patients. It is believed that this study has strengthened what little normative data exists on written discourse in adults, particularly for the non-college educated population. This is important because it has been noted that TBI often occurs in individuals who demonstrate poor academic achievement (Snow et al., 1995). Considering educational level as a factor, the significant differences in performance by the college educated and non-college educated groups further demonstrated that more normative data is needed on non-college educated adults as well as college educated adults so that comparisons can be made to the appropriate educational group when assessing a brain-injured adult.

Furthermore, it is possible that this normative data would be more complete if future research studied three normal subject groups, (1) college educated, (2) high school educated with some college and/or vocational training, and (3) high school educated with no college or vocational training. Although not all college classes or vocational training

programs focus on language skills, it is possible that a refinement of language skills takes place even when the amount of education attained beyond the high school level does not lead to a college degree. Therefore, while it would be expected that the college educated group would use higher-level discourse skills more adequately, there also may be significant differences found between those with some education beyond high school and those without.

The significant differences in the college and non-college educated groups' performance on the procedural discourse task demonstrated that procedural discourse may hold more promise as an assessment procedure for brain-injured adults as compared to narrative assessment procedures. Procedural discourse, specifically written procedural discourse, is a more difficult task due to the complexity of the executive functions involved. For example, written procedural discourse requires the ability to organize information, maintain attention to task, retrieve information from both short- and long-term memory, and to adequately utilize language skills such as syntax, grammar, and semantics (Yorkston et al., 1996).

A larger number of brain-injured subjects might have increased the probability of better representing this population; therefore, it should be taken into consideration that the brain-injured subjects used in this study were meant to serve only as case studies. A larger sample of the brain-injured population, tested using the same procedures, might yield more conclusive results on the abilities of this population.

In conclusion, there is a need for continued research on discourse abilities in normal adults of all educational levels in order to establish appropriate normative data to which speech-language pathologists can refer when assessing and establishing

appropriate therapy goals for brain-injured patients. Continued research of discourse abilities in adults will allow speech-language pathologists to more efficiently and efficaciously serve the brain-injured population.

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APPENDIXES

APPENDIX A

SUMMARY OF NORMAL SUBJECTS

SUMMARY OF NORMAL SUBJECTS

Subject #	Gender	Age	Occupation/College Major	Educational (Years)	Vocational Training (Years)
College Educated Subjects					
C10	Male	24	Electrical Engineer	17.0	
C7	Male	21	Student/Industrial Engineering	16.0	
C5	Male	23	Computer Programmer	17.0	
C11	Male	27	Architect	17.0	
C6	Male	18	Student/Undecided	12.5	
C14	Male	21	Student/Biology	15.5	
C1	Female	20	Student/Graphic Design	14.5	
C15	Female	24	Special Education Teacher	16.5	
C12	Female	23	Student/Speech Pathology	16.5	
C8	Female	19	Student/Forestry	13.5	
C16	Female	27	Teachers Aide	16.0	
C3	Female	20	Student/Speech Pathology	14.5	
Non-College Educated Subjects					
NC2	Female	27	Cosmetologist	12.0	1.5
NC3	Female	21	Clerk	12.0	
NC6	Female	25	Convenience Store Manager	12.0	
NC10	Female	30	Secretary	12.0	
NC9	Female	18	High School Student	11.5	
NC8	Female	21	Waitress	11.75	
NC1	Male	24	Farmer	12.0	
NC4	Male	27	Fiber Optics Technician	12.0	2.0
NC5	Male	26	Convenience Store Cashier	12.0	
NC7	Male	23	Cable TV Installer	12.0	2.0
NC11	Male	25	Carpenter	11.0	2.0
NC12	Male	18	High School Student	11.5	

APPENDIX B

SUBJECT QUESTIONNAIRE AND HEARING SCREENING

Subject #:_____
Date:_____

INTERVIEW QUESTIONNAIRE

Subject's Age: Years: ____ Months: ____

Please answer the following questions in as much detail as possible:

EDUCATION & WORK HISTORY:

1. Have you completed high school? ___ yes ___ no
   If "no": What is the highest level of schooling you have achieved? _____
2. Do you now or have you ever attended college? ___ yes ___ no
   If "yes": How many years of college have you completed? ___
   What is/was your major field of study? _____
3. Have you ever had vocational training? ___ yes ___ no
   If "yes": How many years of vocational training have you had? _____
   What type(s) of vocational training have you had? _____
4. Do you speak any languages other than English? ___ yes ___ no
   If "yes": What languages do you speak? _____
   What is your primary language? _____
5. Are you currently employed? ___ yes ___ no
   If "yes": What is your occupation? _____
6. Have you ever skipped or been retained a grade in school? ___ yes ___ no
   If "yes", please explain: _____
7. Have you ever been told that you have a learning disability? ___ yes ___ no
   If "yes", please explain: _____
8. Have you ever been placed in a special class for learning? ___ yes ___ no
   If "yes", please explain: _____
9. Have you ever had speech or language therapy? ___ yes ___ no
   If "yes", please explain: _____

MEDICAL HISTORY:

1. Are you currently or have you ever been treated by a professional for any of the following:

   a. hearing loss: ___ yes ___ no

   If "yes", please explain: _____

   b. alcohol abuse: ___ yes ___ no

   If "yes", please explain: _____

   c. drug abuse: ___ yes ___ no

   If "yes", please explain: _____

   d. psychological or emotional disorder (i.e. depression, anxiety): ___ yes ___ no

   If "yes", please explain: _____

   e. neurological disorder (i.e.: MS, MD, Cerebral Palsy, brain tumor, migraine headaches): ___ yes ___ no

   If "yes", please explain: _____

   f. serious diseases (i.e.: Diabetes, Epilepsy): ___ yes ___ no

   If "yes", please explain: _____

   g. head injury (i.e. Concussion, loss of consciousness): ___ yes ___ no

   If "yes", please explain: _____

2. Are you currently under a doctor's care or taking prescription medications?

   ___ yes ___ no

   If "yes", please explain: _____

   _____

Thank you for completing this questionnaire and for your participation in this study.

Subject #: _____
Date: _____

AGE (years & months) _____

Hearing Screening: (at 20 dB)

	L	R
500 Hz	_____	_____
1000 Hz	_____	_____
2000 Hz	_____	_____

APPENDIX C

SUMMARY OF BRAIN-INJURED SUBJECTS

SUMMARY OF BRAIN-INJURED SUBJECTS

Subject #	Gender	Age	Education (Years)	Type of Brain Injury	Time Post-Onset	Cause of Injury	FIM Scores At Time Of Testing	
01	M	36	12	Closed head injury	7 months	Motor vehicle accident	Auditory Verbal Writing Reading	4 4 4 4
02	M	20	11	Closed head injury	18 days	Physical assault; Struck head on concrete	Auditory Verbal Writing Reading	4 4 4 4
03	M	29	12	Closed head injury	3 years, 8 months	Motor vehicle accident	Auditory Verbal Writing Reading	7 7 7 7

APPENDIX D

THE FUNCTIONAL INDEPENDENCE MEASURE

The Functional Independence Measure (The FIM Instrument) is an indicator of severity of disability. It is not intended to include all functional activities that could be measured; rather, it is a basic activities measurement scale intended to track a person's progress through the stages of rehabilitation.

The FIM Instrument includes seven levels of disability on a continuum from dependence at the lowest end to independence at the highest end. It is intended to measure what a person with a disability is able to do, not what he or she ought to be able to if the disability was not present. It is used to classify persons with a disability by their ability to carry out an activity independently, in contrast to their need for assistance.

Description of the FIM Scores:

Level 7 Complete Independence: Activities can be performed without assistance from another person or an assistive device, within a reasonable amount of time.

Level 6 Modified Independence: Activities can be performed without assistance from another person; however, an assistive device may be needed, the activity may take longer than normal, or there may be safety risks involved.

Level 5 Supervision or Setup: Activities require no more help than standby assistance, cueing, setup of items needed, or application of assistive/adaptive devices. Physical assistance during activities is not needed.

Level 4 Minimal Contact Assistance: Activities require no more than 25% assistance. Assistance required is no more than touching.

Level 3 Moderate Assistance: Activities require more than 25% assistance but no more than 50% assistance. Assistance required is no more than touching.

Level 2 Maximal Assistance: Activities require more than 50% assistance but no more than 75% assistance.

Level 1 Total Assistance: Activities require 75% or more assistance.

State University of New York at Buffalo Research Foundation. (1993). Guide for use of the uniform data set for medical rehabilitation: Functional independence measure. Buffalo, New York: Author.

APPENDIX E

INSTRUCTIONS TO BE PROVIDED TO THE SUBJECTS

The examiner will give the subject the following instructions verbatim:

NARRATIVES:

The first activity will be a practice task. During this task you will be allowed to ask the examiner any questions you may have about the task. Once the tasks to be used in the study have begun you may not ask the examiner any questions, so be sure that you fully understand the directions before the practice task is finished.

This first task will be practice:

You will be shown a picture sequence which includes six frames. Look at the sequence closely and then explain verbally what is happening in the pictures. Be sure to explain each frame and to give as much detail as you can.
[The practice task will be completed. When the examiner is certain that the subject understands the task, the study stimulus pictures can be presented.]

The next two items will be used for this study. If you feel that you understand the task, we can begin.

Verbal Narrative:
You will be shown a picture sequence which includes six frames. Please look at the sequence closely and then explain verbally what is happening in the pictures. Be sure to explain each frame and to give as much detail as you can.

Written Narrative:
You will be shown a picture sequence which includes six frames. Please look at the sequence closely and then write an explanation of what is happening in the pictures. Be sure to explain each frame and to give as much detail as you can.

PROCEDURES:

The first activity will be a practice task. During this task you will be allowed to ask the examiner any questions you may have about the task. Once the tasks to be used in the study have begun you may not ask the examiner any questions, so be sure that you fully understand the directions before the practice task is finished.

This first task will be practice:

I would like you to tell me all of the steps involved in buying groceries. Pretend that I have never shopped for groceries and that it is your job to teach me how to do it. Be as detailed as possible. [The practice task will be completed. When the examiner is certain that the subject understands the task, the study procedures can be presented.]

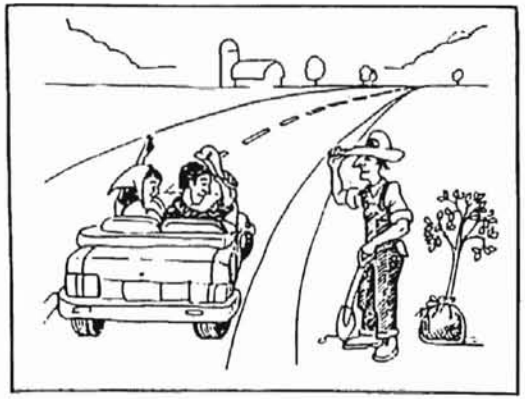
The next two items will be used for this study. If you feel that you understand the task, we can begin.

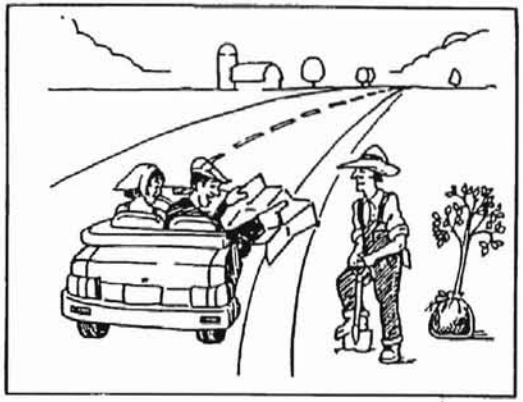
Planning a vacation:
Please explain verbally all of the steps involved in planning a vacation. Pretend that I have never planned a vacation before and that it is your job to teach me how to do it. Be as detailed as possible.

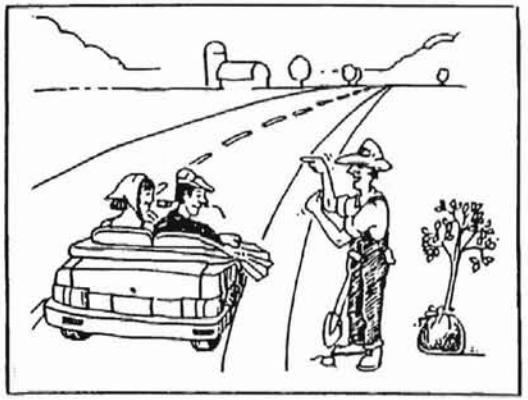
Planning an elaborate surprise party for a friend or family member:
Please write an explanation of all of the steps involved in planning an elaborate surprise party for a friend or family member. Pretend that I have never planned a party before and that it is your job to teach me how to do it. Be as detailed as possible.

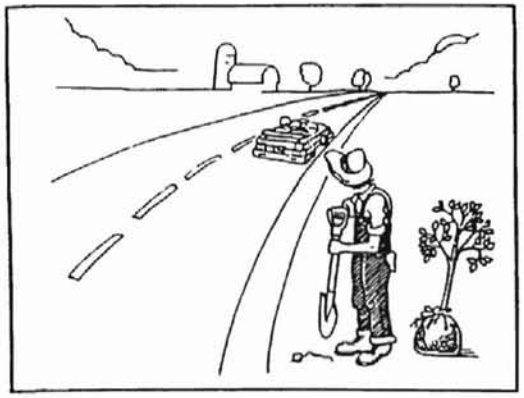
APPENDIX F

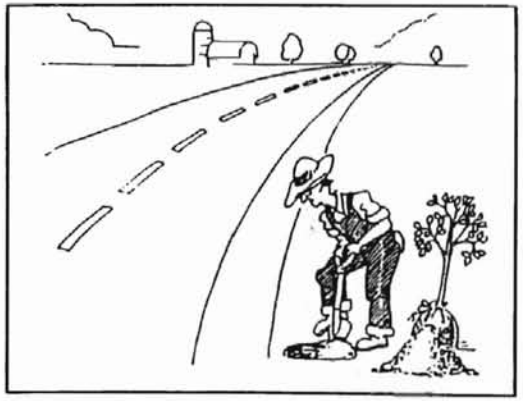
PICTURE SEQUENCES

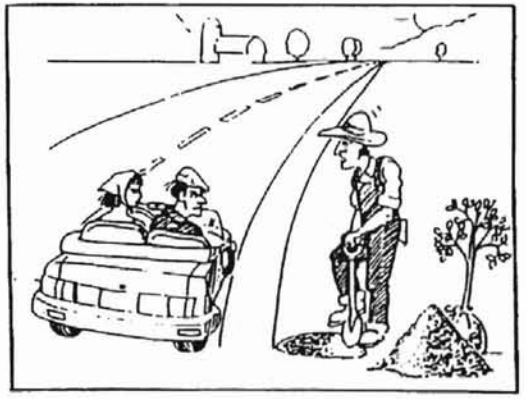


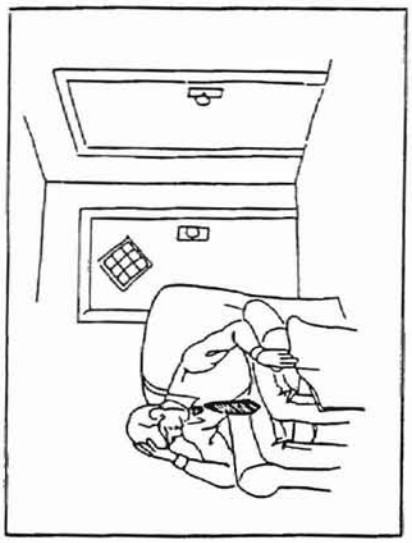


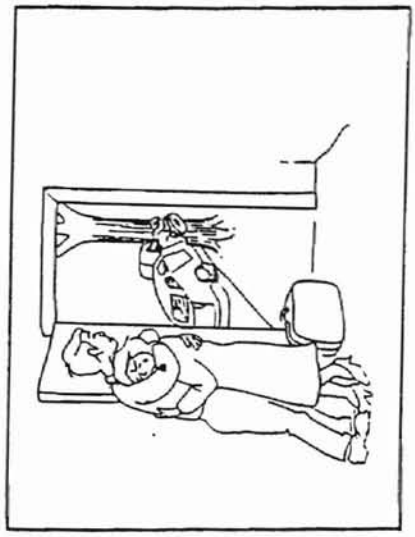


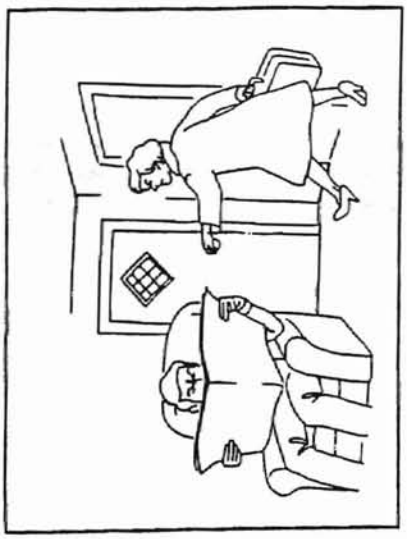


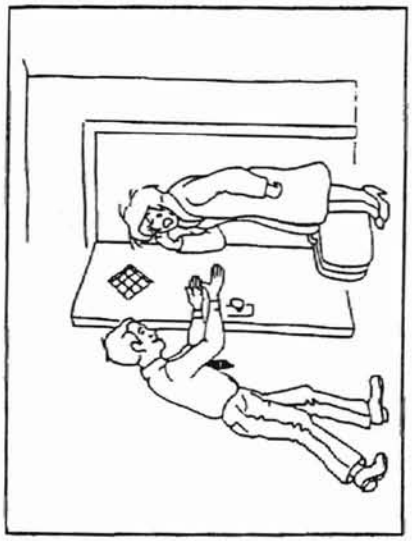


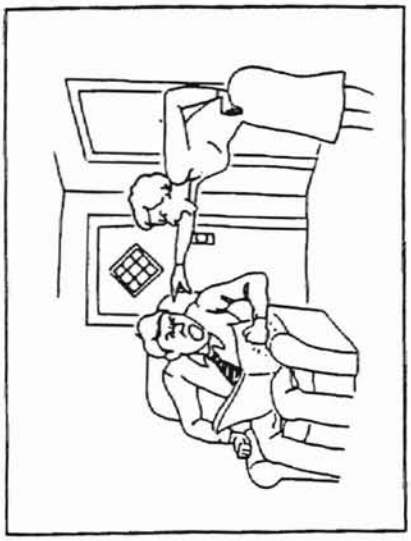


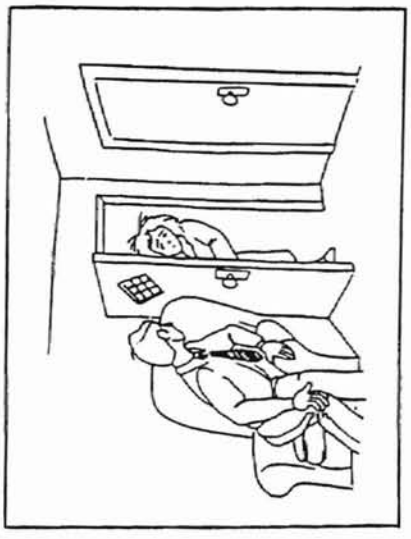












DEPARTMENT OF VETERANS AFFAIRS
Medical Center
One Veterans Drive
Minneapolis MN 55417

In Reply Refer To:

July 17, 1997

Connie E. Stout, Ph.D., CCC-SLP
Oklahoma State University
Department of Communication Sciences and Disorders
120 Hanner Hall
Stillwater, OK 74078-5062

Dear Dr. Stout:

Enclosed are full-sized copies of the cartoon sequences you requested for use in a student research project. I've also enclosed full-sized copies of the two single pictures used in our speech elicitation protocol, in case they may prove useful. You have my permission and that of Linda Nicholas to use them in any research projects for which they may be appropriate. If you plan to use only one of the cartoon sequences, we would recommend the "argument" sequence. It gives somewhat more consistent speech samples across speakers than the "directions" sequence.

If we can be of additional assistance, please do not hesitate to call on us.

Sincerely,

R. Brookshire

Robert H. Brookshire, Ph.D., CCC-SLP
Director, Speech Pathology Section, Neurology Service
Professor, Department of Communication Disorders, University of Minnesota

APPENDIX G

SUMMARY OF THE TYPES OF COHESION USED FOR THE NARRATIVE AND PROCEDURAL TASKS

SUMMARY OF THE TYPES OF COHESION USED FOR THE NARRATIVE AND PROCEDURAL TASKS

Narrative Task	Personal Reference	Demonstrative Reference	Nominal Substitution	Verbal Substitution	Nominal Ellipsis	Additive Conjunction	Adversative Conjunction	Causal Conjunction	Temporal Conjunction	Lexical Nouns
College Educated	71	226	1	0	2	0	2	1	6	293
Non-College Educated	70	131	0	0	0	0	2	0	3	166
TBI	9	8	0	0	0	0	0	0	1	14

Procedural Task	Personal Reference	Demonstrative Reference	Nominal Substitution	Verbal Substitution	Nominal Ellipsis	Additive Conjunction	Adversative Conjunction	Clausal Conjunction	Temporal Conjunction	Lexical Nouns
College Educated	51	190	1	1	4	1	1	18	34	323
Non-College Educated	37	79	0	1	0	1	1	6	16	125
TBI	6	4	0	0	0	0	0	0	1	7

APPENDIX H

INSTITUTIONAL REVIEW BOARD APPROVAL FORMS

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 11-18-97 **IRB#:** AS-98-023

Proposal Title: DISCOURSE ABILITIES OF ADULTS WITH BRAIN INJURY

Principal Investigator(s): Connie Stout, Kathleen M. Youse

Reviewed and Processed as: Expedited with Special Population

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:

Signature

Chair of Institutional Review Board

Date: November 21, 1997

cc: Kathleen M. Youse

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 09-22-97 **IRB#:** AS-98-012

Proposal Title: DISCOURSE ABILITIES OF NORMAL ADULTS

Principal Investigator(s): Connie Stout, Kathleen M. Youse

Reviewed and Processed as: Expedited

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:

Signature: _____ Date: September 25, 1997
Chair of Institutional Review Board
cc: Kathleen M. Youse

VITA

Kathleen Marie Youse

Candidate for the Degree of

Master of Arts

THESIS: COHESION IN WRITTEN DISCOURSE IN NORMAL AND BRAIN-INJURED ADULTS

Major Field: Speech (Pathology)

Area of Emphasis: Communication Sciences and Disorders

Education: Received an Associate of Liberal Arts Degree from Camden County College, Blackwood, New Jersey, in January 1994. Graduated Magna cum Laude with a Bachelor of Arts degree from Rutgers University, Camden, New Jersey, in May 1995. Completed the requirements for a Master of Arts degree from Oklahoma State University, Stillwater, Oklahoma, in May 1998.

Professional Experience: Employed by Oklahoma State University, Department of Communication Sciences and Disorders, as a graduate teaching assistant and a graduate administrative assistant May 1995 to May 1998. Completed clinical practicum internships at: the Oklahoma State University Speech-Language-Hearing Clinic, Stillwater, Oklahoma, June 1996 to May 1997; Gatesway West, Stillwater, Oklahoma, June 1996 to July 1996; the Life Adult Day Center, Stillwater, Oklahoma, January 1997 to May 1997; Kaiser Rehabilitation Center at Hillcrest Hospital, Tulsa, Oklahoma, June 1997 to August 1997; and Children's Medical Center at Hillcrest Hospital, Tulsa, Oklahoma, March 1998 to May 1998.

Professional Affiliations: ASHA: American Speech-Language-Hearing Association; OSHA: Oklahoma Speech-Language-Hearing Association; NSSLHA: National Student Speech-Language-Hearing Association; OSU-NSSLHA: National Student Speech-Language-Hearing Association - OSU Chapter; BIA-OK: Brain Injury Association of Oklahoma, Oklahoma City Head Injury Support Group.

Offices Held: Vice President, OSU-NSSLHA - National Student Speech-Language-Hearing Association - OSU Chapter, August 1996 to May 1997.