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The Elicitation of Descriptive and Procedural Discourse in Expressive Aphasia

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Abstract

Currently, there are no clear clinical guidelines for determining the method that will elicit the best discourse sample from individuals with expressive aphasia. Additionally, there is no universal method used to evaluate discourse samples. Archival data was collected from a 42-year old male who experienced a cerebrovascular accident 15 years ago and was then diagnosed with expressive aphasia. Two consecutive 8-week courses of treatment periods were analyzed to determine the best discourse elicitation and evaluation method. A comparison of descriptive and procedural discourse elicitation techniques revealed that procedural discourse results in a higher average percent Correct Information Units (%CIUs), words per minute (WPM), and Type-Token Ratio (TTR). Additionally, the results suggested that evaluating discourse using a combined analysis approach, both microlinguistic and macrolinguistic analyses, revealed more clinically relevant information. Though this study does need to be replicated with a larger population, this analysis may lead to more informed discussions when selecting a discourse elicitation and evaluation technique for treatment.

Keywords: expressive aphasia, nonfluent aphasia, microlinguistic, macrolinguistic, descriptive discourse, procedural discourse, evaluation

Aphasia

Though there are many different variations in severity and modality, *aphasia* is a communication disorder that stems from two basic premises: aphasia is neurogenic and aphasia is acquired. Individuals with aphasia experience language impairments in any one or multiple of the following language modalities, reading, writing, listening, and speaking. It is important to note that aphasia does not explain deficits in sensory or mental processes (Chapey, 2008).

Damage to the language centers of the brain generally s lesions to the anterior frontal lobe, the posterior temporal lobe, and areas surrounding the parietal/temporal/occipital cortex (LaPointe, 2005). However, the brain is a very complex system with countless interconnected neural networks. Therefore, it is difficult to decipher all of the areas of the brain both directly and indirectly associated with language.

Common etiologies of aphasia include cerebrovascular accident (CVA), traumatic brain injury (TBI), tumor, and in some cases, neurodegenerative diseases. The most common cause of aphasia is CVA, also known as a stroke. A stroke occurs when the blood that supplies the brain with oxygen is not able to fully circulate due to clots, hemorrhages, and blood vessel constriction (LaPointe, 2005).

There are many different types of aphasia based on the location of the damage to the different language areas and the symptoms that ensue. The two most common types are classified as either *receptive/fluent aphasia,* also known as Wernicke's aphasia, or *expressive/nonfluent aphasia,* also known as Broca's aphasia. As the names suggest, expressive aphasia results in deficits in formulating and producing language while receptive aphasia results primarily in deficits in processing and comprehending language.

Expressive aphasia is a result of damage to the frontal lobe. The lesion generally involves the left lateral frontal, suprasylvian, pre-Rolandic region referred to as Broca's area, and also extends into the periventricular white matter. In some cases, the lesion can even include the parietal lobe (Helm-Estabrooks & Albert, 2004).

A lesion to this area is characterized by nonfluent, slow, and effortful speech with specific deficits in articulation, prosody, retrievable vocabulary, and poor syntax structure (Goodglass, Kaplan, & Baressi, 2001). Sentences are often incomplete or syntactically simple and lack function words such as articles, pronouns, auxiliary verbs, and prepositions. The retained speech tends to contain mainly content words such as nouns, adjectives, and adverbs (LaPointe, 2005). It is also common for individuals with expressive aphasia to have impairments in their ability to write and make errors similar to the errors in their speech. Unlike receptive aphasia, individuals with expressive aphasia typically demonstrate relatively intact auditory and reading comprehension skills. Therefore, individuals with expressive aphasia are usually more conscious of their expressive language deficits and are more likely to develop depression or grow frustrated when they make errors (Chapey, 2008, LaPointe, 2005).

The Nature of Discourse in Aphasia

The nature of discourse in aphasia presents as an inverse relationship between the severity of the aphasia and the amount of information that is conveyed in the discourse sample. There are significant differences in the number of content units and syllables included and the rate that content units and syllables are used. The extent of the difference depends on the severity of the aphasia (Craig et al., 1992). Since individuals with aphasia tend to have deficits in word-finding abilities, their speech is characterized by paraphasias, circumlocutions, filled or

unfilled pauses, and repetitions (LaPointe, 2005; Crockford & Lesser, 1994). The discourse generally contains more nouns than verbs, fewer pronouns than normal and frequent omission of determiners (Armstrong, 2000). Additionally, it contains relatively intact elements of story grammar but optional elements are often omitted (Armstrong, 2000). Ulatowska et al., (1981) conducted a study on individuals with aphasia and described the nature of their discourse. The researchers noticed errors in tense shift, anaphora errors, errors in connecting words, and errors in chronological sequence.

Microlinguistic and macrolinguistic structure. The nature of discourse in expressive aphasia can be described in terms of the microlinguistic structure and macrolinguistic structure. Microlinguistic impairments suggest deficits in lexical and grammatical forms which include lexical and syntactic errors and reduced syntactic complexity. Individuals with expressive aphasia may have microlinguistic impairments such as a decrease in the number of pronouns used, a lower ratio of nouns compared to verbs, and more frequent omission of determiners. Macrolinguistic impairments suggest deficits in the general organization, structure, or pattern of discourse which include deficits in the pragmatic aspects and conceptual and narrative structure. According to Ulatowska & Chapman (1990), microlinguistic impairments in the discourse of individuals with expressive aphasia often stem from the reduced amount information conveyed (Ulatowska & Chapman, 1990).

Types of discourse. The precise nature of the discourse of individuals with aphasia also depends in part on the type of discourse elicited. There are several different types of discourse including descriptive, narrative, expository, and procedural (Boyle, 2011). In procedural discourse, the individual provides directions or instructions on how something is done and in a specific order. For example, a participant may be instructed, *Tell me how you would go about*

doing dishes by hand, or, *Tell me how you would go about writing and sending a letter* (Nicholas & Brookshire, 1993). Narrative discourse describes an occurrence and depends heavily upon a good understanding of the pragmatics and story grammar, or organization of an event. It can describe a real or imagined event and details such as the participants and setting are provided. Expository discourse is oriented around one subject and all the details logically relate to the subject matter. Unlike procedural discourse, expository discourse does not necessarily have to be in a chronological sequence (Ulatowska et al., 1981). Descriptive discourse involves the explanation of the details of a stimulus. In aphasia research studies, descriptive discourse often includes descriptions of visual stimuli such as a picture.

Review of Literature

Analysis of Discourse

The current body of research on discourse evaluation in aphasia outlines several different techniques for measurement and analysis. The technique used depends on the type of aphasia and the type of discourse elicited. Boyle (2011) discussed the use of both the microlinguistic and macrolinguistic analysis methods in discourse evaluation. Though the microlinguistic impairments in the discourse of individuals with aphasia are generally more severe, discourse can be analyzed using microlinguistic, macrolinguistic, or both methods. However, it was hypothesized that treating the microlinguistic impairments in discourse could lead to improvements in the macrolinguistic structure (Boyle, 2011).

Nicholas and Brookshire (1993) used The Correct Information Unit (CIU) analysis to calculate the efficiency of discourse. This method of analysis included two counts: number of words and number of CIUs; and the three calculated measures of words per minute, percent

CIUs, and CIUs per minute. The three calculated measures appeared to better distinguish individuals with aphasia from typical individuals.

In the *Manual of Aphasia and Aphasia Therapy,* Helm-Estabrooks and Albert (2004) recommend using the Communicative Effectiveness Profile (CEP) to analyze discourse. Similar to the CIU analysis, the CEP analysis explains how to count the correct Content Units (CUs) produced but it also explains how to compute the index of lexical efficiency and the index of grammatical support. Other parameters for judging discourse are also listed. These measures include phrase length, substantive/functor word ratio, syntax use, paraphasias, speech prosody, and articulatory agility (Helm-Estabrooks & Albert, 2004).

Similar to Boyle's analysis, the macrolinguistic analysis method was thoroughly examined by Nicholas and Brookshire (1995). These researchers discussed the impact that the severity of the aphasia should have on choosing the best type of discourse evaluation method. For example, an individual with more mild aphasia is able to generally convey their general message fairly well. Therefore, the discourse evaluation method should include more measures of the microlinguistic structure. Conversely, the discourse of an individual with more severe aphasia should be evaluated by broader, macrolinguistic measures. More emphasis should be placed on evaluating how well the individual was able to convey an overall message. Nicholas and Brookshire (1995) used *main units* to evaluate the macrolinguistic impairments in their subjects' discourse. Main units of information were analyzed and scored as either present or absent. The accuracy and completeness of the main unit was not evaluated (Nicholas & Brookshire, 1995).

Discourse Elicitation

A variety of discourse elicitation techniques have been used in aphasia research. Participants may be asked to generate or retell a story, give a summary, explain the moral of a story, describe a procedure or picture (Ulatowska et al., 1981; Larfeuil & Le Dorze, 1997), or maintain a conversation (Hengst & Duff, 2007). Some studies have incorporated different combinations of these techniques.

McNeil et al. (2007) compared a discourse elicitation technique called the Story Retell Procedure (SRP) with other discourse elicitation techniques. The researchers wanted to determine which technique resulted in the largest and most reliable language sample. The SRP is very different from the most common elicitation procedures such as picture descriptions and narrative and procedural descriptions. Participants were instructed to listen to a preselected story booklet with pictures. Then, they were asked to retell it immediately in as much detail as possible without the story booklet. Measures of verbal productivity, informational content, verbal disruptions, and grammaticality were computed. Compared to the samples elicited using the most common elicitation procedures, the results suggested that the SRP elicited some samples that were similar. However, the SRP technique also produced some samples that were larger and more reliable than samples elicited by the most common elicitation procedures (McNeil et al., 2007).

Clinically Relevant Analysis

Clinically, there are many different methods used to elicit discourse. However, it is the clinician's responsibility to determine which method will result in the production of the largest language sample with the most lexical diversity. Additionally, the most effective way of evaluating the discourse sample must be selected.

In the current study, an eight-week course of treatment eliciting descriptive discourse was conducted. Even though a strong model was provided with an appropriately complex description, the clinical scenario involved a change from eliciting descriptive discourse. The clinician judged that this elicitation technique resulted in the production of a series of noun strings. In an attempt to elicit more language output with improved story grammar and lexical diversity, elicitation was changed to procedural discourse. Within each discourse condition, a verbal model and reading model was presented before discourse was elicited.

The purpose of this study is to determine whether eliciting descriptive or procedural discourse results in the largest language sample with the most lexical diversity. Therefore, in-depth analyses were performed on the clinical data to determine whether procedural discourse would elicit different discourse. The data collected from each session remained separate for the verbal model and the reading model which were labeled *Trial 1* and *Trial 2*. The analyses included both microlinguistic and macrolinguistic discourse evaluation techniques in order to most accurately depict the nature of the discourse.

Conclusion

It is the clinician's responsibility to determine which discourse elicitation method produces the largest language sample with the most lexical diversity. Therefore, the first purpose of this study was to determine the best method of discourse elicitation: descriptive or procedural. It was hypothesized that the procedural discourse elicitation technique would elicit the best discourse sample because of its similarities to the successful SRP procedure outlined in McNeil et al. (2007).

Further, the current research suggested that the most effective way of evaluating discourse should include microlinguistic, macrolinguistic, or a combined analysis method. The

second purpose of this study was to determine the most effective way of analyzing discourse. In order to gather as much information on the sample as possible, it was hypothesized that using a combined approach that incorporated both macrolinguistic and microlinguistic analysis methods would produce the most accurate and clinically relevant analysis of the discourse samples.

Method

The client was a 42-year old male who experienced a cerebrovascular accident 15 years ago and was then diagnosed with expressive aphasia. He had been living at home with his family and reported limited opportunities to produce conversational discourse. His family members tended to "speak for him" if they noticed a long pause. He participated in therapy sessions at both the Augustana College Center for Speech, Language, and Hearing and at his home via teletherapy sessions since he lived far away. The client received two 8-week courses of treatment from two different clinicians who were supervised by the same clinical supervisor. Sessions held at the Clinic and via teletherapy alternated every week. Archival data was collected from the two consecutive courses of treatment. During the fall of 2015, the first clinician elicited descriptive discourse during four 60-minute clinic sessions and four 60-minute teletherapy sessions. During the winter of 2015, the second clinician elicited procedural discourse during four 60-minute clinic sessions and three 60-minute teletherapy sessions. Ten samples were analyzed from the fall term data and 10 samples were analyzed from the winter term data.

Materials

Archival data. Archival data collected from the participant during the fall and winter of 2015 was studied. Each session was recorded with an Olympus WS-700M digital voice recorder so that the transcriptions of the descriptive and procedural discourse samples could be analyzed.

Descriptive discourse. To elicit the descriptive discourse collected during the treatment sessions, the clinician chose picture scenes (See Appendix A) similar to the *cookie theft* picture used in the Boston Diagnostic Aphasia Exam and the *picnic scene* used in the Western Aphasia Battery. The picture scenes were similar to the cookie theft picture and picnic scene because the image depicted an overarching theme that could be supplemented with multiple supporting details. Two picture scenes were used during each session. Each of these picture scenes was paired with a typed 50-60 word paragraph (See Appendix A) describing the clinician's descriptive interpretation of the picture scene.

Procedural discourse. To elicit the procedural discourse samples collected during the treatment sessions, the clinician selected two procedural tasks to present to the client. The clinician chose common tasks that most people would have had experience performing or observing. Each procedural task (See Appendix B) was paired with a typed 50-60 word paragraph (See Appendix B) with the clinician's interpretation of the procedural task.

Procedure

Descriptive discourse. Two treatment models for descriptive discourse were targeted during each 60-minute therapy session: the *verbal model* and the *reading model*. During the verbal model, the clinician read the prepared 50-60 word paragraph with a descriptive interpretation of a picture scene to the client. Then, the client was asked to give his interpretation of how to describe the picture scene. The clinician consistently used the prompt, *Tell me everything you can about this picture.* During the reading model, the client read aloud the prepared 50-60 word paragraph with a descriptive interpretation of a different picture scene. Immediately after, the written paragraph was removed from the client's sight and he was prompted to give his own descriptive interpretation of the picture scene. Just as in the first

model, the clinician introduced the picture scene by using the consistent prompt, *Tell me everything you can about this picture.* Previous data analyses of the descriptive discourse samples suggested that there was no notable difference between the discourse samples elicited by these two models.

Procedural discourse. In many ways, the method for collecting procedural discourse was very similar to the method for collecting descriptive discourse. Two treatment models for procedural discourse were targeted during each 60-minute therapy session: the *verbal model* and the *reading model*. During the verbal model, the clinician read the prepared 50-60 word paragraph with procedural instructions to the client. Then, the client was asked to give his interpretation of how to complete the procedural task. The clinician introduced the procedural task by using the consistent prompt, *Tell me all the steps to…*. During the reading model, the client read aloud the prepared 50-60 word paragraph with procedural instructions for a different procedural task. Immediately after, the written paragraph was removed from the client's sight and he was prompted to give his own interpretation of how to complete the procedural task. Just as in the first model, the clinician introduced the procedural task by using the consistent prompt, *Tell me all the steps to…*.

Additional details. There were no time restrictions and no specific feedback was given in response to any of the discourse samples elicited. Two new procedural tasks and two new picture scenes were chosen for each session. Although most of the procedural tasks and picture scenes were novel, two picture scenes were used two times over the 8-week treatment. For each session, the clinicians alternated the treatment condition that was presented first to prevent practice effects influencing the data. However, these two picture scenes were used in sessions several weeks apart. During teletherapy sessions, the client was able to access the picture scenes

and the written paragraph models because they were sent to him in an envelope. All procedural and descriptive discourse samples were recorded by a digital voice recorder.

Data Analysis

The clinicians who provided the first two courses of treatment transcribed the discourse samples and performed some measures of analysis. Under the clinical assumption that the procedural discourse technique would elicit different discourse, additional measures of analysis were used.

Microlinguistic analysis. All discourse samples were transcribed by the clinicians and analyzed using the Systematic Analysis of Language Transcripts (SALT) software (Miller & Iglesias, 2002) to determine the quantity and lexical diversity of each sample. From the SALT analysis, the words per minute (WPM) and Type-Token Ratio (TTR) from each discourse sample were obtained. TTR is a ratio of the number of different words used to the total number of words. Comparing WPM helped compare the fluency of the sample while TTR allowed the clinician to compare the quantity of language elicited and the diversity of the vocabulary words used. Between these two measures of analyses, the microlinguistic structure of the participant's discourse samples was compared.

Macrolinguistic analysis. Additional analyses were performed based on the clinical assumption that changing the discourse elicitation from descriptive to procedural would enhance the quality of the language samples. To determine how well the participant was able to convey his overall message in his discourse samples, the transcribed samples were used to calculate the *percent CIUs* (%CIUs). The %CIUs was calculated using the method of determining CIUs outlined by Nicholas and Brookshire (1993) (See Appendix C). Nicholas and Brookshire (1993)

define CIUs as "words that are intelligible in context, accurate in relation to the picture(s) or topic, and relevant to and informative about the content of the picture(s) or the topic" (Nicholas and Brookshire, 1993, p. 348). The %CIUs represents the total number of CIUs divided by the total number of words. To calculate the %CIUs, each line of the transcript was analyzed. Then, the number of CIUs and the number of total words were calculated using the guidelines described by Nicholas and Brookshire (1993). To get the total number of CIUs in the sample, the number of CIUs in each line of the transcript was added. Then, to get the total number of words in the transcript, the total number of words in each line was added. Finally, the %CIUs was computed by dividing the total number of CIUs in the sample by the total number of words in the sample. The %CIUs in the descriptive discourse transcripts and the procedural discourse transcripts were compared to the average %CIUs for a non-brain-damaged individual. The comparative data collected by Nicholas and Brookshire (1993) was used to distinguish any differences between the discourse of individuals with aphasia and the non-brain-damaged individuals. This analysis helped evaluate the overall macrolinguistic structure of the discourse samples.

Results

The data that was collected from the descriptive and procedural discourse conditions is displayed graphically to illustrate the following measurements: words per minute, type-token ratio, and percent CIUs. These graphs helped determine whether there were any trends in the discourse elicited during the descriptive discourse condition (Table 1), procedural discourse condition (Table 2), or between the two conditions (Table 3). Analysis of the data is as follows. Additional tables depicting the data from the reading and verbal models were created but not analyzed for this study (See Appendices D and E).

Table 1

Analysis of Descriptive Discourse

	%CIUs		WPM		TTR	
Session	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1	Trial 2
1	54	47	25.00	21.10	0.59	0.56
2	53	60	44.70	21.09	0.24	0.38
3	46	26	35.26	44.28	0.40	0.29
4	38	72	27.24	29.53	0.31	0.51
5	49	54	25.95	36.20	0.28	0.45
Average	49.9		31.03		0.40	

Note. %CIUs = percent correct information units; WPM = words per minute; TTR = Type Token Ratio. Data for all five sessions are listed in chronological order.

Table 2

Analysis of Procedural Discourse

	%CIUs		WPM		TTR	
Session	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1	Trial 2
1	47	67	45.54	42.73	0.57	0.54
2	51	44	52.8	10.29	0.43	0.77
3	55	72	42.04	30.29	0.61	0.64
4	46	51	11.84	49.22	0.62	0.54
5	60	41	42.13	46.91	0.59	0.50
Average	53.4		37.38		0.58	

Note. %CIUs = percent correct information units; WPM = words per minute; TTR = Type Token Ratio. Data for all five sessions are listed in chronological order.

Table 3

Comparison of Average Descriptive and Procedural Discourse Samples

Discourse	%CIUs	WPM	TTR
Descriptive	49.9	31.03	0.40
Procedural	53.4	37.38	0.58
Difference	+3.5	+6.35	+0.18*

Note. %CIUs = percent correct information units; WPM = words per minute; TTR = Type Token Ratio. * Indicates statistical significance.

Microlinguistic Structure Measurements

Words per minute. Nicholas and Brookshire (1993) suggested that the average WPM for an individual without brain damage is 167.7 with a range of 105-202. The average WPM for an individual with aphasia is 82.3 with a range of 15-150. During the descriptive discourse condition for this subject, the average WPM was 31.03. During the procedural discourse condition, the average WPM rose by 6.35 words to 37.38. Though the difference was not statistically significant $t(0) = -1.15$, $p>.05$, the data does suggest that procedural discourse may elicit slightly more WPM than descriptive discourse (Figure 1).

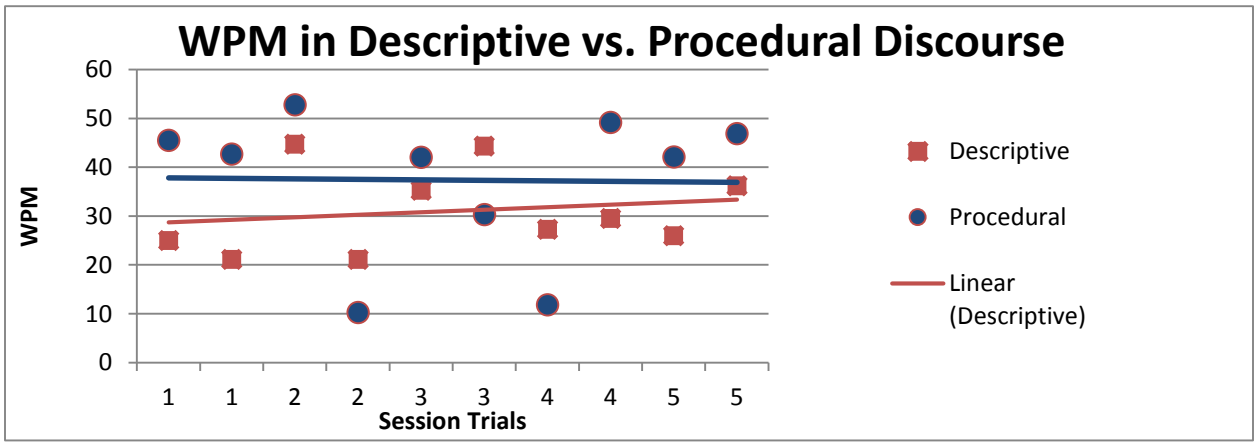

Figure 1. The WPM from each sample and the trend line for each condition.

Type-token ratio. The data indicate a significant difference between the average TTR of descriptive and procedural discourse, $t(0) = -3.7$, $p<.05$. The average TTR of the descriptive discourse was 0.40 while the average TTR of the procedural discourse increased by 0.18 to 0.58. This analysis suggests that procedural discourse elicits a higher TTR than descriptive discourse (Figure 2).

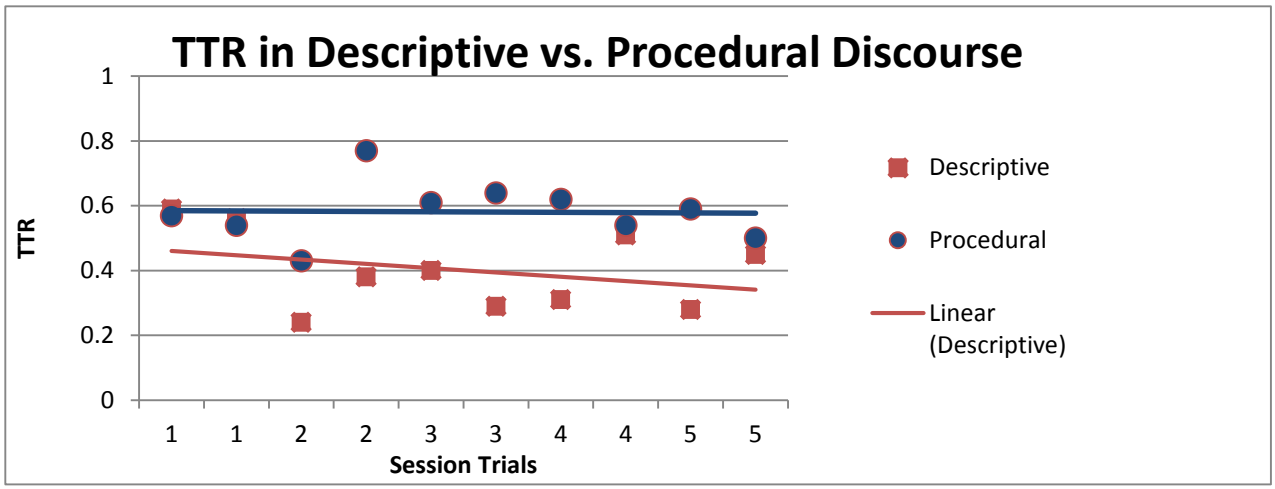

Figure 2. The TTR from each sample and the trend line for each condition.

Macrolinguistic Structure Measurement

Percent CIUs. Nicholas and Brookshire (1993) suggested that the average %CIUs for an individual without brain damage is 86.7 with a range of 75-93. The average %CIUs for an individual with aphasia is 63 with a range of 22-85. During the descriptive discourse condition for this subject, the average %CIUs was 49.9%. During the procedural discourse condition, the average %CIUs rose by 3.5% to 53.4%. Though the difference was not statistically significant $t(0) = -0.69$, $p>.05$, the data does suggest that procedural discourse may elicit slightly more %CIUs than descriptive discourse (Figure 3).

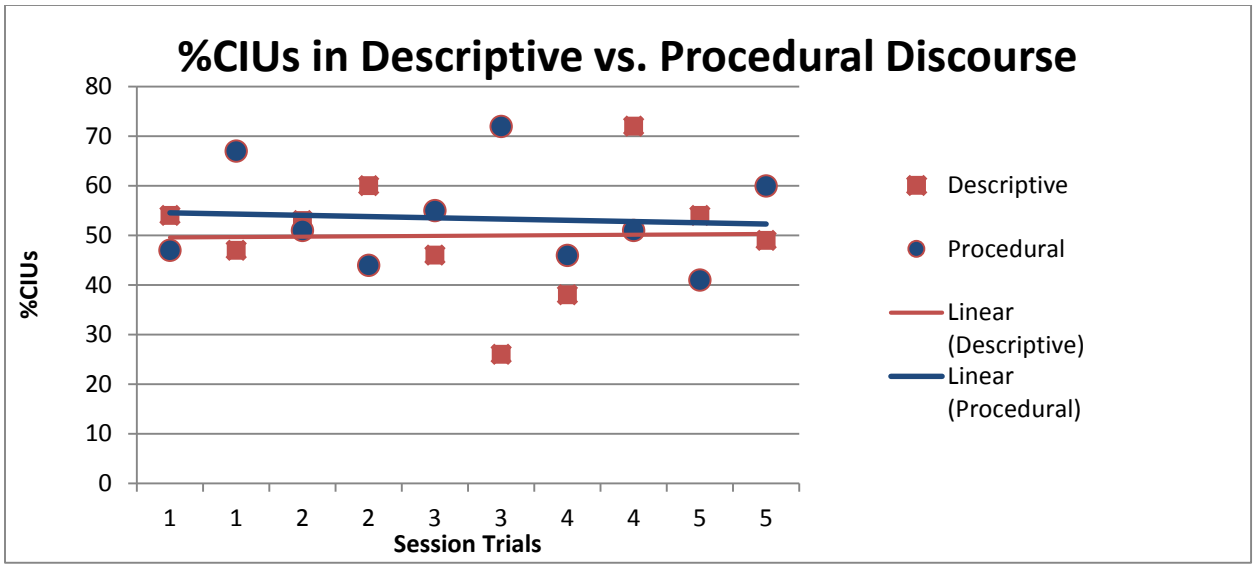

Figure 3. The %CIUs from each sample and the trend line for each condition.

Discussion

The results of the study provide evidence that supports both original hypotheses: 1. The procedural discourse elicitation technique will elicit the best discourse and 2. Using a combined approach that incorporates both macrolinguistic and microlinguistic analysis methods will produce the most accurate and clinically relevant analysis of the discourse samples.

Though the aphasia literature outlines several discourse elicitation techniques, there are no clear clinical guidelines for determining the method that will elicit the largest language sample with the most lexical diversity and correct information units. Additionally, there is no universal method used to evaluate discourse samples. Ideally, the analysis of these two 8-week courses of treatment will lead to more informed discussions when selecting a discourse elicitation technique for treatment.

It is interesting to consider that most standardized tests currently used to evaluate the discourse of individuals with aphasia use descriptive elicitation techniques. However, the results

of this study suggest that a procedural elicitation technique may be the most clinically relevant. Since the Story Retell Procedure (SRP) outlined in McNeil et al. (2007) involved a technique very similar to the one used it this study, it seems that there may be a trend towards a future of using a procedural elicitation technique.

Previous analyses of only the microlinguistic structure led to the clinical decision to use the combined analysis approach that incorporated both macrolinguistic and microlinguistic methods. The use of the combined analysis approach revealed more clinically relevant information from the discourse samples. Previous microlinguistic analyses of the verbal and reading models yielded no difference between these two conditions. However, the addition of a macrolinguistic analysis method revealed that there does seem to be a difference between the reading and verbal model conditions. During both descriptive and procedural discourse, the verbal model elicited higher %CIUs and TTR. However, there was not a clear trend in WPM. Since the addition of the macrolinguistic analysis method revealed more clinically relevant information from the discourse samples, a combined analysis approach should be considered when analyzing clinical discourse samples.

Limitations

It should be noted that more than one clinician transcribed the discourse samples from each term and no measure of inter-rater reliability was conducted. This could have resulted in minor deviances in the data collected. The clinician conducting the macrolinguistic analyses was also not blind to the hypotheses of the study. Further, no measure of consistency between stimuli was conducted. This could have resulted in slight discrepancies in the participant's performance in the discourse samples collected. Additionally, there was no standardized test conducted on the

participant to determine the severity of his aphasia. There could be differences in best practice discourse elicitation and evaluation procedures depending on the severity of the aphasia. Before the results of this study can be applied to a larger population, the procedure needs to be repeated with a larger sample size.

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Appendix A

Example of one of the picture scenes the clinician chose to elicit descriptive discourse and the typed 50-60 word paragraph it was paired with.

This scene takes place in a park. There is a woman walking her toddler in the stroller. A boy is roller-skating with a blue balloon. Another boy is riding his bike. His dog is riding on the back. Another woman is sitting on the bench with a white dog and a little boy.

Appendix B

Example of one of the procedural tasks the clinician chose to elicit procedural discourse and the typed 50-60 word paragraph it was paired with.

I want you to tell me all the steps to make a PB&J

First, gather your ingredients: two slices of bread, a knife, peanut butter, and jelly. Use a knife to spread a glob of peanut butter on one slice of bread. Open the jar of jelly and spread some jelly on the other slice of bread. Then, press both slices of bread together and enjoy!

Appendix C

The following is adapted from Nicholas and Brookshire (1993).

Correct information units are words that are **intelligible** in context, **accurate** in relation to the picture(s) or topic, and **relevant** to and **informative** about the content of the picture(s) or the topic.

Words do not have to be used in a grammatically correct manner to be included in the correct information count. Each correct information unit consists of a single word and only words that have been included in the word count can be considered for inclusion in the correct information unit count.

RULES FOR COUNTING CIUs

2.1. DO NOT COUNT THE FOLLOWING

(In this section, words in **bold print** would not be counted as correct information units.)

2.11. Words that do not accurately portray what is in the picture(s) or that do not seem accurate in relation to the topic being discussed, such as incorrect names, pronouns, numbers, actions, etc.

If a word reflects regional usage (such as calling the midday meal "dinner" in some areas), it is counted as a correct information unit. If grammatical incorrectness would lead to misunderstanding or uncertainty about the meaning of words, the grammatically incorrect words would not be counted as correct information units.

(See 3.12 for examples of grammatically incorrect words that would be counted as correct information units.)

*The girl s riding her bike. (The picture shows a girl with a bike nearby which she may have been riding, but which she is not currently riding.)

* The **girl** is on a **ladder. She fell.** (The picture shows a boy on a stool who is tipping but has not fallen yet.)

* The **boys** and **girls** are arriving. (The picture shows only one boy and one girl arriving.)

If several people are involved in an action and only one of them is mentioned, the mentioned one is still counted as a correct information unit. This constitutes an incomplete description but not an inaccurate one.

The boy is arriving. (The picture shows a boy and a girl arriving.)

The man drove away. (The picture shows a couple driving away.)

2.12. Attempts to correct sound errors in words except for the final attempt.

* He put **paper popper** pepper on his food.· She saw her with her mass... **mack.** .. mask.

2.13. Dead ends, false starts, or revisions in which the speaker begins an utterance but either revises it or leaves it uncompleted and uninformative with regard to the picture(s) or topic.

·**My si . .. no no not my sister ... my fa** ... with my wife.
· He goes over to her and puts **his** wants to give her a hug.
· He looks out and sees that **she had** the car ran into the tree.
*** The** ... **the ... that one oh forget It.**

· **In the hose In the mouse** in the house
·We go to a **party** no I mean a movie

If an utterance is incomplete, but some information about the picture(s) or topic has been given, count that information.

* The kitchen window was ...

In this example, the words the kitchen window was would be counted as correct information units (if they meet the other criteria). Even though the entire statement was not completed, the words are informative.

Words that express some legitimate uncertainty or change in perception about characters, events, or settings in a picture are counted as correct information units (if they meet the other criteria). See 2.18 for further examples.

* Her dad or maybe a neighbor was in the tree.
* From the looks of the candles, he must be four. No there is another candle on the table so he must be five years old.

2.14. Repetition of words or ideas that do not add new information to the utterance, are not necessary for cohesion or grammatical correctness, and are not purposely used to intensify meaning.

* The **blue** truck was blue.
* The restaurant was a new one. It was a **new restaurant.**
* She was cleaning washing the dishes.

Such repetition of words or ideas can be separated by other counted words.

*The mother was very angry. The daughter was crying. The **mother was very mad.**

Exceptions:
(a) If the repeated words or ideas are necessary for cohesion, they are counted. She went to the store. The store was closed.
(b) If words are repeated to achieve effect or to intensify a statement they are counted.

* The girl was very, very sad.

* They were fighting, really fighting.
(c) If repeated words are used to expand on previous information, they are counted.

* He put on a shoe ... a left shoe.
* There were some people ... a man and a woman.

2.15. The first use of a pronoun for which an unambiguous referent has not been provided. Subsequent uses of the pronoun for the same unspecified or ambiguous referent are counted as correct information units (if they meet the other criteria).

*She (no referent) was doing the dishes. I think she was daydreaming.

If an inaccurate referent is provided but it is clear that a pronoun refers back to it, the pronoun would be counted as a correct information unit.

*The fox (inaccurate referent) ate some of the cake and it was hiding.

2.16. Vague or nonspecific words or phrases that are not necessary for the grammatical completeness of a statement and for which the subject has not provided a clear referent and for which the subject could have provided a more specific word or phrase.

* The mother is drying one of those **things.**
* She gave him some stuff.
* He put **something** up to the tree but that one knocked it down.
* We had pancakes or scrambled eggs **or something** like that.
I wash the glasses and plates **and so on.**

The words "here" and "there" frequently fall into this category.

***** Here we have a boy.
·This here boy is crying.
* That mother there is doing dishes.
* There is a cat here and a dog there.
* The mother is there.
* She put them over here.
· She has a bike there.
* The cookies were up **there.**

The following are examples of uses of "here" and "there" that are necessary for the grammatical completeness of the statement and cannot be replaced by a more specific word. These uses of "here" and "there" would be counted as correct information units.

* There is a boy.
*Here comes the same couple.

The following is an example of a nonspecific word that is preceded by a clear referent and would be counted as a correct information unit.

* The boy opened the cupboard. The cookies were up there.

2.17. Conjunctive terms (particularly **so** and **then)** if they are used indiscriminately as filler or continuants rather than as cohesive ties to connect ideas.

* There is a man. Then there is a woman and **then** a cat.

When used cohesively, "then" indicates the temporal order or sequential organization of things or events.

She had lunch and then she went to the store.
* When you go into my house you see the living room first, then the dining room, then the kitchen.

When used cohesively, "so" indicates a casual consequence.

· He was thirsty so he drank some juice.
* The mother was after the dog so the boy was crying.

2.18. Qualifiers and modifiers if they are used indiscriminately as filler or are used unnecessarily in descriptions of events, settings, or characters that are unambiguously pictured. The following examples concern unambiguously pictured information.
· **Apparently** this is a kitchen.
* **Evidently** the boy is on a stool.
· I **think that** the cat is in the tree.
*** It looks like** the man is up in the tree too.
· The boy is **sort of** crying and the dog is **kind of** hiding.
· **Of course,** the woman left in a huff.

When used informatively, qualifiers and modifiers suggest legitimate uncertainty on the part of the speaker about events, settings, or characters portrayed in the picture(s) or modify associated words in a meaningful way. The following examples concern ambiguously pictured information.

· Apparently this is a mother and her two children.
· I think she is his sister.
· It looks like he gave them the wrong directions.
· She must be daydreaming.
· He might be the girl's dad or maybe he's a neighbor.
· He is the father or a neighbor. I don't know which.
· He looks sort of sad.
* Evidently they went around in a circle.

2.19. Filler words and phrases **(you know, like, well,** I **mean, okay, oh well, anyway, yeah),** interjections when they do not convey information about the content of the picture(s) or topic (oh, **oh boy, wow, gosh, gee, golly, aha, hmm),** and tag questions (It is really

smashed up, Isn't It).

2.20. The conjunction "and." "And" is never counted as a correct information unit because it is often used as filler and we have found that its use as filler cannot be discriminated reliably from its uses as a conjunction.

2.21. Commentary on the task and lead-in phrases that do not give information about the picture(s) or topic and are not necessary for the grammatical completeness of the statement.

*** These pictures are poorly drawn.**
This is kind of hard.
*** In the first picture ...**
*** As I said the last time,** she was upset.

2.22. Commentary on the subject's performance or personal experiences.

· I can't **think of the name of that.**
· I **can't say** It.
· No, that's not right.
·**My kids were always getting Into trouble too.**
·**My wife and I used to fight like that.**
· They are fighting **but I don't know why.**

Some statements that contain personal information may be appropriate in procedural and personal information descriptions and, in such cases, they would be counted as correct information units (if they meet the other criteria). See 3.16 for embellishments that are counted as correct information units. See previous page for statements that are deleted before beginning the word and correct information unit counts.

3.1. COUNT THE FOLLOWING (if they meet all other criteria)

(In this section, words in bold print would be counted as correct information units.)

3.11. All words (nouns, adjectives, pronouns, verbs, adverbs, articles, prepositions, and conjunctions) that are intelligible in context, accurate in relation to the picture(s) or topic, and relevant to and informative about the content of the picture(s) or topic.

3.12. Words do not have to be used in a grammatically correct manner to be counted. Words that violate standard English grammar rules concerning appropriate verb tense and form, agreement in number between subject and predicate, agreement between articles and nouns, incorrect use of articles, and appropriate singular and plural forms are counted as correct information units unless these violations would lead to misunderstanding or uncertainty about the meaning of the words. See 2.11 for examples of words that would not be counted as correct information units.

* The firemans are coming.
* The firemen ain't rescued them yet.

· Put some stamp on it.
· The friends **Is** here.
* He don't look very happy.

3.13. Production of a word that results in another English word, if the production would be intelligible as the target word in context.

* He is standing on a school and it is tipping over.

3.14. The final attempt in a series of attempts to correct sound errors.

* He went to the musket ... minuet ... market.

3.15. Informal terms (nope, **yep, uh-huh, un-uh)** when they convey information about the content of the picture(s) or topic.

* She said "Uh-huh, I'll do it."

3.16. Words in embellishments that add to the events portrayed in the picture(s) or express a moral, if they are consistent with the situation or events portrayed. Words that express some legitimate uncertainty about characters, settings, or events in the pictures.

· **He's going to get hurt and his mom Is going to be angry.**
· **Some days everything seems to go wrong.**
· **That looks like a nice way to spend a summer day.**
· **Sooner or later cats usually get stuck up a tree.**
· **Mothers sometimes get distracted and don't notice things.**
· **This is the one about the accident-prone family.**

However, see 2.22 for examples of extraneous commentary that may resemble embellishments, but are not counted.

3.17. Verbs and auxiliary verbs **(is, are, was, were, to, has, have, will, would, has been,** etc.) as two separate correct information units-one for the auxiliary verb and one for the main verb.

* His mom **Is going to be** angry. (Each word in bold print is a correct information unit.)

3.18. Contractions [both standard (won't) and colloquial (gonna) j as two correct information units.

3.19. Each word in hyphenated words (father-in-law, **good-bye).**

RULES FOR COUNTING WORDS

1.1. DO NOT COUNT THE FOLLOWING

1.11. Words or partial words that are not intelligible in context to someone who knows the picture(s) or topic being discussed.

· He went to the **frampi.**
· That appears to be a **norble.**
·He had a **st** ... **sn** ... steak.

1.12. Nonword filler (um, er, uh). (See 1.23 and 1.24 for a rule dealing with filler words and phrases, interjections, and informal terms.)

1.2. COUNT THE FOLLOWING

1.21. All words that are intelligible in context. Count words that contain sound substitutions, omissions, distortions, or additions if the word is intelligible in context **(hiscup** for hiccup). If the incorrect production results is another real word that does not appear to be the target word, it is still included in the word count (paper for pepper).

1.22. Commentary on the task, on the speaker's performance, or on the speaker's experiences.

*** This is pretty hard.**
· I can't think of that word.
· No, that's not right.
*** My wife and I used to fight like that.**

1.23. Filler words and phrases **(you know, I mean, okay).** Do not count nonword filler. (See 1.12.)

1.24. Interjections **(oh, oh boy, wow, golly, gosh, gee, aha, hmm)** and informal terms **(uh-huh [affirmative], un-uh [negative], nope, yep, yeah).**

1.25. Common contractions or simplifications of words (gonna for **going to, sorta** for **sort of, em for them).** Contractions (both **standard [don't, he's]** and colloquial **[gonna, sorta])** are counted as two words.

1.26. Each word in hyphenated words **Jack-in-the-box** = 4 words).

1.27. Each word in numbers **(twenty-two** = 2 words, **one hundred thirty-four** = 4 words, **nineteen fifty-five** = 3 words).

1.28. Compound words as one word **(pancake, cowboy).**

1.29. Each word in proper names **(Mary Smith, St. Paul, Mason City** = 2 words each).

1.30. Count acronyms as one word (VA, VFW, TWA = 1 word each).

Appendix D

Table D1

Analysis of Descriptive Discourse

	%CIUs		WPM		TTR	
Session	Reading	Verbal	Reading	Verbal	Reading	Verbal
1	54	47	25.00	21.10	0.59	0.56
2	53	60	44.70	21.09	0.24	0.38
3	46	26	35.26	44.28	0.40	0.29
4	38	72	27.24	29.53	0.31	0.51
5	49	54	25.95	36.20	0.28	0.45
Average	48	52	31.63	30.44	0.36	0.44

Note. %CIUs = percent correct information units; WPM = words per minute; TTR = Type Token Ratio. Data for all five sessions are listed in chronological order.

Table D2

Analysis of Procedural Discourse

	%CIUs		WPM		TTR	
Session	Reading	Verbal	Reading	Verbal	Reading	Verbal
1	47	67	45.54	42.73	0.57	0.54
2	51	44	52.8	10.29	0.43	0.77
3	55	72	42.04	30.29	0.61	0.64
4	46	51	11.84	49.22	0.62	0.54
5	60	41	42.13	46.91	0.59	0.50
Average	52	55	38.87	35.89	0.56	0.60

Note. %CIUs = percent correct information units; WPM = words per minute; TTR = Type Token Ratio. Data for all five sessions are listed in chronological order.

Appendix E

Table E1

Comparison of Descriptive and Procedural Discourse Samples

	%CIUs		WPM		TTR	
Discourse	Reading	Verbal	Reading	Verbal	Reading	Verbal
Descriptive	48	52	31.63	30.44	0.36	0.44
Procedural	52	55	38.87	35.89	0.56	0.60
Difference	+4	+3	+7.24	+5.45	+0.20	+0.16

Note. %CIUs = percent correct information units; WPM = words per minute; TTR = Type Token Ratio.