2017

THE RELATIONSHIP BETWEEN SELECTIVE ATTENTION AND GLOBAL COHERENCE IN NARRATIVE DISCOURSE FOLLOWING RIGHT HEMISPHERE STROKE

Katherine McComas Maddy
University of Kentucky, klmc227@uky.edu
Digital Object Identifier: https://doi.org/10.13023/ETD.2017.440

STUDENT AGREEMENT:

I represent that my thesis or dissertation and abstract are my original work. Proper attribution has been given to all outside sources. I understand that I am solely responsible for obtaining any needed copyright permissions. I have obtained needed written permission statement(s) from the owner(s) of each third-party copyrighted matter to be included in my work, allowing electronic distribution (if such use is not permitted by the fair use doctrine) which will be submitted to UKnowledge as Additional File.

I hereby grant to The University of Kentucky and its agents the irrevocable, non-exclusive, and royalty-free license to archive and make accessible my work in whole or in part in all forms of media, now or hereafter known. I agree that the document mentioned above may be made available immediately for worldwide access unless an embargo applies.

I retain all other ownership rights to the copyright of my work. I also retain the right to use in future works (such as articles or books) all or part of my work. I understand that I am free to register the copyright to my work.

REVIEW, APPROVAL AND ACCEPTANCE

The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student's thesis including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Katherine McComas Maddy, Student

Dr. Gilson J. Capilouto, Major Professor

Dr. Esther Dupont-Versteegden, Director of Graduate Studies

THE RELATIONSHIP BETWEEN SELECTIVE ATTENTION AND GLOBAL COHERENCE IN NARRATIVE DISCOURSE FOLLOWING RIGHT HEMISPHERE STROKE

DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the College of Health Sciences at the University of Kentucky

By

Katherine McComas Maddy

Lexington, Kentucky

Co-Directors: Dr. Gilson Capilouto, Professor of Communication Sciences and Disorders
and Dr. Anne Harrison, Professor of Physical Therapy

Lexington, Kentucky

ABSTRACT OF DISSERTATION

THE RELATIONSHIP BETWEEN SELECTIVE ATTENTION AND GLOBAL COHERENCE IN NARRATIVE DISCOURSE FOLLOWING RIGHT HEMISPHERE STROKE

Stroke is the leading cause of serious, long-term disability and nearly half of older stroke survivors experience moderate to severe disability. A common impairment following stroke is impaired discourse production. Functional outcome studies have proposed that the recovery of discourse abilities is critical to achieving a good quality of life. Communication impairments often persist into the chronic stages of recovery and can cause individuals to withdraw from social situations. Discourse production deficits may not be apparent in basic communication interactions, but become more obvious during complex conversations following non-aphasic brain injury (NABI) or right hemisphere stroke (RHD). The purpose of this three-part dissertation was to examine discourse production deficits following NABI and the current practices of speech-language pathologists in the assessment and treatment of discourse deficits.

The first study examined the macrolinguistic processes of discourse, which included local coherence, global coherence and cohesion, following NABI. Ten individuals with NABI and 10 heathy controls, closely matched for age, gender, and education, provided a narrative recount of an event. Discourse samples were analyzed for local coherence, global coherence, and cohesion. Results indicated that individuals with NABI demonstrated impaired global coherence compared to healthy controls with relatively intact local coherence and cohesion. Although global coherence deficits were identified in the discourse of individuals with NABI, empirical evidence suggests that speech-language pathologists do not routinely assess or treat discourse production deficits.

The second study explored the current practices of speech-language pathologists in the assessment and treatment of individuals with NABI with a specific focus on discourse production deficits using a phenomenological approach. Nine speech-language pathologists participated in semi-structured 1:1 interviews. Results indicated that speech-language pathologists do not routinely assess and treat discourse production deficits due to competing internal values and external or environmental demands. However, speech-

language pathologists reported that discourse deficits are present following NABI and are characterized by impaired topic maintenance or global coherence. Participants reported that they were routinely assessing and treating the underlying cognitive process of attention in hopes that it would generalize to improved topic maintenance or global coherence. However, little is known about the relationship between selective attention and global coherence.

The third study examined the maintenance of global coherence across discourse tasks and explored the relationship between selective attention and global coherence. Eleven participants with non-aphasic brain injury secondary to right hemisphere stroke participated in the study. Participants provided discourse samples in response to five discourse tasks in a single-task and dual-task condition. Additionally, participants completed the Stroop test to examine selective attention abilities. Results indicated that mean global coherence scores differed across discourse tasks, and that mean global coherence scores for stories was significantly higher than for simple recount and single picture description tasks. To examine the relationship between selective attention and global coherence, mean global coherence scores in the single-task and dual-task condition were compared. Mean global coherence scores were lower in the dual-task condition for all five discourse tasks. Mean global coherence scores for the complex recount task were significantly lower in the dual-task condition. This suggests that the maintenance of global coherence is influenced by attention abilities. There was no significant correlation between performance on the Stroop task and the maintenance of global coherence for any of the five discourse tasks.

Key Words: global coherence, discourse, right hemisphere disorder, attention

Katherine McComas Maddy

September 19, 2017

THE RELATIONSHIP BETWEEN SELECTIVE ATTENTION AND GLOBAL COHERENCE IN NARRATIVE DISCOURSE FOLLOWING RIGHT HEMISPHERE STROKE

By

Katherine McComas Maddy

Dr. Gilson J. Capilouto
Co-Director of Dissertation

Dr. Anne Harrison
Co-Director of Dissertation

Dr. Esther Dupont-Versteegden
Director of Graduate Studies

September 19, 2017

Acknowledgments

This dissertation is the product of many individuals whom must be acknowledged for their endless support throughout this process. Gilson, thank you for taking a chance on me when I was a struggling student. I was struggling to narrow my questions and find my passion, and you took me in and with your discipline and focus, guided me to explore the questions I wasn't able to ask yet. You always encouraged me to stay true to my clinical questions and pursue the difficult but fulfilling path. You not only supported me academically, but encouraged my growth while balancing being a wife, mother, clinician, researcher, and friend. For that, I'm most grateful.

To Anne, Dana, Lee and Phillip, I am thankful for each question you asked and the new perspective you added to this research. This dissertation has truly been an interdisciplinary effort. There were many meetings where we narrowed questions, defined terminology, reflected on the literature, and then of course, revised a model before revising a model again. Thank you for your guidance throughout my doctoral studies.

To the speech-language pathologists at Cardinal Hill Rehabilitation Hospital and the University of Kentucky Enterprise, thank you for believing in me and supporting me along the way. As a young clinician, I was supported by a strong team of clinicians at Cardinal Hill that challenged me to pursue this doctoral program to advance my career and develop as a clinical researcher. April and Liz, I appreciate your efforts recruiting participants and your assistance in ensuring that my data collection ran smoothly. Thank you, colleagues, at the University of Kentucky Enterprise for supporting my research endeavors by allowing flexibility and understanding when balancing clinical work and

school commitments, but mostly providing a good, "you got this" when I needed it most. Sarah, I have appreciated commiserating with you through the difficult times during this program and celebrating with you during our successes.

To my mom and dad, Karen and Michael, words cannot express my gratitude for all you have contributed to my education and success. I'm grateful that I was raised in a home that valued education and the sacrifices you made to ensure that I had a wonderful education are not forgotten. At different time points in my life, I was able to also witness you both pursue further education in spite of numerous obstacles, while always putting Christopher and I first. What wonderful role models you have been. Mom, you always believed that I could do this work because you had done it before. As a speech-language pathologist who completed doctoral work, you knew the path and knew that I could maneuver it, one step at a time. Dad, you always believed in me, simple because, you knew me.

To John, my husband, I cannot express my appreciation for the sacrifices you made so that I could pursue my dream. You spent many nights alone while I worked at our neighborhood Starbucks until they closed without one grumble. You take care of all things at home so that I can divide my focus on our son and my dissertation. You never once doubted me. Thank you for unconditional love and support.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Stroke is the leading cause of serious, long-term disability and nearly half of older stroke survivors experience moderate to severe disability (Go et al., 2014; Kelly-Hayes et al., 2003). Every year, approximately 800,000 individuals are estimated to suffer a new or recurrent stroke and approximately 7 million individuals are currently living with stroke in the United States alone (Go et al., 2014; "Stroke Statistics," 2010). Medical costs for stroke survivors have been reported to range from $28 billion up to $71 billion ("Stroke Statistics," 2010). As the population ages, the prevalence of stroke is expected to increase to an additional 3.4 million people living with stroke in 2030, relative to 2012 (Ovbiagele et al., 2013). Between 2012 and 2030, total direct medical stroke-related costs are predicted to triple from $71.55 billion to $184.13 billion (Ovbiagele et al., 2013). As incidence rates and medical costs continue to grow each year, medical professionals are faced with the challenge of identifying and treating residual impairments in a both an effective and efficient manner.

A common impairment following stroke is impaired discourse production (Chapey, 2008; Peach & Shapiro, 2012). Functional outcome studies following stroke have proposed that the recovery of discourse abilities is critical to achieving a good quality of life following stroke (Clarke, Marshall, Black, & Colantonio, 2002; Mackenzie & Chang, 2002). Discourse can be defined as any language that goes beyond the boundaries of isolated sentences and is aimed at conveying a message among communication partners (Ewing-Cobbs, Brookshire, Scott, & Fletcher, 1998; Ulatowska & Olness, 2004). Communication impairments following stroke often persist into the chronic stages of recovery and can cause individuals to withdraw from social situations.

Discourse production deficits may not always be apparent in basic communication interactions, but become more obvious during complex, extended conversations particularly following right hemisphere disorder (RHD) (Glosser, 1993). Therefore, deficits are not easily identified and may be more likely to be recognized in the chronic stages of recovery, well after the conclusion of rehabilitation services (Brownell, Gardner, Prather, & Martino, 1995).

Discourse can be analyzed on multiple levels (Brownell et al., 1995). Individuals with language dominant hemisphere damage, typically left hemisphere brain damage and aphasia, often demonstrate impairments at the microlinguistic level of discourse (Armstrong, 2000). Analyses at the microlinguistic level examine *within-sentence* processes, such as *informativeness*, *grammatical complexity* and *lexical diversity*. Deficits at the macrolinguistic level are more prevalent in the discourse of individuals with non-aphasic brain injuries, or brain injuries of the non-language dominant hemisphere (Marini et al., 2011; Carlmagno et al., 2011; Rogalski et al., 2010; Coelho, 2002; Coelho et al., 2005). Analyses at the macrolinguistic level examine *between-sentence* processes and relate to pragmatic and discourse-level aspects of language production. Between-sentence processes include *cohesion, local coherence*, and *global coherence* and are the focus of this dissertation.

Cohesion refers to the specific relations of meaning between elements within discourse. Cohesion occurs when connections are made between parts of a discourse sample by use of cohesive ties (e.g., personal pronouns, conjunctions). For example, if asked to describe their last holiday, a person may say "last Thanksgiving we went to visit our son who lives in San Diego" and then follow that with, "and he took us to see a

football game on Thanksgiving Day." This would be an example of good cohesion, as there are multiple cohesive ties, including the grammatical tie "and" and the lexical ties of "Thanksgiving Day" and the pronoun "he." If the individual had stated "she took us to a football game," that would have been an example of a cohesive error and poor cohesion because "she" is the wrong pronoun and does not refer to the son. Bloom, Borod, Santschi-Haywood, Pick, and Obler (1996) compared the discourse of individuals with RHD and healthy controls. They found no significant differences in cohesion scores across groups. Similarly, Coelho and Flewellyn (2003) examined cohesion in the discourse of individuals with closed head injury and found no differences in global coherence for story generation and retelling discourse tasks. Glosser and Deser (1990) examined cohesion in personal interview narratives produced by individuals with closed head injury. The participants with closed head injury did not demonstrate impaired cohesion when compared to healthy controls. In contrast, Davis and Coelho (2004) and Davis, O'Neil-Pirozzi, and Coon (1997) reported fewer cohesive ties produced by individuals with closed head injury compared to healthy controls in story retelling tasks.

Local coherence refers to the ability for a speaker to maintain the topic from one verbalization to the next (Glosser & Deser, 1990). Specifically, local coherence refers to the conceptual links that maintain meaning between proximal propositions within smaller textual units (Glosser, 1990). When scoring local coherence, higher ratings are given for those utterances that continue, repeat, elaborate, and coordinate with the topic in the immediately preceding utterance. For example, if a speaker describes his or her activities of the previous weekend by saying "this past weekend I went to Applebee's for happy hour" and then says "so that was fun," that would be considered good maintenance of

local coherence as “that” serves as a lexical tie to refer to the main idea conveyed in the previous utterance. If the speaker then states, “it’s nice to eat lots of greasy food for cheap,” that would be considered poor coherence because there are no significant lexical ties or transitional verbiage to connect the utterance to the preceding utterance. Studies examining the maintenance of local coherence in the discourse of individuals with non-aphasic brain injury (NABI) or RHD have been equivocal. Glosser and Deser (1990) and Hough and Barrow (2003) examined the maintenance of local coherence in the discourse of individuals with head injury. They reported impaired local coherence scores for individuals with brain injury compared to healthy controls. In contrast, Rogalski, Altmann, Plummer-D'Amato, Behrman, and Marsiske (2010) and Van Leer and Turkstra (1999) reported relatively intact local coherence in the discourse of individuals with RHD and traumatic brain injury(TBI).

Global coherence refers to the manner in which discourse is organized with respect to an overall goal, plan, theme or topic and is based on the listener’s perception of the discourse sample (Glosser & Deser, 1991). Higher global coherence scores are given to utterances that provide the most substantive information directly related to the topic at hand (Glosser & Deser, 1992). For example, if a person is asked to describe a last vacation, responses similar to, “we traveled to the Smoky Mountains” would be considered good maintenance of global coherence because the utterance is overtly related to the stimulus. Responses such as “the weather is so bad in the fall” would be considered poor maintenance of global coherence since it is not overtly related to the prompt or topic. Studies examining the maintenance of global coherence including both RHD and traumatic brain injury (TBI), have also been equivocal; however, the general consensus is

that global coherence is impaired (Brady, Armstrong, & Mackenzie, 2005; Carlomagno, Giannotti, Vorano, & Marini, 2011; Hough & Barrow, 2003; Marini et al., 2011; Van Leer & Turkstra, 1999).

It has been proposed that macrolinguistic level deficits, particularly global coherence, occur due to impairments in selective attention (Glosser & Deser, 1992; Marini et al., 2011; Van Leer & Turkstra, 1999). Selective attention refers to the ability to restrict distraction; a person must be able to attend to relevant information and ignore irrelevant information in order to complete higher order cognitive tasks, whether voluntarily or involuntarily (O'Donnell, 2002). A prominent aspect of selective attention is the ability to make fast decisions between relevant and irrelevant features of a task (Sturm, Schnitker, Grande, Huber, & Willmes, 2011). Attention deficits are a universal consequence of brain injury, particularly when the right hemisphere has been damaged (Brookshire, 2003; Chapey, 2008; Sturm et al., 2011). The prevalence of attention deficits following stroke reported in the literature has varied. Higher estimates indicate that 46-92% of individuals demonstrate impaired attention following stroke (Stapleton, Ashburn, & Stack, 2001). Clinical manifestations of attention deficits in RHD have also been well documented in the speech-language pathology literature (Blake, Duffy, Myers, & Tompkins, 2002; Chapey, 2008; Peach & Shapiro, 2012). Blake et al (2002) examined the prevalence and patterns of cognitive-communication deficits following RHD. Results indicated that attention was the most commonly reported deficit; 67.5% of patients admitted to an inpatient rehabilitation facility had documented deficits in attention. As selective attention is thought to sub-serve a variety of higher-level cognitive mechanisms, it is generally agreed upon that deficits in attention will result in discourse production

deficits. However, little is known about the specific impact on the various discourse processes, particularly global coherence, in both healthy aging populations and disordered populations. Further research is needed to specifically characterize these deficits and the relationship between cognitive processes and discourse production.

Several researchers have examined age-related changes in discourse production and have proposed that age-related changes in discourse production are caused by underlying age-related changes in cognitive functions. Glosser and Deser (1992) examined the maintenance of global coherence in the discourse of middle aged (mean age = 51.9 years) and elderly healthy adults (mean age = 76.2 years) in the context of personally relevant narratives. Results indicated that the middle-aged group had a significantly better mean global coherence scores and had fewer incoherence verbalizations compared to the elderly group. They concluded that their results support the hypothesis that discourse production changes in healthy aging are secondary to changes in cognitive processes instead of specific linguistic processes. Arbuckle and Gold (1993) examined instances of off topic speech (OTS), similar to global coherence, and found an increase in the instances of OTS in healthy aging. The authors suggested that these age-related changes in the ability to maintain topic is affected by age-related changes in cognitive ability. Although many researchers have proposed a relationship between age-related cognitive declines and discourse production impairments, few have systematically examined the relationship. Wright, Capilouto, and Koutsoftas (2013) examined the maintenance of global coherence and the relationship between cognitive processes of attention and memory across the lifespan. Results showed impaired maintenance of global coherence in the oldest age group only in tasks and a correlation

between global coherence and selective attention as measured by the Stroop test only for story tasks. Wright et al. (2013) reported that as Stroop scores increased so did global coherence scores for stories. Their findings support the notion that although there is a relationship between the maintenance of global coherence and the cognitive contribution to global coherence, the relationship is discourse task dependent. Further research is needed to better quantify and describe the relationship between cognitive processes and the maintenance of macrolinguistic organization of discourse.

To better understand the underlying cognitive mechanisms contributing to discourse production, two theoretical frameworks may be useful: the limited-capacity model, or resource allocation view, and the inhibitory-deficit model. Both models have been extensively used to describe age-related changes in attention. McDowd and Shaw (2000) claimed that "a limited supply of attentional resources could be allocated to any number of tasks as long as task demands did not exceed available supply" (p. 264). Within the limited-capacity model, the available supply is influenced by a variety of factors, including the goals and complexity of the task. Murray (1999) proposed that the implications of capacity models have ecological importance for individuals with aphasia, as language tasks are often completed in various activities requiring simultaneous processing of and responding to multiple stimuli (see Murray, 1999 for a review of allocation resource theory and aphasia). The same principles can be applied to communication deficits following right hemisphere disorder. Not only do language tasks occur in various activities, generating a narrative, such as telling a story, has been proposed as a multitasking situation itself in which the storyteller must do three things at once. First, a compelling narrative structure must be produced. Second, this structure

must be conveyed in an understandable manner that is syntactically correct and coherent. Lastly, the storyteller must monitor feedback and adjust to the listener (Murray, 1999). Using the limited-capacity framework, the cognitively impaired storyteller faces a choice of how to allocate resources to meet these demands (Wingfield & Stine-Morrow, 2000). Studies examining attention from a resource allocation or limited-capacity framework have employed dual-task experiments, in which decrements in the performance of one task have been taken as an indicator of processing load incurred by a second, concurrently performed task (Chapey, 1974; Kemper, Herman, & Nartowicz, 2005; McNeil et al., 2004; Rogalski et al., 2010).

As an alternative to the limited-capacity model and to account for age-related declines in the ability to ignore irrelevant stimuli, Hasher and Zacks (1988a) offered the inhibitory-deficit model as a replacement for the limited-capacity model. They proposed that much of the decline of cognitive performance in aging could be explained in terms of inefficient inhibition. Selective attention requires two separate mechanisms to be completed concurrently: the enhancement of relevant information and the inhibition of irrelevant information. Hasher and Zacks (1988) proposed that older adults are more vulnerable to distractions because of a weakening of the inhibitory system that occurs with aging. A weakened inhibitory system negatively impacts a person's ability to ignore competing or distracting stimuli, thereby, impacting selective attention. The inhibitory-deficit model proposes that older adults are less efficient in the ability to inhibit the processing of task-irrelevant information, making them more susceptible to interference from irrelevant information (Hasher, Lustig, & Zacks, 2007; Hasher & Zacks, 1988b; Hasher, Zacks, & May, 1999).

Although the literature suggests equivocal findings regarding discourse production deficits following NABI, it is generally agreed upon that individuals with NABI and RHD have some degree of discourse impairment at the macrolinguistic level of discourse. Research on the recovery of communication abilities suggests such improvements in discourse production and communication have a greater impact on community reintegration as compared to improvements in cognitive processes of attention or memory. Yet, the extent to which SLPs address discourse production in their standard clinical practice is not yet known. Duff and colleagues (2002) examined the current practices of speech-language pathologists and treatment of individuals with mild TBI. Clinicians indicated that they targeted less frequently those domains most closely related to discourse (e.g., social skills and pragmatics). Further research is needed to examine the current practices of SLPs who assess and treat individuals with discourse productions deficits following RHD.

The purpose of this dissertation work is threefold: (1) to describe the macrolinguistic level discourse impairments of individuals with RHD; (2) to explore the current practices of speech-language pathologists in the assessment and treatment of individuals with discourse deficits following RHD; and, (3) to investigate the underlying mechanisms contributing to discourse production deficits following RHD.

Specific Aims

Specific Aim 1 examines the maintenance of the macrolinguistic processes of local coherence, global coherence, and cohesion in the narrative discourse between non-aphasic stroke survivors (NABI) (n=10) and healthy controls (HC) (n=10), matched for age, gender, and education, in the context of a personal recount task. Data is extrapolated

from larger studies, one examining discourse across the lifespan and one examining the needs of individuals living with stroke in rural Appalachia. It is hypothesized that the NABI group will demonstrate impaired global coherence in spite of relatively intact local coherence and cohesion.

Specific Aim 2 explores the lived experiences of speech-language pathologists relative to clinical practice for assessing and treating cognitive communication disorders of individuals with NABI, with a particular focus on discourse production deficits. A phenomenological approach of inquiry will be used to explore the question of interest and to further understand the current clinical practice of speech-language pathologists in relation to NABI. Empirical evidence suggests that SLPs do not routinely assess or treat discourse impairments, but a deeper investigation into the clinical decision making of SLPs is needed.

Specific Aim 3 investigates the relationship between selective attention and the maintenance of global coherence following right hemisphere stroke (RHD). First, the study examines the maintenance of global coherence across discourse tasks and genres. It is hypothesized that global coherence scores will be lower in recount tasks. Second, the study examines the relationship between the process of inhibition as measured by performance on the Stroop task in selective attention and the maintenance of global coherence. It is hypothesized that there will be a relationship between inhibition and the maintenance of global coherence. Specifically, higher Stroop scores will correlate with higher mean global coherence scores. And lastly, the study investigates the relationship between selective attention and the maintenance of global coherence using a dual-task experiment. It is hypothesized that there will be a relationship between selective attention

and the maintenance of global coherence in a dual-task experiment. Specifically, there will be lower global coherence scores in the distraction condition than the isolated condition.

Operational Definitions

NABI: This term is used to refer to someone who had a non-aphasic brain injury, either due to traumatic brain injury or stroke. This term is used when the exact location of the stroke or brain injury is unknown.

RHD: This term is used to refer to a right hemisphere stroke or disorder caused by right hemisphere stroke.

Limitations

1. The first study used extrapolated data from larger studies, one examining discourse across the lifespan and one examining the barriers and needs of individuals living with stroke. Therefore, no attempt to control for location, severity, or time post onset of stroke was made.
2. The second study collected data from speech-language pathologists working in Eastern and Central Kentucky. As discourse is significantly influenced by culture, findings may not be generalized to therapists working in other areas.
3. The third study employed a small sample size. Although sample size was consistent with other studies examining discourse production following brain injury, a small sample size may have reduced statistical power to fully examine the relationship between selective attention and global coherence, particularly using the Stroop as a measure of attention.

Delimitations

1. Participants were recruited from a large medical facility in Lexington, Kentucky. The medical facility serves both the Lexington metro area and eastern and south central Kentucky Appalachian region. As discourse has been identified to be culturally dependent, consideration should be taken before generalizing to the general population.
2. Although multiple methods were used to ensure reliability and validity of the results, one researcher and clinician collected and analyzed the majority of the data. For the quantitative studies, 10% of samples were randomly selected for scoring for intra- and inter-rater reliability by a second trained researcher. For the qualitative study, multiple measures were used to triangulate findings and to reduce bias. Each study discusses these methods in detail.

Chapter 2: Literature Review

This chapter provides a pertinent review of the literature regarding discourse production deficits and selective attention in both healthy aging and right hemisphere disorder (RHD). This chapter is organized by research question. Pertinent literature for each research question will be presented. At the conclusion of Chapter 2, a summary of the literature will be provided.

Research Question 1: Do individuals with non-aphasic brain injury (NABI) demonstrated impaired macrolinguistic processes of global coherence, cohesion, and local coherence in narrative discourse in the context of a personal recount?

Discourse can be defined as any language that is beyond the boundaries of isolated sentences and is aimed at conveying a message among communication partners (Ewing-Cobbs et al., 1998; Ulatowska & Olness, 2004). Discourse is a highly complex task that "involves retrieving information from memory, deciding what elements to include or exclude, remembering what has been said, planning upcoming utterances, accounting for what the listeners may or may not know, all while maintaining the topic over time" (Rogalski et al., 2010, p. 212). Although there are variable discourse genres, of particular interest to the current study is narrative discourse. Narrative discourse consists of a sequence of dependent events that develop over time and space and include a beginning, middle and end (Wright & Capilouto, 2009). Narrative discourse is an important part of everyday communication exchanges because narratives are often embedded in conversational exchanges.

Discourse can be analyzed for structure and quality in a variety of ways. Discourse can be analyzed on two levels: the microlinguistic level and the

macrolinguistic level. Discourse at the microlinguistic level is analyzed using *within-sentence* analyses. Brownell (1988) described *within-sentence analyses* as word or sentence level analyses that provide information with respect to informativeness and efficiency of discourse (Nicholas & Brookshire, 1993; Yorkston & Beukelman, 1980), lexical diversity (Duran, Malvern, Richards, & Chipere, 2004), and syntactic complexity (Schneider, Dube, & Hayward, 2005). Discourse at the macrolinguistic level is analyzed by employing techniques for quantifying *between-sentence* processes such as local coherence, global coherence and cohesion. We will discuss these processes in relation to the discourse of individuals with neurological impairments and healthy aging.

Global Coherence

Global Coherence in Healthy Aging

Global coherence refers to the manner in which discourse is organized with respect to an overall goal, plan, theme or topic and is based on the listener's perception of the discourse sample (Glosser & Deser, 1991). Foundational work was completed in a closely related line of research that includes the examination of off-topic speech (OTS) in healthy aging (Arbuckle & Gold, 1993). OTS is defined as extended speech that is lacking in focus or coherence, or speech that begins relevant to the topic but becomes more loosely related (or unrelated) to the topic (Wills, Capilouto, & Wright, 2012). It is believed that OTS increases with healthy aging leading researchers to believe that a specific age-related decline in the ability to inhibit irrelevant thoughts underlies the age-related increase observed in OTS.

Arbuckle and Gold (1993) examined this hypothesis by examining the relationship between cognition and OTS in the discourse of 222 healthy participants.

Participants completed a comprehensive cognitive assessment battery and provided life history narratives that were analyzed for instances of OTS. Results indicated that the older group (73-90 years) performed more poorly on attention measures and had more instances of OTS compared to the younger group (61-72 years). Arbuckle and Gold (1993) concluded that the age-related increase in OTS is associated with age-related declines in selective attention and inhibition, rather than declines in language processing. This finding supports the inhibitory-deficit model proposed by Hasher and Zacks (1988b).

In a similar study, James, Burke, Austin, and Hulme (1998) examined OTS in younger (M = 19.4 years) and older (M = 73.1 years) healthy adults. Participants provided personal narratives (e.g., describe your job, describe a memorable vacation) and three picture descriptions. Results indicated that the older group had more instances of OTS compared to the younger group for the personal narratives. No significant differences for the picture description tasks were present. The presence of increased instances of OTS in personal narratives is of particular interest to the current review. James et al. (1998) hypothesized that personal narratives allow for autobiographical information to invade the participants' thought processes. This supports the inhibitory-deficit model, suggesting a deficit in the restraint mechanism. Participants were unable to prevent emotionally charged and strong but inappropriate responses from gaining control over thoughts.

Trunk and Abrams (2009) reported conflicting results in the OTS of older adults. They examined OTS in younger (18-21 years) and older (75-87 years) healthy adults. Participants provided two personally relevant and autobiographical discourse samples: a

recount (i.e., an episodic memory) and procedure (i.e., an individual's routine). Older adults exhibited significantly more instances of OTS in procedural discourse than younger adults. No age differences were present in the recount task. This result is partially contradictory to the findings reported by James et al. (1998); participants did not have more instances of OTS in personal recount tasks that incorporate personal memories. Although no attempt was made to correlate OTS with measures of selective attention or inhibition, the authors reported that their results did not support the inhibitory-deficit hypothesis.

Wills et al. (2012) examined the decline in attention associated with healthy aging and its relationship to instances of OTS. Thirty participants comprised five age decade cohorts (40s, 50s, 60s, 70s, and 80s). Participants provided three personal recounts (e.g., last vacation, last holiday) and completed two measures of attention, the Stroop and Comprehensive Trail-Making Test (CTMT; Reynolds, 2002). No age-related increases in the instances of OTS were present. Furthermore, attention was not significantly correlated (and no trend emerged) with OTS scores, regardless of cohort. The authors proposed several notions for why they found no age-related declines. First, selective and shifting attention scores were collapsed into one attention score. The authors reported linear trends in Stroop scores showing an age-related decline in selective attention scores. The CTMT scores were more difficult to interpret and no linear relationships emerged. The examination of Stroop scores in isolation may provide useful information for the assessment of the inhibitory-deficit hypothesis. Second, this study used only one discourse task, personal recounts. Although James et al. (1998) proposed that instances of OTS was greater in unconstrained tasks (e.g., personal recount, oral history) compared to

constrained tasks (e.g., picture description, story telling), this study did not examine the within-group performance across tasks.

Glosser and Deser (1992) first measured global coherence in the discourse of middle-aged (46-61 years; M= 51.9) and elderly (67-88 years; M = 76.2) cognitively healthy adults. Participants completed 10-20 minute interviews in which they were asked to describe his or her family and a work experience. The first significant finding indicated that middle-aged adults had higher global coherence scores compared to the elderly adults. The second significant finding was that the middle-aged group had significantly fewer incoherent verbalizations compared to the elderly group, indicating that the middle-aged group abandoned the topic less often and were less tangential than the elderly group. The authors proposed that changes in linguistic performances observed across the lifespan are the result of disruptions in diffuse cognitive processes, rather than language-specific neurocognitive systems. No attempt to examine the role of cognition in the maintenance of global coherence was made.

Marini, Boewe, Caltagirone, and Carlomagno (2005) examined the maintenance of global coherence across the lifespan in cognitive healthy adults. Participants, comprised of five age groups (20-24, 25-39, 40-59, 60-74, 75-84 years), provided single picture and sequential picture description narratives. Results indicated that the oldest group had significantly lower global coherence scores compared to all groups except the young elderly group. Results support the findings of Glosser and Deser (1992), indicating that global coherence declines in healthy aging. No attempt to examine the role of selective attention in the maintenance of global coherence was made.

To our knowledge, Wright, Koutsoftas, Capilouto, and Fergadiotis (2013) were the first to report the cognitive contributions to global coherence in healthy aging. Participants provided discourse samples in the context of stories, personal recounts, and picture description. Older adults (70-87 years; M = 76.9) had lower global coherence scores than younger adults (20-39 years; M = 28.9), although results were task dependent. Correlation analysis revealed that the Stroop task was significantly correlated with global coherence for stories. However, no other correlations were present for recounts and picture description tasks. This finding suggests a relationship exists between selective attention and global coherence, particularly with the inhibitory process of selective attention, although it may be task dependent. Results did not support the work by James et al. (1998); no significant difference in global coherence between groups was present for recounts. The significant difference in stories is interesting. As stories are typically longer, this suggests that global coherence may be more difficult to maintain in lengthy discourse tasks.

Global Coherence Following NABI

Deficits in the discourse of persons with NABI or RHD are thought to be secondary to cognitive impairments, as opposed to a specific language or linguistic impairment. Communication problems in RHD are typically manifested above the sentence level and impact between-sentence processes of discourse, such as global coherence. Studies that have examined the maintenance of global coherence in the discourse of individuals with RHD, TBI, and NABI have been equivocal (Brady et al., 2005; Carlomagno et al., 2011; Hough & Barrow, 2003; Marini et al., 2011; Van Leer & Turkstra, 1999). Van Leer and Turkstra (1999) examined cohesion and coherence in the

narratives of six adolescents with NABI and six cognitively healthy adolescents. Participants provided a description of his or her injury and hospitalization and retold a current event. Discourse samples were scored for local coherence using a 5-point rating scale. Results indicated no statistically significant difference between groups for global coherence. Limitations of the study included small sample size and the use of adolescents, who may be susceptible to more individual differences in global coherence.

In a similar study, Brady et al. (2005) examined the maintenance of global coherence in the narrative and procedural discourse of individuals with RHD. Four discourse samples (three procedural and one picture description task) were collected from 17 individuals with RHD at 1 and 6 months post-stroke and from a healthy control group (n = 41). There was no statistically significant difference in global coherence measures between groups, suggesting that individuals with RHD exhibit global coherence abilities similar to adults without RHD. Caution should be taken when examining these results however, as global coherence was only examined in the context of one narrative task.

Hough and Barrow (2003) examined global coherence, local coherence, cohesion and lexical errors in the narrative discourse of 5 high-functioning individuals with TBI as defined by a score of 6-8 on the Ranchos and 15 healthy young adults. Participants provided personal narratives (i.e., describe his or her family and work experience). Discourse samples were scored for local coherence using a 5-point rating scale. Results indicated that individuals with TBI had relatively intact lexical production and cohesion, but had impairments in local and global coherence scores compared to healthy controls. TBI participants also demonstrated more variability in global coherence scores.

Limitations to this study include small sample size and small number of discourse tasks used. The authors concluded that global coherence is impacted by TBI.

In a similar study, Marini et al. (2011) examined the narrative discourse of 14 individuals with TBI and 14 cognitively healthy adults. Participants completed single and sequential picture description tasks. Discourse was analyzed for the within-sentence processes of productivity, lexical processing, grammatical correctness, and the between-sentence processes of cohesion and global coherence. The TBI group demonstrated reduced cohesion and global coherence, but relatively intact productivity, lexical processing, and grammatical correctness. A clear incongruence between within-sentence processes and between-sentence processes was present, leading the authors to propose a deficit in the interface between cognitive and linguistic processing. NABI participants had more difficulty maintaining coherence and this deficit appeared to be related to cognitive deficits, as opposed to specific linguistic impairments. Similarly, Carlomagno et al. (2011) examined global coherence in the narrative discourse of 10 individuals with NABI and 28 healthy adults. Participants completed single and sequential picture tasks. Results indicated that global coherence scores for NABI participants were significantly lower than healthy controls. These findings suggest that the maintenance of global coherence is impaired following NABI.

Of particular interest to this review, Rogalski et al. (2010) examined coherence using the inhibitory-deficit and limited-capacity models. Local and global coherence in dual-task conditions and the relationship between measures of selective attention and coherence were examined. Local coherence refers to the linkages between individual utterances or propositions in the discourse to maintain the topic from one verbalization to

the next (Glosser & Deser, 1992). Rogalski et al. (2010) hypothesized that participants would demonstrate relatively intact local coherence and reduced global coherence in the dual-task condition and that global coherence would correlate with measures of attention and concentration. Twelve individuals with NABI provided personal narrative discourse samples in single task (talking) and dual task (talking and walking) conditions. Participants provided narrative samples to personally relevant prompts (e.g., "tell me what you like or dislike about the city you grew up in"). During the dual-task condition, global coherence decrements were observed in spite of relatively intact local coherence. This finding supports the limited-capacity model; since global coherence is more cognitively demanding and requires increased effort, it may be more susceptible to decrements in dual-task conditions. When examining the relationship between inhibition and global coherence, no relationship, as measured by the Stroop task, was found. Although results of this study provide insight into the relationship between attention and global coherence following NABI, there were notable limitations. First, the maintenance of global coherence was not compared to a control group of healthy participants. Second, the maintenance of global coherence in various discourse tasks was not examined. This study provided initial empirical evidence for previous hypotheses that attention contributes to the maintenance of global coherence.

Equivocal findings regarding the maintenance of global coherence in healthy aging and following NABI, TBI and RHD may be the result of various inter-study factors. Factors include discourse tasks used, demographic variables (e.g., time post onset, age, severity), and analyses procedures used (e.g., 4-point scale, 5-point scale, questionnaire). Moreover, it is important to examine the maintenance of global coherence

following RHD using a variety of discourse tasks. Based on the findings of others, it would seem that the influence and relationship of selective attention across discourse tasks should also be examined.

Measuring Global Coherence

Researchers have employed multiple methods to assess global coherence in discourse. In their early work, Glosser and Deser (1990) utilized a 5-point scale to assess global coherence. Higher scores were assigned to utterances that were judged to be most on topic, or hold the highest level of coherence. This method was also utilized by Coelho and Flewellyn (2003) when examining global coherence of an individual with aphasia as compared to healthy controls.

Wright, Fergadiotis, Koutsoftas, and Capilouto (2010) developed a 4-point scale to score global coherence in narrative discourse of individuals with and without aphasia. They investigated the reliability of the 4-point scale and 5-point scale as well as the concurrent validity of the 4-point scale. They found that the correlation between the two stories was stronger for the 4-point scale, which may indicate that the 4-point scale was a more reliable measure of global coherence. When examining global coherence of individuals with aphasia, they found that the two scales significantly correlated across the stories, which suggested that the 4-point scale had adequate concurrent validity. Therefore, for the purposes of the present study, the 4-point scale by Wright et al. (2010) is used.

Local Coherence

Local Coherence in Healthy Aging

Glosser and Deser (1992) examined local coherence in the narrative discourse of 14 middle-aged (43-61 years; M = 51.9) and 13 older (67-88 years; M = 76.2) adults in the context of a personal narrative. Participants were asked to describe his/her family and then a work experience from his/her past. Discourse was analyzed for local coherence using a 5-point rating scale. Results indicated that there was no statistically significant difference in the ability to maintain local coherence between younger and older adults, suggesting that local coherence is relatively preserved in healthy aging.

Local Coherence Following NABI

Glosser and Deser (1990) examined local coherence in the discourse of individuals with a variety of neurogenic disorders. Of particular interest to the current study is the discourse production of individuals with closed TBI. Nine individuals with TBI and 17 healthy controls provided personal interview narratives. Discourse samples were scored for local coherence using a 5-point rating scale. Results indicated that individuals with TBI demonstrated impaired local coherence compared to healthy controls. They concluded that the maintenance of local coherence is negatively impacted by TBI.

Van Leer and Turkstra (1999) examined local coherence in the discourse of six adolescents with NABI and six cognitively healthy controls. Participants provided both personal event narrative (i.e., a description of his or her injury and hospitalization) and a current event narrative. Discourse samples were scored for local coherence using a 5-point rating scale. Results indicated no statistically significant difference between groups

for local coherence, although participants had lower coherence ratings in current event narratives compared to personal event narratives.

Hough and Barrow (2003) examined local coherence in the narrative discourse of 5 high-functioning individuals with TBI and 15 healthy young adults (M = 25.6 years). Participants provided personal narratives describing his or her family and work experience. Discourse samples were scored for local coherence using a 5-point rating scale used by Glosser and Deser (1990). Results indicated that individuals with TBI had relatively intact lexical production and cohesion, but had impairments in local coherence scores compared to healthy controls. They concluded that local coherence is impacted by TBI.

Rogalski et al. (2010) examined local coherence in the discourse of individuals with NABI. Local and global coherence in dual-task conditions and the relationship between measures of selective attention and coherence were examined. Rogalski et al. (2010) hypothesized that participants would demonstrate relatively intact local coherence and reduced global coherence in the dual-task condition and that global coherence would correlate with measures of attention and concentration. Twelve individuals with NABI provided personal narrative discourse samples in single task (talking) and dual task (talking and walking) conditions. Participants provided narrative samples to personally relevant prompts (e.g., "tell me what you like or dislike about the city you grew up in"). Results indicated that local coherence was relatively persevered following NABI, even in dual-task conditions. When examining the relationship between inhibition and coherence, no relationship, as measured by the Stroop task, was found. Although results of this study provide insight into the relationship between attention and coherence following NABI,

there were notable limitations. First, the maintenance of local coherence was not compared to a control group of healthy participants and second, the maintenance of local coherence across various discourse tasks was not examined.

Measuring Local Coherence

Like global coherence, researchers have employed multiple methods to assess global coherence in discourse. In their early work, Glosser and Deser (1990) utilized a 5-point scale to assess both local and global coherence. Higher scores local coherence ratings were assigned o verbalizations that continued, repeated, elaborated, or coordinated with the topic in the immediately preceding utterance. This method was also utilized by Coelho and Flewellyn (2003) when examining local coherence of an individual with aphasia compared to healthy controls.

Wright, Fergadiotis, Koutsoftas, and Capilouto (2010) developed a 4-point scale to score coherence in narrative discourse of individuals with and without aphasia. They investigated the reliability of the 4-point scale and 5-point scale as well as the concurrent validity of the 4-point scale. They found that the correlation between the two stories was stronger for the 4-point scale, which may indicate that it was a more reliable measure of coherence. Therefore, for the purpose of the present study, the 4-point scale by Wright et al. (2010) will be used.

Cohesion

Cohesion in Healthy Aging

Few studies have examined the maintenance of cohesion in healthy aging. Glosser and Deser (1992) examined cohesion in the discourse of 14 middle aged (43-61; mean of 51.9 years) and 13 healthy elderly (67-88; mean 76.2 years) adults. Participants provided

narrative discourse samples to the following prompts: description of his/her family and a work experience from his/her past. Results showed no significant difference between groups on the maintenance of cohesion. This suggests that cohesion may not be impacted in healthy aging.

Cohesion Following NABI

In the early work of Mentis and Prutting (1987), cohesion was examined in the conversational and narrative discourse of three individuals with closed head injury and three healthy controls matched for age, sex and education. Of interest to the current study is the maintenance of cohesion in narrative discourse. Participants were asked to describe a current project or work they were doing. In the narrative condition, individuals with closed head injury used fewer cohesive ties than the healthy control group. Furthermore, qualitative analysis showed that the closed head injury group also used different proportions of the varying types of cohesive ties.

Similarly, Hartley and Jenson (1991) examined the maintenance of cohesion in the narrative and procedural discourse of closed head injury adults and healthy controls. Eleven individuals with closed head injury and 21 healthy controls provided both narrative and procedural discourse samples. Narrative discourse was elicited via story retelling and sequential picture description (or comic strip). Like Mentis and Prutting (1987), persons with closed head injury used fewer cohesive ties in both narrative discourse tasks compared to healthy controls.

Davis, O'Neil-Pirozzi, and Coon (1997) also examined the macrolinguistic process of cohesion in the narrative discourse of individuals with right hemisphere dysfunction. Eight individuals with right hemisphere stroke (RHD) and eight healthy

controls provided discourse samples elicited from both sequential picture tasks (cartoon sequences) and auditory story retelling tasks. Their results indicated that individuals with RHD did not differ from healthy controls in the number of cohesive ties produced but differed in the cohesion ratio. Furthermore, this was also discourse task dependent as lower ratios were produced in the retelling condition and not in the sequential picture description condition.

In contrast to the previous studies, Coelho (2002) examined cohesion in the discourse of 55 individuals with closed head injury and 46 healthy controls in the context of a story retelling task (i.e., 19 frame filmstrip) and a story generation task (i.e., Norman Rockwell painting, The Runaway). Researchers tallied the number of complete cohesive ties, incomplete cohesive ties, and cohesion errors. The primary dependent variable was cohesive adequacy which was calculated as the percentage of complete ties out of total number of cohesive ties. Results showed no statistically significant difference in cohesive adequacy between groups.

Like the previous study, Hough and Barrow (2003) examined the discourse abilities, particularly the maintenance of coherence and cohesion, of five individuals with traumatic brain injury. In this study, participants were asked to provide a family description and work experience. Each participant's performance was reviewed individually and findings were compared to the mean performance of a group of 15 healthy controls. Results revealed that the maintenance of cohesion was relatively spared in the discourse of individuals with traumatic brain injury.

Marini et al. (2011) examined cohesion in the narrative discourse of 14 individuals with traumatic brain injury and 14 healthy controls. Discourse tasks included

single and sequential picture description. Cohesion was measured by tallying the number of cohesive errors and dividing this by the number of utterances produced. Results indicated that the traumatic brain injury group produced significantly more cohesive errors. However, their calculations also included abrupt interruptions of utterances and when these were omitted from calculation, there was no statistically significant difference between groups.

Measuring Cohesion

To complete cohesion analyses, methods employed by Wright et al. (2012) were employed. Each utterance was evaluated for the presence of complete grammatical and lexical ties, incomplete ties, and errors. A complete cohesive tie was defined as a linguistic marker that binds C-units together to create an unedified narrative. An incomplete tie occurs when the cohesive marker is not presented within three utterances of the target. A cohesive error occurs when the wrong cohesive tie was used. To compute an overall score, an additive cohesion score for each of the three calculations and was then divided by the number of C-units in the utterance.

Taken together, the literature remains equivocal regarding the maintenance of cohesion in the narrative discourse following NABI. Like with coherence, these differences may be to different research methodologies employed. First, several studies have reported varying levels of cohesion maintenance across discourse tasks. Future studies should examine the maintenance of cohesion across discourse tasks and those discourse tasks should be ecologically valid. Picture description is often used both by clinicians and researchers, but may not be the most ecologically valid method of discourse production as we rarely describe pictures in everyday conversational

exchanges. Second, differences in results across studies may also be due to varying methods of calculations. For example, Marini et al. (2011) calculated the number of cohesive errors while Coelho (2002) examine the proportion of complete cohesive ties.

Discourse Elicitation Methods

A variety of measures have been employed to elicit narrative discourse production. It is important to consider discourse genre when analyzing discourse and making synthesizing information across the literature. Genres are defined by Eggins and Martin (1997) as "different ways of using language to achieve different culturally established tasks" (p. 9). Therefore, researchers and clinicians should be cautioned from comparing data based on different genres due to the likelihood of significant variability. Common discourse genres and elicitation tasks, both in research and clinical practice, include picture description, stories, and recounts.

Picture description tasks require participants to describe either a single scene (Capilouto, Wright, & Maddy, 2016; Cooper, 1990; Mackenzie, 2000; Mackenzie, Brady, Norrie, & Poedjianto, 2007; Marini et al., 2005) or a six-frame cartoon sequence of pictures (Capilouto, Wright, & Wagovich, 2005; Capilouto et al., 2016; Duong, Giroux, Tardif, & Ska, 2005). Picture description tasks are commonly used in assessments because such tasks provide a standardized approach to language sampling (Cooper, 1990). The use of the picture description allows the clinician to control for the complexity of the language sample across all participants and across groups (Mackenzie et al., 2007). Of particular interest for the clinical setting is that picture description allows a clinician to assess change in discourse performance across time, such as pre- and post-treatment (de Lira, Ortiz, Campanha, Bertolucci, & Minett, 2011). It is also thought that

the use of picture description allows the clinician to control for memory or attention deficits as the speaker is provided a visual scaffold to build the discourse sample. However, persons with mild discourse impairments due to underlying cognitive deficits may not be susceptible to impairments in discourse when elicited via picture description, as attention and memory demands are limited and controlled.

Recounts are verbal reiterations of an event and are commonly used to elicit discourse production. The structure of narratives includes the use of past tense, first and/or third person, and usually temporal sequencing (Bliss & McCabe, 2006). Eliciting personal recounts provide ecological validity, as personal recounts are thought to reflect functional communication as speakers often embed personal narratives in every day conversations. Bliss and McCabe (2006) suggest that the advantages of personal recounts include that they enable clinicians to assess how a speaker plans, sequences and organizes a text while also being motivating to the speaker as he or she is communicating novel information.

Story telling tasks are highly fictionalized and structured narratives in which participants are asked to tell a story using wordless picture books (Bliss & McCabe, 2006). Typically, during story telling tasks, the examiner will demonstrate the task using a wordless picture book. Then, the examiner allows the participant to take a look through the book, get a sense of the story and then tell a story that coincides with the pictures. Stories also elicit longer discourse samples. However, it has been suggested that memory and cognitive demands are low as participants have access to the picture throughout the discourse task (Bliss & McCabe, 2006).

Research Question 2: What are the lived experiences of speech-language pathologists relative to current clinical practice for assessing and treating cognitive communication disorders of individuals with non-aphasic brain injury (NABI), with a particular focus on discourse production deficits?

Discourse production deficits following NABI have been identified in the above literature review, but do vary person to person based on discourse genre and analyses procedures. What is not clear is how speech-language pathologists are addressing these deficits in their everyday assessments and interventions. Few researchers have examined the current practices of speech-language pathologists related to their assessment and treatment practices. Duff, Proctor, and Haley (2002) surveyed a cohort of speech-language pathologists to identify their assessment and treatment practices when working with individuals with mild TBI. They provided a list of 26 standardized or formal assessment measures typically used by speech-language pathologists and participants were asked to rank the tools in the order of frequency of use. The three most commonly used instruments are the Ross Information Processing Assessment, the Boston Diagnostic Aphasia Examination, and the Boston Naming Test. This finding points out that of the three most commonly used assessment tools, two were designed and standardized to measure the discourse of individuals with aphasia as opposed to the discourse of individuals with mild TBI or RHD. Routine use of such assessments then, might not be a valid way to assess the cognitive communication deficits of individuals with TBI (Duff et al., 2002).

Aphasia assessment batteries focus on language production at the word and sentence level, and do not provide a systematic assessment of between sentence level

processes of discourse, such as cohesion and coherence, which are more commonly impacted by acquired brain injury. Turkstra, Coelho, and Ylvisaker (2005) proposed that using standardized assessments to evaluate discourse production deficits following acquired brain injury may result in an overestimation of communicative performance due to the limited scope and ceiling effect of aphasia batteries, which were not intended to assess subtle deficits common following acquired brain injury.

In a similar study, Turkstra et al. (2005) gathered data from speech-language pathologists and reported that clinicians predominately used standardized assessments designed for individuals with aphasia or dementia when assessing individuals with brain injury. Although the standardized measures may be useful for identifying general cognitive and linguistic deficits in this population, they may not inform the nature of the individual's communication in daily situations. Furthermore, of particular interest to the current study, thirteen percent of participants reported using self-devised assessment tools, included checklists, that evaluated areas such as information sequencing, memory, problem-solving, orientation, mental calculations, attention, reading/writing, and pragmatics. Interestingly, there was no mention of any assessment focused on discourse production.

In regard to treatment, Turkstra et al. (2005) found that when describing treatment practice, respondents reported that they emphasized the following areas (in order of frequency): 1) memory, 2) attention, 3) reasoning and problem-solving, 4) executive function, 5) vocational skills, 6) social skills and pragmatics, 7) speech production, 8) reading, and 9) writing. It is important to note that there was no mention of discourse production abilities. Although the aforementioned areas are important for the recovery of

cognitive skills that may be critical for return to home safely following brain injury, ignoring discourse production skills in therapy has the potential to negatively impact a person's ability to return to previously held social and vocational roles. Functional outcome studies have proposed that recovery of discourse abilities is critical to achieving a good quality of life following stroke (Clarke, Marshall, Black, & Colantonio, 2002; Mackenzie & Chang, 2002). Communication impairments often persist into the chronic stages of recovery and can cause individuals to withdraw from social situations. Discourse production deficits may not always be apparent in basic communicational interactions, but become more apparent in complex, extended conversation particularly following RHD (Glosser, 1993). Therefore, deficits are not easily identified and may be more likely to be identified in the chronic stages of recovery.

Research Question 3: For individuals with right hemisphere stroke, are selective attention abilities correlated with the maintenance of global coherence across narrative discourse tasks?

As described above, the disruption of the macrolinguistic level of discourse in persons with non-aphasic brain injury has been attributed to deficits in cognitive processes, such as attention. Many researchers have suggested that selective attention is a critical component of various discourse processes, including global coherence (Glosser & Deser, 1992; Marini et al., 2011; Van Leer & Turkstra, 1999); however, few have systematically examined the relationship (Arbuckle & Gold, 1993; Gold, Andres, Arbuckle, & Zieren, 1993; Rogalski et al., 2010; Wills et al., 2012; Wright et al., 2013). Attention can be operationalized as a cognitive process or mechanism that concentrates mental effort on an external stimulus or an internal representation or thought (Peach &

Shapiro, 2012). There are multiple levels of attention, which are thought to be hierarchical in nature. In order to maintain higher levels of attention, such as *divided attention* or *alternating attention*, one must be able to demonstrate competency with lower level attention tasks, such as *sustained attention* and *selective attention* (Brookshire, 2003). Of particular interest to this review is the lower level task of selective attention.

Selective attention refers to the ability to restrict distraction. A person must be able to attend to relevant information and ignore irrelevant information in order to complete higher order cognitive tasks, whether voluntarily or involuntarily (O'Donnell, 2002). A prominent aspect of selective attention is the ability to make fast decisions between relevant and irrelevant features of a task (Sturm et al., 2011). Declines in selective attention have been documented in healthy aging and many neurogenic communication disorders, including stroke (Brookshire, 2003; Chapey, 2008; Sturm, Schnitker, Grande, Huber, & Willmes, 2011).

Theoretical Frameworks for Age-Related Declines in Selective Attention

Declines in selective attention in healthy aging are well documented in the literature (for a review see Craik & Salthouse, 2007). As attention processes are involved in a range of cognitive functions, deficits will undoubtedly have a mixture of functional consequences. Possible impairments might include difficulty completing activities of daily living (e.g., driving, cooking) and disordered communication (Craik & Salthouse, 2007), both of which would negatively impact a person's ability to live independently in his or her home and community. Several theoretical models have been developed to describe the age-related changes observed in selective attention abilities. This review will

focus specifically on the *limited-capacity model* and the *inhibitory-deficit model*. These models provide a theoretical framework for the examination of the influence of selective attention on the maintenance of global coherence in particular on narrative discourse performance.

Limited-Capacity Model

The limited-capacity model, or resource allocation view of attention provides a useful framework for the examination of selective attention deficits in healthy aging and cognitively disordered populations. Within this model, the terms attention, resources, capacity and cognitive effort are used interchangeably to refer to the driving mechanism or activation for cognitive operations. Kahneman (1973) first provided a conceptualization of attention as a processing source for other cognitive processes. Specifically, the maintenance of attention was deemed necessary to complete higher-level cognitive processes, such as the organization of the macrolinguistic level of discourse production. Kahneman proposed that attention is limited in capacity, and that its availability and allocation are influenced by a variety of factors, including the goals and complexity of the task. For example, "a limited supply of attentional resources could be allocated to any number of tasks as long as task demands did not exceed available supply" (Murakami et al., 2014, p. 264).

In a capacity limited system, if both the primary task and the secondary and competing task rely on a common reservoir of resources, performing the tasks concurrently may drain or exceed available resources and cause performance decrements. Kahneman (1973) proposed that interference may be involved in this phenomenon. Interference refers to the presence of irrelevant external or internal stimuli that hampers

the processing of task-specific relevant information. Interference between tasks occurs due to the insufficient response of the system to demands and to the narrowing of attention when effort is high. Interference will occur even when the total load on the system is far below total capacity. However, the amount of interference is an increasing function of the cognitive load. At low values of cognitive load, there may be little or no interference between tasks. Within this model, attentional capacity is elastic and varies both within and among individuals. Allocation is regulated by factors such as the novelty of the task, the intent to attend to a specific task, and arousal level. Arousal level can be high when there is time pressure involved or low when a person is fatigued.

The limited-capacity model has been used to describe age-related changes in attention. It has been proposed that as people age, their cognitive resources decline. Hasher and Zacks (1979) suggested that a prominent feature of healthy aging is a reduction in attentional capacity in older individuals. An important component of this model is that different operations require more resources and this drains resources from other operations completed concurrently. Not only do older adults have reduced resources, they also have more difficulty allocating those resources. As attentional capacity declines in healthy aging, little impact on the automatically occurring processes is expected. A larger impact on intentional and more cognitively demanding tasks, such as discourse, would be expected.

Murray (1999) proposed that the implications of capacity models have ecological importance for individuals with aphasia, as language tasks are often completed in various activities requiring simultaneous processing of and responding to multiple stimuli (see Murray, 1999 for a review of allocation resource theory and aphasia). The same

principles can be applied to communication deficits following right hemisphere disorder. Not only do language tasks occur in various activities, but telling a story or narrative has been proposed as a multitasking situation itself in which the storyteller must do three things at once. First, a compelling narrative structure must be produced. Second, this structure must be conveyed in an understandable manner that is syntactically correct and coherent. Lastly, the storyteller must monitor feedback and adjust to the listener. Using the limited-capacity framework, the older or cognitively impaired storyteller faces a choice of how to allocate resources to meet these demands (Wingfield & Stine-Morrow, 2000).

Inhibitory-Deficit Model

Rabbitt (Rabbitt, 1965; Rabbitt, 1968) first identified age-related declines in the ability to ignore irrelevant stimuli in visual search tasks. Based on this seminal work, Hasher and Zacks (1988) offered the inhibitory-deficit model as a replacement for the limited-capacity model. They proposed that much of the decline in cognitive performance seen in healthy aging could be explained in terms of inefficient inhibition. Selective attention requires two separate mechanisms to be completed concurrently: the enhancement of relevant information and the inhibition of irrelevant information. Hasher and Zacks (1988) proposed that older adults are more vulnerable to distractions as a result of a weakening of the inhibitory system that occurs with aging. A weakened inhibitory system negatively impacts a person's ability to ignore competing or distracting stimuli, thereby, impacting selective attention. The inhibitory-deficit model proposes that older adults are less efficient in the ability to inhibit the processing of task-irrelevant

information, making them more susceptible to interference from irrelevant information (Hasher et al., 2007; Hasher & Zacks, 1988b; Hasher et al., 1999).

To understand the inhibitory-deficit model, it is important to understand the neurobiological control of inhibition. It is well accepted that the frontal lobe is highly involved in the process of inhibition (Dempster, 1992; Stuss, 1992; West, 1996). Previous research indicates that age-related structural changes occur earlier and more rapidly in the frontal lobes than in other parts of the cortex and that cognitive functions that are supported by the frontal lobe may be the first to decline (Shilling, Chetwynd, & Rabbitt, 2002). Kramer, Humphrey, Larish, Logan, and Strayer (1994) suggested that there are various inhibitory systems in the brain that decline in efficiency at different rates during healthy aging. However, it is the mechanisms served by the prefrontal cortex that appear to be more sensitive to effects of normal aging than the posterior cortex. Therefore, inhibition may be impacted earlier than other cognitive processes.

To explain the role of inhibition in attention, Hasher and Zacks (1999) identified three different mechanisms that may play central roles in inhibition and selective attention: *access, deletion,* and *restraint.* To meet the aims of the current review, the mechanisms are introduced and their function to discourse production described. See Hasher et al. (2007) for a comprehensive review of the three mechanisms.

Access: Early in the inhibitory processing sequence, inhibition functions to prevent irrelevant information from gaining access to the focus of attention. Access is responsible for directing attention to the specific goal or stimuli by suppressing distracting or irrelevant elements from entering consciousness. When efficient, all irrelevant representations are suppressed and the contents of consciousness will be

narrowly tied to task-oriented goals. Deficits in access control allow distraction to influence the processing of intended stimuli and reduces enhancement of relevant information. Previous research showing that older adults have more difficulty in differentiating visual or auditory targets amidst distraction offers support to suggest that access is impaired in healthy aging (Hasher et al. 2007).

Deletion: The next mechanism in the inhibitory processing sequence is deletion. Inhibition also serves to delete irrelevant information from the focus of attention. Deletion is critical for removing irrelevant representations from the focus of attention as to enable efficient processing of goal-directed information. Deletion also removes once-relevant information that is no longer relevant to the task at hand because of a change in goals, context, or situational demands. This is particularly relevant to conversational discourse, as there is a constant shifting between communication partners. Not only do older adults demonstrate impairments with allowing irrelevant information to gain access, they also show a reduced ability to delete irrelevant information. As information no longer becomes relevant, such as a topic change in conversation, a person with reduced deletion would have difficulty shifting topics and may perseverate on previous topics or conversational goals.

Restraint: The last mechanism in the inhibitory process is restraint, which is the inhibitory mechanism that controls strong responses. The ability to control strong responses can come into play in tasks requiring retrieval of detailed information when a strong response is triggered by a cue or context. Restraint function serves to prevent strong but inappropriate (to the situation) responses from gaining control over thoughts. This allows for the consideration of weaker but more relevant responses (Murakami et

al., 2014). The mechanism of restraint could describe the process of preventing emotionally charged memories or ideas to enter discourse production when not relevant to the topic at hand.

To examine the inhibitory-deficit model, Hasher et al. (1991) compared the ability of 30 younger (18-24 years; *M* = 19.4) and older (62-74 years; *M* =67.9) adults to suppress irrelevant information in the context of a letter naming procedure. Older adults made more errors in letter naming and demonstrated slower reaction times than younger adults. Across experimental tasks, there was an absence of a detectable suppression effect for older adults, indicating that older adults did not inhibit irrelevant information to the same extent of younger adults. Furthermore, older adults showed no carryover effect of their exposure to a distracting stimulus on a subsequent naming trial. This finding suggests that there are age-related differences in the mechanisms involving inhibition that are thought to underline selective attention. Findings support Hasher and Zacks (1988) theory that age differences in inhibition are present at the level of selective attention. Using the same letter-naming task, Stoltzfus, Hasher, Zacks, Ulivi, and Goldstein (1993) examined age-related inhibition and selective attention and reported similar results; older adults consistently demonstrated reduced inhibition and suppression when compared to younger adults.

The inhibitory-deficit model has also been examined in the context of language tasks. Carlson, Hasher, Connelly, and Zacks (1995) examined selective attention and inhibition of 32 younger (17-22; *M* = 18.2) and older (62-75 years; *M* = 68.8) healthy adults in a reading task. Results indicated that older adults had reduced inhibition in reading tasks when distracting information was present. This effect was magnified when

the surrounding and distracting information was linguistic in nature. Morrone, Declercq, Novella, and Besche (2010) examined the inhibitory-deficit model in a metaphor task. The inhibitory capacity of younger (21-30 years; $M = 24.5$) and older (65-75 years; $M = 70$) adults was compared. Results indicated that older adults had more difficulty with inhibiting memories and personal interpretations that were unrelated to the task at hand. This finding is of particular interest to the current review as older adults may have more difficulty inhibiting the sharing of memories and personal experiences in discourse tasks, when not relevant to the discourse topic or goal. This suggests an age-related decline in the restraint mechanism.

The hypothesis concerning the decline of inhibitory processes with aging has been the catalyst for much research, but no clear consensus has been reached. One explanation for the equivocal literature is that *all* of the inhibitory processes and mechanisms do not decline with age. For example, automatic selective attention, which is triggered by the presence of salient stimuli in the environment, may not be as susceptible to age-related declines as voluntary selective attention (Kane, Hasher, Stoltzfus, Zacks, & Connelly, 1994; Kar & Srinivasan, 2013). Despite its criticisms, the inhibitory-deficit model provides a framework for the examination of selective attention and its relationship to discourse in the healthy aging and neurologically impaired population.

Proposed Model for The Examination of Global Coherence Following RHD

Based on the theoretical relationships proposed a model is proposed to explain the impact of selective attention deficits and the impact on global coherence following RHD (see Figure 2.1). Hasher and Zack's (1988) inhibitory-deficit theory is applied to the RHD population. This theory has been a highly successful tool for generating interesting

experimental work in language and aging. Damage to the right frontoparietal region of the brain will result in reduced neuronal firing necessary for the enhancement of relevant information and inhibition of irrelevant information. Specifically, it is proposed that decreased inhibition of irrelevant utterances will result in global coherence decrements. To assess this hypothesis, assessments of inhibition, such as the Stroop task, should be correlated with measures of global coherence in a variety of discourse tasks.

To assess the limited-capacity model and its impact on selective attention and global coherence following RHD, the proposed model should be tested under dual-task conditions. Since communication interactions rarely occur in isolation and without distraction, the examination of global coherence in dual-task conditions can provide ecological validity. It is expected that selective attention will be impacted by concurrently performed cognitively demanding tasks. Specifically, as tasks increase in complexity, the resources required for inhibiting irrelevant information will be reduced. This decrement will result in impaired maintenance of global coherence. Global coherence measures should be compared between a single-task condition (e.g., speaking) and dual-task condition (e.g., reading, listening to spoken language), and dual-tasks should be systematically and independently manipulated for difficulty level.

On a larger scale, it is predicted that the maintenance of global coherence will have a direct impact on a person's communicative competence. By definition, global coherence is based on the listener's perception of the overall meaning of the discourse. It has been identified as an important indicator of communicative competence (Olness & Ulatowska, 2011). Communicative competence is highly crucial in the ability to reintegrate into the community and for one to resume previously held roles and

responsibilities. Therefore, it is proposed that deficits in global coherence will negatively impact communicative competence, which will negatively impact a person's ability to reintegrate into his or her community. When examining discourse production, it is impossible to fully separate the left hemisphere and right hemisphere contributions. Finally, it is important to consider individual variability. Individual variation occurs in extralinguistic (e.g., intonation, prosody) and personal factors (e.g., education, cultural variation, communication style), which have also been accounted for in the proposed model.

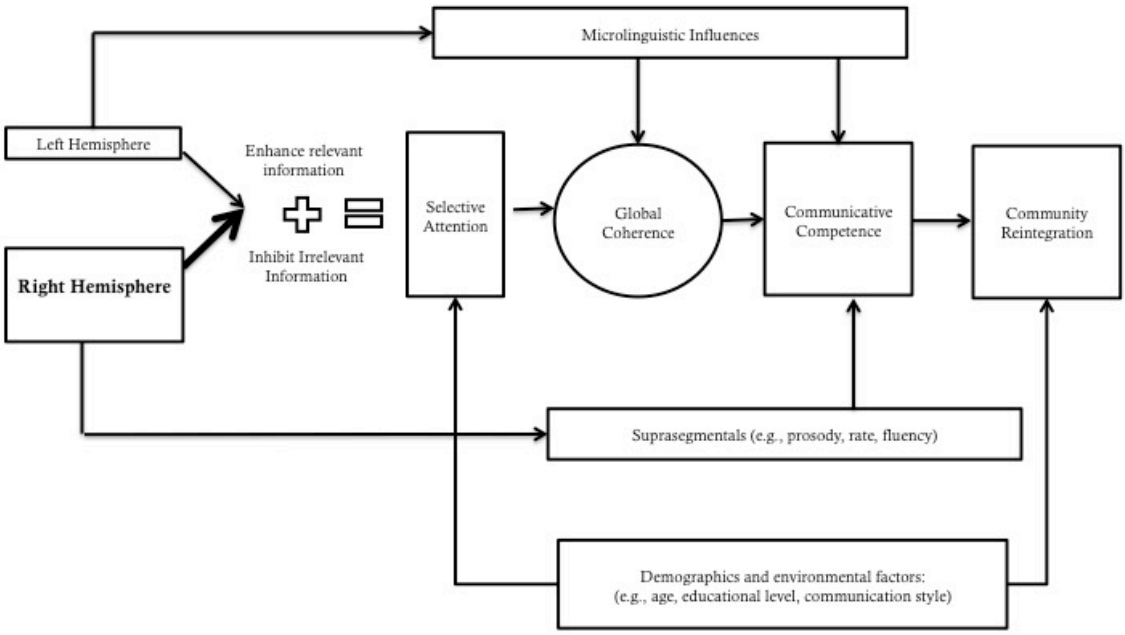


Figure 2.1 Proposed model to assess the impact of selective attention on global coherence in discourse of individuals with RHD.

Chapter 3: Coherence and Cohesion in the Recounts of Individuals with Non-Aphasic Brain Injury

Background

Discourse can be defined as any language that is beyond the boundaries of isolated sentences aimed at conveying a message among communication partners and can be analyzed across multiple levels (Duong et al., 2005). Analyses at the microlinguistic level refer to *within-sentence* processes (e.g., amount of information conveyed, grammatical complexity, and lexical diversity) (Glosser & Deser, 1990). Microlinguistic deficits are prevalent in the discourse of individuals with aphasia. Analyses at the macrolinguistic level refer to the *between-sentence* processes that establish relationships between linguistic elements (e.g., coherence, cohesion and main ideas) and relate to pragmatic and discourse-level aspects of language production (Glosser & Deser, 1990). Macrolinguistic deficits are more prevalent in the discourse of individuals with non-aphasic brain injury (NABI), secondary to brain injury or stroke, although previous research has been equivocal. The current study focuses on the maintenance of macrolinguistic processes following NABI secondary to stroke; specifically, local coherence, global coherence and cohesion. Figure 3.1 demonstrates the relationships between the three processes.

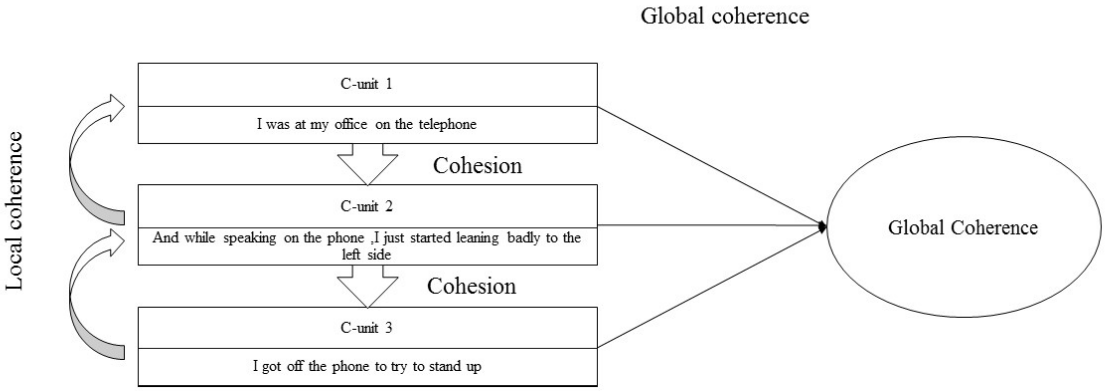


Figure 3.1 Working Model Demonstrating the Relationship Between the Macrolinguistic Processes of Local Coherence, Cohesion and Global Coherence

Coherence is the appropriate maintenance of some aspect of the topic within the discourse based on the listener's impressions of meaning. The term coherence has been used to describe the organizational aspects of discourse at the suprasentential level (Glosser & Deser, 1990). Coherence can be analyzed on two levels; local and global. *Local coherence* refers to the ability of a speaker to maintain the topic from one verbalization to the next (Glosser & Deser, 1990). Local coherence is established through the use of repetition, continuation, elaboration, subordination, or coordination with the topic in the immediately preceding verbalization. The following is an example of good local coherence:

This past weekend I went to Applebee's for happy hour

So that was fun

In this example, local coherence is considered to be achieved because "that" serves as a lexical tie to refer to the main idea conveyed in the previous utterance (I went to Applebee's for happy hour) and "so" provides transitional verbiage between the two utterances. On the contrary, if the participant followed the first utterance with "it's nice to

eat lots of greasy food for cheap," this would be considered poor local coherence because there are no significant lexical ties or transitional verbiage to connect the utterance to the preceding utterance.

Global coherence refers to how verbalizations throughout the discourse sample relate to the topic and contribute to the overall goal or meaning and is based on the listener's perception of the discourse (Glosser & Deser, 1990). Higher global coherence ratings are assigned to verbalizations which provide substantive information to the designated topic. The following is an example of good global coherence following a request to describe their last vacation:

We traveled to the Smoky Mountains

And we went hiking and mountain biking

These utterances would be considered a representation of good global coherence maintenance because they are overtly related to the stimulus. Responses such as "the weather is so bad in the fall" would be considered poor maintenance of global coherence since it is not overtly related to the prompt or topic.

Cohesion refers to the specific relations of meaning between elements within discourse. Cohesion occurs when there are connections made between parts of a discourse sample via specific cohesive ties (e.g., pronouns, conjunctions) (Halliday & Hasan, 1976). Glosser & Deser (1990) described cohesive ties as "the 'glue' which binds the individual elements together to achieve the impression of coherence (p. 70)." The following is an example of good cohesion:

Last Thanksgiving, we went to visit our son who lives in San Diego

And he took us to see a football game on Thanksgiving Day.

In this example, cohesion between the two utterances is obtained by use of the grammatical cohesive tie of "and" and the lexical ties of "he" and "Thanksgiving." If the speaker used the pronoun "she," it would be a cohesive error since she is a feminine pronoun and so would not refer to 'son'.

Studies examining the maintenance of local coherence, global coherence and cohesion following NABI have reported equivocal findings. Hough, Glosser and Deser (1990) examined the discourse of individuals with fluent aphasia, Alzheimer's disease, closed head injury, and normal controls. Of interest to the present study are the results specific to discourse production of individuals with closed head injury and their controls. Participants were prompted to describe his/her family and then a work experience (recount) from his/her past. Results indicated that individuals with closed head injury and healthy controls did not differ significantly in their use of cohesive ties to achieve narrative cohesion. However, the closed head injury group demonstrated impaired local and global coherence compared to healthy controls. Furthermore, participants with closed head injury had more difficulty maintaining global coherence than local coherence.

Hough and Barrow (2003) examined the discourse abilities of individuals with TBI and reported similar findings. Participants were asked to provide a family description and a work experience. Each participant's performance was reviewed individually and findings were compared to the mean performance of a group of 15 healthy controls. Similar to Glosser and Deser (1990), cohesion was relatively spared in the presence of coherence deficits. Results revealed that mean coherence ratings for the TBI group were consistently lower than the healthy control group and that TBI participants demonstrated greater difficulty maintaining global coherence than local coherence.

Studies focused on the maintenance of cohesion in discourse have also reported equivocal findings. Liles et al. (2010) examined cohesion in the discourse production of participants with non-aphasic closed head injury (CHI) across tasks, and found participants had impaired cohesion in story generation tasks but not in story retelling tasks. While several authors reported relatively spared cohesion, several studies have reported impaired cohesion following brain injury. For example, Davis, O'Neil-Pirozzi, and Coon (1997) examined cohesion in the narrative discourse of individuals with right hemisphere dysfunction. Eight individuals with right hemisphere stroke (RHD) and eight healthy controls provided discourse samples elicited from both sequential picture tasks (cartoon sequences) and auditory story-retelling tasks. In the auditory story-retelling task, the examiner read a story and then prompted the participant to retell the story as completely as possible. Results indicated that individuals with RHD did not differ from healthy controls in the number of cohesive ties produced but the 2 groups did differ in the cohesion ratio, which was computed as the number of complete ties relative to the number of clear elements produced. The RHD group had significantly lower cohesion ratios compared to the healthy control group. The difference in cohesion ratios was discourse task dependent; lower ratios were produced in the retelling condition and not in the sequential picture description condition.

Davis and Coelho (2004) also examined cohesion in the narrative discourse of individuals with closed head injury and healthy controls. Participants generated six narratives in three experimental conditions: cartoon-sequence (sequential pictures), story retelling in absence of picture stimulus, and story retelling in the presence of pictures. The participants with closed head injury produced significantly fewer cohesive ties as

compared to the healthy control group in the cartoon-sequence with visual stimulus present and the auditory-oral retelling task conditions. However, there was no significant difference in number of cohesive ties used in the story retelling in absence of visual stimulus condition between groups. Furthermore, participants with CHI produced significantly more ties in retelling tasks. This suggests that there are differences in the maintenance of cohesion but that it may be narrative task dependent. Similar results were reported by Hartley and Jensen (1991). Hartley and Jenson (1991) examined the maintenance of cohesion in the narrative and procedural discourse of closed head injury adults and healthy controls. Eleven individuals with closed head injury and 21 healthy controls provided both narrative and procedural discourse samples. Of interest to the present study is the narrative discourse samples, elicited via story retelling and sequential picture description. Participants with closed head injury used fewer cohesive ties in both narrative discourse tasks compared to healthy controls.

Taken together, these studies suggest that there is disparity in reported findings relative to the maintenance of local coherence, global coherence and cohesion in the discourse of individuals with NABI. Therefore, the aim of the present study was to compare local coherence, global coherence, and cohesion of individuals with NABI and healthy controls, matched for age, gender, and education, in the context of a personal recount narrative.

Methods

The discourse productions of 10 individuals with NABI and 10 healthy controls (HC) matched for age, gender, and education, were analyzed for the macrolinguistic processes of local coherence, global coherence and cohesion. Data used in the present

study were taken from two larger studies. Data from individuals with NABI was extrapolated from narrative interviews investigating needs and barriers of individuals living with stroke in rural Appalachia. Data from the healthy control group were taken from a larger study investigating discourse processing in healthy adults across the lifespan.

Participants

Participants in the healthy control group met the following inclusion criteria per self-report: (1) hearing within functional limits as measured by the CID List of everyday speech; (2) native English speakers as documented by self-report; (3) negative history for neurodegenerative disease (e.g., Alzheimer's or Parkinson's) per self-report as well as measured by a scaled score of 30 or above on the *Mini-Mental Status Examination* (MMSE; Folstein & Folstein, 2002); (4) vision within functional limits, aided or unaided, as indicated by passing a vision screening; and, (5) no history of previous neurological condition (e.g., brain injury, stroke). NABI participants had a history of a previous stroke and did not present with aphasia, per self-report and confirmed by a certified speech-language pathologist who listened to audio-recorded interviews in their entirety. Table 3.1 provides demographic information for the study population.

Table 3.1
Means (SD) of Demographic Variables of Interest

	Study Population	
Variables of Interest	NABI N = 10	HC N = 10
Gender (M:F)	6:4	6:4
Mean age (years)	65.3 (14.3)	66.0 (13.9)
Mean education (years)	14.3 (3.3)	14.9 (3.5)

Tasks and Language Measures

To meet the aims of the study, participants provided a personal recount narrative; specifically, an illness story. Recounts are verbal reiterations of an event and are commonly used to elicit discourse production. The structure of narratives includes the use of past tense, first and/or third person, and usually temporal sequencing (Bliss & McCabe, 2006). Personal recounts provide ecological validity, as they are thought to reflect functional communication since speakers often embed personal narratives in their everyday conversations. Bliss and McCabe (2006) suggested that the advantages of using personal recounts to elicit narratives include the fact that they enable clinicians to assess how a speaker plans, sequences and organizes a text while also being motivating to the speaker as he or she is communicating novel information.

Discourse samples were audio or video recorded and transcribed orthographically. The healthy control group completed the study protocol in a quiet research laboratory and was asked to describe a recent illness or injury. The NABI group provided the discourse sample in the context of a semi-structured, qualitative interview examining the lived experiences of individuals living with stroke and was asked to describe their experience having their stroke. Following data collection, discourse samples were segmented into C-

units (Loban, 1976b). A C-unit is a communication unit and is commonly used to segment oral discourse samples (Loban, 1976). A C-unit includes an independent clause and all its modifiers. The following is an example of C-unit segmentation:

Pre-c-unit segmented sample

There's a family of mice that live in a house in the forest and one day they decide to pack everyone up a large family of mice into the truck and go out for a picnic the whole family.

C-unit segmented

1. There's a family of mice that live in a house in the forest.
2. And one day they decide to pack everyone up a large family of mice into the truck and go out for a picnic the whole family (Wright & Capilouto, 2009, p. 1299)

Linguistic Measures

Researchers followed a multi-step training protocol prior to scoring transcripts to ensure adequate inter- and intra-rater reliability. Prior to scoring, the researchers reviewed all discourse scoring procedures, including previously scored transcripts that had been marked up indicating scores and rationale for scores for all analyses. Next, analyses were performed on two transcripts. Researchers compared their results to previously scored transcripts for the same discourse samples. Agreements and disagreements were then identified and discussed. Once the researchers were in 100% agreement with the previously scored transcripts, training was considered complete.

Local coherence. To calculate local coherence, a four-point rating scale developed by Wright and Capilouto (2009) was used. The 4-point scale has been shown

to be a valid and reliable tool for measuring coherence (Wright et al., 2013). The rules for scoring local coherence are presented in Table 3.2. Each C-unit is provided a score of 1 to 4. Overall local coherence scores are determined using the following formula: (additive local coherence score / # of C-units).

Global coherence. To calculate global coherence, a four-point rating scale developed by Wright & Capilouto (2009) was used. The four-point scale has been shown to be a valid and reliable tool for measuring coherence (Wright et al., 2013). Each C-unit is provided a score of 1 to 4. Overall global coherence scores are determined using the following formula: (additive global coherence score / # of C-units). The rules for scoring global coherence are presented in Table 3.3.

Cohesion. To complete cohesion analyses, each C-unit was evaluated for the presence of complete grammatical and lexical ties, incomplete ties, and errors per total words (Wright, Fergadiotis, Stoltzfus, & Capilouto, 2012). A complete cohesive tie is a linguistic marker that binds C-units together to create a unified narrative. An incomplete tie occurs when the cohesive marker is not presented within three C-units of the target. A cohesive error occurs when the wrong cohesive tie is used. To compute an overall score, an additive coherence rating was calculated and then divided by the number of C-units in the utterance.

Table 3.2
Local Coherence Scoring Procedures

Score	Criterion
4	The topic of the preceding utterance/C-unit is continued by repetition or elaboration of the general theme, as defined by the use of two or more previously presented lexical items (maintaining the same actor, action, and/or object). **These lexical items must be of significant importance to the main details provided in the utterance.**
3	The topic of the preceding utterance is continued by repetition or elaboration of the general theme through the use of only one previously presented lexical item. **This lexical item must be of significant importance to the main details provided in the previous utterance.**
2	The utterance contains appropriate transitional verbiage (e.g., and, so, then, but, next, because, meanwhile, etc.) to link completely unrelated information to the preceding utterance **(i.e., no previously presented lexical items used)**.
1	The utterance has no relationship to the content of the preceding utterance; **no transitional verbiage or previously presented lexical items are used.**

Table 3.3
Global Coherence Scoring Procedures

Score	Criterion
4	The utterance is overtly related to the stimulus as defined by mention of actors/actions/objects present in the stimulus which are of significant importance to the main details of the stimulus. In the case of procedural descriptions and recounts when a designated topics acts as the stimulus, overt relation is defined by provision of substantive information related to the topic so that no inferencing is required by the listener.
3	The utterance is related to the stimulus or designated topic but with some inclusion of suppositional (extra) or tangential information that is relevant to the main details of the stimulus; or substantive information is not provided so that the topic must be informed from the statement. In recounts, appropriate elaborations that are not essential but related to the main topic should be scored a 3.
2	The utterance is only remotely related to the stimulus/topic, with possible inclusion of inappropriate egocentric information; may include tangential information or reference some element of the stimulus that is regarded as non-critical.
1	The utterance is entirely unrelated to the stimulus/topic; the utterance may be a comment on the discourse or tangential information is solely used.

Reliability

Inter-rater and intra-rater reliability for word-by-word transcription and C-unit segmentation was completed for 10% of samples. Inter- and intra-rater reliability for orthographic transcription and C-unit segmentation was greater than 95%. To assess reliability of coherence and cohesion scores, 10% of discourse samples were randomly chosen for analyses by an independent researcher and speech-language pathologist to calculate inter- and intra-rater reliability. Inter- and intra-rater reliability for local and global coherence was 90.6% and 90.3%, 87.5% and 90.6%, respectively. Inter and intra-rater reliability for cohesion was 87% and 91%, respectively. Reliability was judged to be adequate for all measures.

Results

SPSS (v.20) was used for all statistical tests. Since groups were closely matched for age, gender, and education, preliminary analyses of demographical data were not completed. However, preliminary analyses were conducted to ensure that total number of words (TNW) was not significantly different across groups. The ability to maintain cohesion and coherence could negatively be affected by both either a concise or lengthy discourse sample. For example, a concise sample of only 2-3 utterances could have a lower number of cohesive ties as there are few utterances to connect or be less likely to have reduced global coherence as not much information or details are provided. An independent variable *t*-test was conducted to examine the differences in mean TNW between groups. Results indicated that the healthy control group used a greater TNW ($t(18) = 3.545$; $p = 0.002$). Therefore, TNW was accounted for in subsequent analyses.

Two, one-way ANOVAs were conducted to compare means for global and local coherence between groups. The HC group demonstrated statistically significantly higher

global coherence scores as compared to the NABI group (F (1, 17) = 10.696, p = 0.005). No significant difference was found for local coherence scores (F (1, 17) = 0.413, p =0.529) between groups.

Three, one-way ANOVAs were conducted to compare means for cohesion scores between groups. Analyses showed no significant differences between groups for proportion of complete ties (F (1, 17) = 0.656, p =0.362), proportion of incomplete ties (F (1, 17) = 1.079, p = 0.362), or proportion of errors (F (1, 17) =0.710, p = 0.506).

Discussion

The purpose of the present study was to compare the macrolinguistic processes of local coherence, global coherence, and cohesion in the narrative discourse of individuals with NABI and healthy controls matched for age, gender, and education, using a personal recount task. We hypothesized that individuals with NABI would demonstrate impaired global coherence, as evidenced by lower global coherence scores, when compared to healthy controls, in the presence of relatively persevered local coherence and cohesion. Findings supported our hypothesis that individuals with NABI would have impaired global coherence in the context of a recount task. The NABI group demonstrated statistically significantly lower global coherence scores compared to healthy controls. Results of this study add to existing literature demonstrating that macrolinguistic processes of discourse following stroke are affected in different ways, and that these differences may be related to underlying cognitive impairments. Since the completion of the current study, Ellis, Henderson, Wright, and Rogalski (2016) published a systematic review examining the maintenance of global coherence in healthy aging and following various neurological injuries. They concluded that although findings vary based upon

patient population (e.g., TBI vs. dementia vs. stroke vs. healthy aging) and discourse analyses methods, the maintenance of global coherence is generally negatively influenced by both healthy aging and neurological impairments.

Our findings partly support the work by Hough and Barrow (2003), suggesting that global coherence deficits are prevalent in discourse following NABI. However, they also reported lower local coherence scores in the discourse of individuals with NABI as compared to healthy controls; a finding not supported here. Although both local and global coherence deficits were identified in their study, the reported results showed that TBI participants had greater difficulty maintaining global coherence than local coherence. Results revealed that mean coherence ratings for the TBI group were consistently lower than the healthy control group and that TBI participants demonstrated greater difficulty maintaining global coherence than local coherence. The authors suggested that the different findings based on coherence type suggests that each may be sub-served by different cognitive processes. It may be that global coherence is more difficult to maintain without the visual cues provided in a picture description task. Lastly, our results support the findings of Hough and Barrow; like their subjects with TBI, our study subjects with NABI demonstrated relatively intact cohesion.

Rogalski et al. (2010) has also suggested that the maintenance of local coherence and cohesion may be influenced by different cognitive processes than those required to maintain global coherence. This idea is consistent with previous research that has shown that individuals with Alzheimer's disease (Dijkstra et al., 2004; Laine et al., 1998) and TBI (Glosser & Deser, 1990; Hough & Barrow, 2003) had poorer global coherence than local coherence while individuals with fluent aphasia showed no significant difference

between local and global coherence. Therefore, Rogalski et al. (2010) concluded that maintaining global coherence is more cognitively demanding than maintaining local coherence and so global coherence may be more susceptible to mild cognitive impairments, such as NABI.

Studies examining global coherence in healthy aging have also shown impairments in global coherence. In a closely related line of study, Arbuckle and Gold (1993) examined the relationship between off topic speech, which is closely related to global coherence, and cognition. They examined this relationship in the discourse of 222 healthy adults. Results indicated that the oldest group (73-90 years) performed more poorly on attention measures and had more instances of OTS. The authors concluded that declines in language production are associated with declines in the cognitive process of selective attention increased instances of off-topic speech (OTS) in healthy aging. Similarly, Marini et al. (2005) examined the maintenance of local and global coherence across the lifespan. Participants were divided into five age groups (20-24, 25-39, 40-69, 60-74, 75-84). Participants provided single and sequential picture narrative descriptions. The oldest performed significantly worse on the degree of global coherence maintenance. The authors suggested that because declines in cognitive processes, such as working memory, have been identified in healthy aging, it is likely that deficits in macrolinguistic organization occurs due to cognitive deficits. In particular, as declines in healthy aging are proposed to be secondary to age-related changes in the right hemisphere (Hasher & Zacks, 1988), individuals with right hemisphere strokes are likely to experience similar declines in cognition and global coherence maintenance.

Although authors have proposed a relationship between underlying cognitive deficits and declines in macrolinguistic processes, few have examined this. Wright et al. (2013) systematically analyzed the relationship between the maintenance of global coherence and the cognitive processes of memory and attention. Forty younger (20-39 years) and forty older (70-87 years) cognitive healthy adults provided a variety of discourse samples and completed a cognitive assessment battery. Group differences in the maintenance of global coherence were reported only in the recount task with the older group having poorer maintenance of global coherence. For the older group, episodic memory and selective attention were associated with the ability to maintain global coherence. Despite these promising results, future research is needed to examine the maintenance of macrolinguistic processes across discourse tasks and the influence of different cognitive processes.

There were several limitations to this study. First, because this study was retrospective in nature and data were pulled from larger studies, there was little control for important variables for our participants with NABI. For example, we were unable to control for time post onset of stroke, site of lesion, or handedness. Second, only one discourse task, the personal recount, was used to elicit discourse. Previous research has demonstrated that there are different patterns of discourse use across discourse genres. Eggins and Martin (1997) defined discourse genres as "different ways of using language to achieve different culturally established tasks" (p. 9). Wright et al. (2013) was the first to examine the maintenance of global coherence across a battery of discourse genres. They found that older adults had lower global coherence scores compared to younger adults, but that the maintenance of global coherence impaired only in personal recount

tasks. Therefore, researchers and clinicians must interpret with caution the results of the present study and its application to other discourse genres. Lastly, it is imperative that future studies include a variety of stimuli to analyze discourse production across discourse genre.

Chapter 4: Current Practices Regarding Discourse Analysis and Treatment Following Non-Aphasic Brain Injury: A Qualitative Study

Study previously published: Maddy, K., Howell, D., & Capilouto, G. (2015). Current practices regarding discourse analysis and treatment following non-aphasic brain injury: A qualitative study. *Journal of Interactional Research in Communication Disorders, 6*(2), 211-236.

Discourse can be defined as any language that is beyond the boundaries of isolated sentences and is aimed at conveying a message among communication partners (Ska, Duong, & Joanette, 2004; Ulatowska & G. Olness, 2004). Discourse production deficits are a hallmark of aphasia (Armstrong, 2000). However, they also occur in non-aphasic acquired brain injuries (ABI), such as right hemisphere stroke and traumatic brain injury (TBI) (Myers, 1993). Deficits in discourse production disrupt the ability to successfully produce conversation and may have a negative impact on a person's quality of life (Marsh & Knight, 1991; Marsh, Knight, & Godfrey, 1990). Functional outcome studies following stroke have proposed that recovery of discourse abilities is critical to achieving a good quality of life after rehabilitation (Clarke et al. 2002; Mackenzie and Chang 2002). Furthermore, significant correlations between discourse variables and social integration have been identified following neurological injury, indicating that discourse production deficits negatively affect a person's ability to reintegrate into the community (Galski, Tompkin, and Johnston 1998).

Previous studies examining discourse production following ABI, in the absence of aphasia, have identified common deficits in the areas of global coherence, topic maintenance, and cohesion. Global coherence refers to the manner in which discourse is

organized with respect to an overall goal, plan, theme or topic and is based on the listener's perception of the discourse sample (Glosser and Deser, 1991). Global coherence is one construct of discourse production that is particularly vulnerable to the effects of ABI (Brady, Armstrong and Mackenzie, 2005; Carlomagno et al., 2011; Hough & Barrow 2003; Marini et al., 2011; Van Leer & Turkstra, 1999). Topic maintenance is a similar construct to global coherence and deficits are a common impairment following ABI (Bryan, 1988; Glosser & Deser, 1991). Deficits in topic maintenance include the use of inappropriate remarks related to the discourse (Bryan, 1998; Myers, 1993) and tangential speech (Myers, 1999; Rehak, Kaplan, & Gardner, 1992; Trupe and Hillis, 1985). Cohesion refers to the connection of semantic relations between parts of a discourse narrative and occurs when the interpretation of some element is dependent on the interpretation of another element within the text (Halliday & Hasan, 1976). Like global coherence, cohesion is a common discourse impairment following ABI (Davis, O'Neil-Pirozzi, & Coon, 1997; Ewing-Cobbs et al., 1998; Hartley & Jensen, 1991; Marini et al., 2011; Mentis & Prutting, 1987).

Although discourse production deficits following ABI have been documented, few researchers have examined the current practices of speech-language pathologists related to their assessment and treatment of individuals with ABI. Duff and colleagues (2002) surveyed a cohort of speech-language pathologists to identify their assessment and treatment strategies when working with individuals with mild TBI. Results indicated that speech-language pathologists used a variety of assessment measures, including standardized and non-standardized protocols. Two of the three most frequently used assessment tools were instruments developed for assessing the communication of

individuals with aphasia, the *Boston Diagnostic Aphasia Battery* (BDAE; Goodglass, Kaplan, & Barresi, 2001) and the *Boston Naming Test* (BNT-2; Kaplan, Goodglass, & Weintraub, 2001). However, the use of these tests may not be a valid approach for assessing cognitive communication deficits and discourse production in persons with TBI since these tools were not designed for that purpose (Duff, Proctor, & Haley, 2002). Aphasia assessment batteries historically focus language production at the word and sentence level, and so do not provide a systematic assessment of between sentence level processes of discourse, such as cohesion and coherence, and commonly impacted by ABI (Duff et al., 2002). Furthermore, Coelho, Ylvisaker, & Turkstra (2005) proposed that using standardized language assessments to evaluate discourse production following ABI may result in an overestimation of communicative performance due to the limited scope and ceiling effect of aphasia batteries, which were not intended to assess subtle deficits common follow ABI.

In studies examining treatment practices, speech-language pathologists indicate they commonly treat deficits of social skills and pragmatics (Duff, Proctor and Haley 2002). Although not cited explicitly, this could include discourse production deficits. However, when ranking areas most frequently targeted in treatment, work by Duff and colleagues (2002) suggested that social skills and pragmatics were targeted less frequently than memory and learning, attention, reasoning and problem solving, executive functioning and vocational skills (Duff, Proctor, & Haley, 2002). These findings suggest discourse production may not be a primary focus of treatment programs for individuals with ABI.

Similarly, Turkstra and colleagues (2005) gathered data from speech-language pathologists and reported that clinicians predominately used standardized assessments designed for individuals with aphasia or dementia when assessing individuals with brain injury. The authors suggested that the standardized assessment measures commonly used for the population with brain injury might be useful for identifying cognitive and linguistic functions influencing communication performance. However, they went on to point out that such measures are not ecologically valid measures of communication in daily situations. Current standardized language and cognitive-linguistic assessments designed for individuals with brain injury do not allow for the exploration of communication deficits in functional communicative interactions. The authors proposed a need for the development of new assessment tools to examine communication behaviors and discourse that are designed specifically for individuals with cognitive-communication deficits following ABI (Turkstra, Coelho, & Ylvisaker, 2005).

Practice guidelines support the use of a variety of assessment measures specifically designed for each individual patient. For example, the Society for Cognitive Rehabilitation suggests that a combination of standardized psychometric assessments, questionnaires, structured interviews, and behavioral observations across a range of functional settings should be used without giving stronger emphasis to any one approach (Malia et al., 2004). Furthermore, the American Speech-Language-Hearing Association (ASHA) Preferred Practice Patterns for the Profession of Speech-Language Pathology states that assessment of cognitive-communication impairment is expected to "identify and describe strengths and deficits related to cognitive factors (e.g., attention, memory, and problem solving) and related language components (e.g., semantics and pragmatics)"

(American Speech-Language-Hearing Association, 2003). The current literature suggests that while speech-language pathologists are routinely assessing cognitive factors that may negatively influence discourse production, they may not fully and adequately assess related language components.

Researchers suggest speech-language pathologists use both standardized and non-standardized tools to assess cognitive communication disorders, focusing on cognitive processes of individuals with ABI (Duff, Proctor, & Haley, 2002; Turkstra, Coelho, & Ylvisaker, 2005). Still, little is known about the clinical practices of speech-language pathologists working with individuals with ABI in regard to discourse specifically. No study has explicitly focused on the assessment and treatment of discourse production following ABI using a qualitative approach.

There are important clinical implications for identifying the experiences of speech-language pathologists in the assessment and treatment of discourse production deficits, which is the goal of the current study. First, findings have the potential to provide information that informs development of clinician-friendly assessment measures designed to identify and characterize discourse production deficits following ABI. Second, findings can be used to guide the development of discourse focused treatment programs. Lastly, findings will aid in identifying current practices of speech-language pathologists in the assessment and treatment of discourse production deficits in the discourse of individuals with ABI. Therefore, the purpose of the study was to explore the lived experiences of speech-language pathologists in relation to approaches used to assess and treat cognitive communication disorders of individuals with ABI, with a particular focus on discourse production deficits.

Method

Research Approach

To meet the aims of the study, a phenomenological approach was used. Phenomenology reduces the experiences of persons with a phenomenon to a description of the universal essence, or the nature of the thing (van Manen, 1990). Methods of inquiry included phenomenological reflection on data elicited by the investigation of speech-language pathologists' current practices in the assessment and treatment of individuals with discourse production deficits following ABI. Ethical approval for the study was obtained from the Institutional Review Board at the University of Kentucky.

Participant Selection

Participants were recruited using purposeful, criterion-based sampling (Miles & Huberman, 1994) to ensure representation of varying clinical experience levels in the assessment and treatment of individuals with ABI and to allow for rich descriptions of the phenomenon of interest. To recruit participants, fliers were distributed to rehabilitation and health care centers in Central and Eastern Kentucky via electronic communication. Interested participants contacted the first author to express interest in participation in the study. Participants met the following pre-determined inclusion criteria: ASHA Certificate of Clinical Competence in speech-language pathology (CCC-SLP), between the ages of 21 and 60, and possessed at least one year of clinical experience treating persons with ABI. Participant recruitment and enrollment continued until saturation was met. Data saturation was considered met after constant comparison of the data had been completed and no new themes emerged (Tuckett, 2004).

Data Collection

Individual semi-structured, open-ended interviews (Creswell, 2007; Doody & Noonan, 2013) were conducted by the first author. Interviews were chosen as the method of data collection to allow for the collection of in-depth, rich, layered description of participants' perspectives (Öhman, 2005; Rowles & Schoenberg, 2002). A predetermined interview protocol created by the primary investigator was used to structure the interview (see Appendix A). Interviews lasted between 25 and 60 minutes. Interviews were conducted at a location of convenience as determined by participants, including participants' homes, workplaces, and the University of Kentucky Department of Communication Sciences and Disorders.

Data collection and analysis was completed concurrently and iteratively to allow the researchers to explore emerging themes in subsequent interviews (Cherney & Canter, 1993). Interviews were audio-recorded and transcribed verbatim by both the first author and a research assistant. Transcriptions were then de-identified and pseudonyms of the participants' choice were used throughout the analysis and are used in the reporting of the results.

Data Analysis

To analyze data, we used procedures developed by Tesch (1990) (as cited in Creswell & Plano Clark, 2011). Prior to coding, transcripts were read two to three times by the first author to get a sense of the data as a whole. Then the researcher read each transcript and highlighted segments of the text that were relevant to the phenomena of study. Initial thoughts and ideas about the meaning of the data were then documented. The investigator then coded each transcript line by line using some of the initially

identified thoughts and ideas about the meaning of the data. Coding is the process of organizing the material into chunks or segments (Rossman & Rallis, 1998). Next, related codes were merged together to form categories. For example, the codes, "limited time" and "quantity over quality" were identified to be similar and were grouped together to form the category, "we're in a rush against the clock." Identified categories were then collapsed into two over-arching themes that emerged from the data, *Clinician Values* and *Environmental Factors.* Each theme is comprised of three categories or subthemes. See Table 4.1 for an example of the coding process. Throughout data analysis, an iterative approach was utilized; codes and themes emerging in later transcripts were checked against earlier transcripts to ensure new themes represented new meanings or concepts and were not previously identified themes (Srivastava & Hopwood, 2009).

Table 4.1
Example of Coding Process

Participant statements	*Codes*	*Category*	*Theme*
"We have a limited amount of time they [patients] are going to be here, we got to get right to the heart of things and begin addressing the things that are most impacting their ability to function because we aren't going to have them for long."	Limited time	"We're in a rush against the clock."	External factors
"If you did a good thorough evaluation, I think it would take you 60 minutes and most therapists don't have that time."	Quantity over quality		
"We pick out those itty bitty areas like thought organization and memory and problem solving and we don't necessarily look at how all of those together impact discourse."	Impairment level	"We might be more comfortable with doing things that are a little more concrete."	
"Discourse is a little harder because I don't know if there's a direct, here's what you should be doing and here's an activity [to target deficits]."	Unstructured tasks		

Rigor

To ensure adequate rigor, several procedures were employed throughout the research process (Gibbs, 2007). First, a second researcher listened to all audio recordings and checked transcripts. Any discrepancies were rectified through discussion. To reduce potential bias, reflexive bracketing was completed prior to the initiation of the study (Ahern, 1999). Throughout the research process, the first author recorded reflective memos following each interview and kept a reflective diary throughout the research

process (Groenewald, 2008; Houghton et al., 2013). In addition to researcher reflexivity, peer debriefing was used (Houghton et al., 2013). The first two authors, one of whom was not a speech-language pathologist, discussed emerging themes and categories throughout the research process to ensure agreement with the logical paths taken to arrive at the identified categories and themes. To increase dependability, the first author maintained an audit trail to outline and document rationale for methodological decisions throughout the research process (Glaser & Strauss, 1967). Finally, to ensure credibility of findings, member checking was used in which several participants reviewed the final data analysis to ensure that their views were expressed accurately. All participants were in agreement with the final data analysis.

Findings

Participants

Nine participants volunteered to participate in the study and provided informed consent. Participants ranged in years of age from 28 to 58 years (M = 40.1; SD = 10.1). Years of experience as a practicing speech-language pathologist ranged from 3 to 33 years (M = 14.1; SD = 10.0). Eight females and one male participated in the study. Participants worked in a variety of clinical settings including: inpatient rehabilitation, skilled nursing facilities, outpatient rehabilitation, acute care, and brain injury rehabilitation day programs. One participant, Amanda, provided significantly less data than the others, as she had not recently worked in rehabilitation. Demographic data for participants are presented in Table 4.2.

Table 4.2

Biographical Information for Participants

Participant	*Gender*	*Age*	*Experience level (years)*	*Clinical experience settings*
Cora	F	28	7	Inpatient acute care Skilled nursing facility
Daisy	F	50	25	Inpatient rehab facility
Victoria	F	28	4	Inpatient rehab facility Outpatient rehab facility
Lauren	F	50	26	Inpatient rehab facility Outpatient rehab facility Outpatient day program for brain injury
Susan	F	58	32	Inpatient rehab facility Outpatient rehab facility
Amy	F	31	3	Inpatient rehab facility
Eric	M	46	10	Inpatient rehab facility, inpatient acute care
Jamie	F	36	13	Inpatient rehab facility, outpatient day program for brain injury
Amanda	F	36	12	Inpatient rehab facility Public schools

Findings are discussed using the following organization. First, the essence of the experiences of speech-language pathologists in the assessment and treatment of discourse

production deficits of individuals with ABI is identified. Second, identified overarching themes of internal factors, or clinician values, and environmental factors are discussed with three subthemes. Participant quotes are used throughout to support identified themes.

Essence

Findings suggest that speech-language pathologists identify discourse production deficits, have at least a surface level understanding of the impact discourse production deficits have on a person's ability to reintegrate into the community, and include discourse elicitation tasks into assessment practices. However, findings also suggest that speech-language pathologists are not routinely analyzing elicited discourse samples and implementing treatment to improve identified deficits. Consequently, for this sample, there was an incongruity between the values and beliefs of participants and their clinical practice of assessing and treating discourse production deficits following ABI. The disconnect occurs due to the influence of various internal, or clinician values, and environmental factors discussed below. A summary of the overarching themes and sub-themes or categories is displayed in Table 4.3.

Table 4.3
Summary of Identified Categories and Themes

Category	*Description*
	Clinician Values
The [discourse] just doesn't flow	Participants reported that patient discourse does not flow and is hard to understand. This occurs due to deficits in cohesion, coherence, and topic maintenance. Discourse is often tangential and is also impacted by impaired prosody, intonation and affect.
I think it's life altering	Participants reported that disordered discourse production has a negative implication on a person's social reintegration and quality of life.
I usually have a half hour worth of conversation at the beginning before I ever actually start the formal evaluation	All participants reported collecting discourse samples, specifically in the patient interview. Patients provided medical and biographical histories prior to the initiation of the evaluation. Discourse was also elicited using open-ended prompts, picture description tasks, and conversation.
	Environmental Factors
We're in a rush against the clock	Speech-language pathologists reported that time constraints place on their facilities limited time to complete an evaluation. Clinicians were allotted 15 to 60 minutes for evaluations. High productivity requirements required participants to complete informal evaluations that lend themselves to concurrent documentation and interpretation. Short length of stay (LOS) also impacted evaluation protocols as clinicians reported the need to initiate treatment quickly.
I don't even remember talking about the word discourse until I got into rehab	Participants largely reported an absence of formal education regarding discourse analysis and treatment in the adult neurogenic population. Participants reported that graduate programs were highly focused on pediatric language analysis and treatment.

Table 4.3 (continued)

We might be more comfortable with doing things that are a little more concrete	Participants reported some discomfort in the planning and execution of treatment for discourse production deficits. This occurred due to a lack of prescriptive treatment programs. Therefore, clinicians focused treatment on cognitive processes (e.g., attention, memory) and hoped that treatment would generalize to discourse. When treatment was provided for discourse, it was targeted informally and indirectly during other structured therapy tasks.

Clinician Values

The [discourse] just doesn't flow…

The speech-language pathologists in this study cited various discourse impairments. All participants unanimously identified topic maintenance as negatively impacted by ABI and the presence of tangential speech or off-topic speech was prevalent. A majority of participants also identified discourse cohesion and coherence to be negatively impacted following ABI. Amy stated, "from what I've seen a lot of times, it impacts the patient's ability to maintain topic and be organized, to really organize their thoughts to get their point across in a cohesive, coherent, short concise manner so they're not tangential." Many participants reported that the discourse, or the story, just doesn't flow. In addition to specific discourse processes, participants also reported deficits in prosody, intonation, and affect.

I think it's life altering…

Participants overwhelmingly reported significant negative implications of discourse production deficits, such as a decline in a person's quality of life. Several participants described individual patients they identified as having difficulty reintegrating

into the community following ABI due to discourse deficits. Eric stated that deficits in topic maintenance impact a person's "social, personal, and medical [communication] domains." He stated,

> there's no way you could participate in any social activities, you couldn't go to church and be able to discuss anything. It would affect your medical care because you would go to the doctor and wouldn't be able to tell them what's wrong with you…if you were engaged in a disagreement with your spouse and you couldn't express yourself, yeah…[it would be hard].

The issue of social withdrawal and social isolation also surfaced. Daisy stated,

> I think [discourse deficits] could definitely impact social roles, especially if someone is a lot different than they were before in terms of initiation, topic maintenance, and turn taking so it could potentially lead to some social isolation if you know, friends just can't take it and the same, could potentially cause some issues with you know with a spouse or significant other.

While many participants identified the significant negative implications discourse production deficits have on a person's quality of life, there was also uncertainty as to how such deficits would specifically impact individual patients. Daisy reported that she did not have a great understanding of what kind of impact the deficits make in real life "and what's the impact of that deficit on a person's function." Although participants acknowledged the likelihood of significant implications, a few participants reported that it is hard to see the direct impact of discourse deficits on a person's daily life. Deficits in cognitive linguistic areas of memory and attention and the impact on a person's functioning were considered to be more evident, and therefore were often the focus of assessment and treatment programs.

I usually have a half hour worth of conversation at the beginning before I ever actually start the formal evaluation…

Although the participants did not report formally analyzing discourse, participants did report eliciting discourse in a variety of contexts. Discourse was typically elicited during the initial patient interview through conversational exchange. Clinicians consistently described prompting their patients to describe their illness or injury, their premorbid roles and activities, and their goals following rehabilitation. Laura stated, "I usually have a half hour worth of conversation at the beginning before I ever actually start the evaluation, the formal evaluation." A few participants reported the use of a picture description, a sentence starter, and/or an object description task to elicit a discourse sample. Victoria said, "if I can't get them to engage in conversation then I'll default to the picture, but it's not my first choice."

All participants reported collecting discourse samples during the assessment process. Although participants routinely elicited discourse during the evaluation and identified the negative implications of discourse production deficits they also report they do not routinely analyze language samples for specific discourse deficits and so do not implement discourse treatment. The reasons for the discrepancy between clinician values and current practice are reportedly the result of various environmental factors discussed below.

Environmental Factors

We're in a rush against the clock…

All participants reported the limited time allotted to assess and treat individuals with ABI influenced their clinical practice. Cora, who worked in a skilled nursing facility

(SNF), reported that she is influenced by management to complete a full evaluation of communication in 15 minutes, since evaluations are considered unbillable procedures. Participants working in inpatient and outpatient rehabilitation facilities reported that they spent approximately 60 minutes completing a full evaluation. All participants reported little to no time allotted in their workday for the completion of scoring and documentation following the evaluation. Cora stated, "the time to go back and score a test is non-existent." All participants reported using hospital-based assessment protocols, which are quantified by pluses and minuses, to allow for online scoring and interpretation. Hospital-based assessment protocols consist of stimuli from a variety of standardized tests. Scoring consists of pluses and minuses and a percentage accuracy is determined. Due to the time constraints, Daisy reports that she uses a hospital-based assessment protocol so that she can "get a good cross-section of a lot of different areas in a time-efficient manner" and states that "often times, it comes down to quantity over quality."

Although the time constraints for completing an evaluation differ across facilities, the issue of length of stay (LOS) surfaced. Participants reported the feeling of being pressured to complete assessments quickly so that treatment could be initiated as soon as possible. Daisy said,

> we have a limited amount of time that they are going to be here, we got to get kind of right to the heart of things and you know, begin addressing the things that are most impacting their ability to function because we aren't going to have them very long.

When participants were asked specifically about eliciting and analyzing discourse, time constraints resurfaced. Although participants routinely collected discourse samples

during the evaluation session, language samples were not recorded, transcribed, or systematically analyzed using documented procedures. Daisy stated, "language samples take forever." When prompted to describe their analyses procedures, participants reported completing subjective judgments during the elicitation process. Subjective judgments included noting if the discourse sounded natural, concise, cohesive, and coherent. Victoria stated, "I take my notes on it, I look at where I think the breakdowns are and give a subjective rating of mild to severe." Time constraints overwhelmingly penetrated the experiences of speech-language pathologists in the assessment of discourse production deficits.

I don't even remember talking about the word discourse until I got into rehab…

Preservice education and training also surfaced as a barrier to the implementation of discourse assessment and treatment following neurogenic communication disorders. Participants felt that their graduate programs were heavily skewed to pediatric and school-aged language content. They reported a strong educational background in the systematic and concrete analysis of discourse and connected speech in the pediatric and school-aged population, citing the use the Systematic Analysis of Language Transcripts (SALT; Miller & Iglesias, 2012) program. However, none of the participants demonstrated any knowledge of the available software tools for the analysis of discourse of adults with acquired neurogenic communication deficits. Only one participant reported learning about discourse analysis in the adult neurogenic population. Amy stated, "we learned all about content units and stuff like that…so I will look at that with people with aphasia or people who don't have aphasia."

Along with limited formal education about discourse analyses during graduate school, participants cited the lack of continuing education on the topic, both formal and informal. Cora reported that she has no time to keep up with the literature. She stated, "It's not that I don't think it's important, when I am in practice, I don't take the time to go out and read the literature." No participant reported attending continuing education courses regarding discourse production in the neurogenic population.

Although a general lack of knowledge regarding discourse assessment and treatment was reported, a particular gap in knowledge and understanding of normalized discourse production was also identified as a barrier to discourse assessment. Participants recognized the absence of standardized data or norms by which to compare patient performance. Victoria stated, "I don't feel comfortable quantifying them because it so hard to judge individually right now, how one person compares to another especially not having a great idea of their baseline communication." The difficult task of objectively analyzing discourse production, due to the lack of standardized norms for comparison, coupled with the sense of individual variation was echoed by multiple participants. Some participants also asserted that discourse could not be objectively analyzed due to the individual variation and inability to know a person's premorbid communication style. Amy stated, "I think it's (discourse) subjective, which I think is part of the reason there's not a standard, there's not standardization. I think it's subjective also in that every person that you work with is a little different." While pediatric language samples are compared to standardized developmental norms, participants had limited knowledge of what constituted "normal" discourse in the adult population. Several participants reported that they listen to the discourse and decide what "sounds normal" and whether an unfamiliar

listener would identify this person to have had a neurological impairment during conversational exchanges. A combination of an absence of formal education, continuing education and time to keep up with the literature constrains these speech-language pathologists' practice in the assessment and treatment of discourse production deficits following ABI.

We might be more comfortable with doing things that are a little more concrete…

Participants reported some discomfort in the planning and execution of treatment for discourse production deficits. Victoria stated, "discourse is a little harder because I don't know if there's a direct, here's what you should be doing and here's an activity [to target deficits]." Participants reported increased comfort when treating deficits at the impairment level, including the processes of memory, thought organization and reasoning, in structured tasks. For example, Cora reported that her treatment was typically focused on attention and thought organization. She stated, "I tried to treat the underlying problem of attention to try to get to the other." Part of this increased comfort is the accessibility to structured therapy procedures and workbooks. However, they identified difficulty when implementing treatment in functional discourse interactions as there are no structured and published treatment manuals and worksheets designed to target discourse production. Victoria stated, "there is no WALC (Workbook of Activities of Language and Cognition) for discourse."

Discourse deficits are primarily targeted informally and indirectly during other structured therapy tasks. Many participants acknowledged that they didn't frequently write a specific measurable goal for discourse production. Participants engaged patients in multiple situations requiring them to use discourse throughout the therapy session(s),

which often occurred during a shift from one structured task to another. Several participants stated that they work on discourse all the time in everything they are doing. Jamie and Laura both worked at an outpatient brain injury day program. Laura stated,

> you should never have that you didn't address [discourse deficits] because if the problem didn't come up, then they did great, then you say they didn't have the problem. If they did have the problem, you can't ignore it because you were doing something else. You have to work on it no matter what's going on.

Jamie echoed this response and said that she is always cueing patients for discourse related behaviors during all activities, structured or unstructured. She stated, "if a person has a problem with discourse, you have to make the person aware by pointing it out to them and then asking them to go back and do it again."

Topic maintenance was one component of discourse that participants reported feeling most comfortable targeting. They reported targeting topic maintenance during structured conversational tasks. One reason that participants felt comfortable targeting topic maintenance in therapy is that it is more easily measured. Eric provided a common therapy task he implements using the following directions: "here's your topic, let's talk about it. Then at the end we will count how many utterances were on topic and how long were they on topic." Response to treatment was determined by the number of instances that a patient strayed off topic or how many cues they needed to maintain the topic.

Although participants targeted discourse deficits informally during treatment, many identified a gap in their clinical practice. They reported that discourse has not been the focus of their treatment. Daisy said, "I don't think that it (discourse) has been that much of an emphasis." Treatment primarily focused on cognitive-linguistic processes, such as memory, attention and thought organization, with hopes that improvements in

this area would generalize to discourse production and overall communicative competence. Amy stated, "we pick out those itty bitty areas like thought organization and memory and problem solving and we don't necessarily look at how all of those together impact discourse." When asked if she thought treatment for discourse was more difficult than treatment for thought organization and memory, she responded, "yeah, well not necessarily…I don't know if I can answer that because I don't really feel like I've directly treated and I should." Participants identified that they may be missing the big picture by not focusing on discourse directly.

Discussion

The purpose of the study was to explore the lived experiences of speech-language pathologists in relation to approaches used to assess and treat cognitive communication disorders of individuals with ABI, with a particular focus on discourse production deficits. Our findings describe the experiences of speech-language pathologists in the assessment and treatment of discourse production deficits following ABI, particularly the gap between speech-language pathologists' values and their current clinical practice. The identified disconnect occurs as a result of the interaction between clinician values and environmental influences. Findings from the current study suggest that environmental factors have a greater impact on the current practices than the values of speech-language pathologists.

Clinician Values

Participants were able to cite impairments of discourse production following ABI. Participants overwhelmingly reported deficits in topic maintenance, coherence, and cohesion. Previous studies have identified deficits of topic maintenance (Bryan, 1988;

Glosser & Deser, 1991), global coherence (Brady, Armstrong, & Mackenzie, 2005; Carlomagno et al., 2011; Hough & Barrow, 2003; Marini et al., 2011; Van Leer & Turkstra, 1999), and cohesion (Davis, O'Neil-Pirozzi, & Coon, 1997; Ewing-Cobbs et al., 1998; Hartley & Jensen, 1991; Marini et al., 2011; Mentis & Prutting, 1987) deficits in the discourse of individuals following ABI. Our findings suggest that speech-language pathologists have at least a surface level understanding of discourse production deficits following ABI, as they successfully reported common discourse impairments. Although participants reported acquiring little background regarding discourse following neurological injury, this suggests that they have acquired knowledge regarding components of disordered discourse whether through formal education, continuing education, or clinical experience. However, no attempt was made to determine whether participants could accurately define these linguistic processes or describe measures to analyze the processes. Further research is warranted to examine if speech-language pathologists can accurately define and analyze discourse using the identified constructs.

In addition to reporting common discourse production deficits, speech-language pathologists speculated about the impact of discourse production deficits on a person's quality of life. For example, Eric reported that discourse deficits negatively impact social, personal, and medical [communication] domains of a person's life. Furthermore, all participants suggested that social isolation and social withdrawal were likely to occur due to discourse production deficits, therefore, leading to a poor quality of life. Previous studies have identified significant correlations between discourse variables and social integration following neurological injury, indicating that discourse production deficits negatively affect a person's ability to reintegrate into the community following

neurological injury and inability to do so leads to social isolation and withdrawal (Galski, Tompkins, & Johnston, 1998; Marsh & Knight, 1991). Although the relationship between discourse and community reintegration has been identified, determining which components of discourse are correlated with communicative competence and reintegration is needed. Specifically, what makes someone an effective communicator? It has been proposed that coherence and clarity (Olness, 2005), informativeness (Christensen et al., 2009), and the ability to relate story propositions (Christensen et al. 2009) are essential for communicative competence. Little remains known about the individual components of discourse production and their impact on a person's ability to reintegrate into the community. Determining the components of discourse that may necessary for returning to vocational activities versus social activities is essential. By identifying the components of discourse that are necessary for successful communication, clinicians can better design individualized treatment plans for patients following ABI.

It is surprising that although participants identified the negative implications of discourse production deficits on the quality of life of individuals with ABI, discourse has not been the focus of their treatment programs. Participants largely reported that their assessment and treatment programs are focused on other cognitive domains, such as attention and memory. It has been suggested that impairments in language and discourse production have a greater impact on a person's social participation than deficits in other cognitive domains, such as attention and memory (Marsh & Knight, 1991; Marsh, Knight, & Godfrey, 1990). Therefore, treatment programs aimed at improving discourse production deficits may have a greater impact on a person's quality of life following

neurological injury than programs targeting other cognitive processes such as memory and attention.

The relative value speech-language pathologists included in this study place on patient discourse production is evidenced in their assessment protocols. Speech-language pathologists reported using a variety of methods to elicit discourse. Methods included conversation, open-ended narrative questions, and picture description tasks. Participants reported collecting language samples during the patient interview. Laura reported that she typically has about 30 minutes of discourse prior to the initiation of the formal evaluation. Although participants did not routinely analyze discourse, they consistently collected discourse samples. This indicates that speech-language pathologists do place some value on discourse as they frequently elicit discourse using a variety of techniques. However, participants did not routinely score or examine discourse systematically, as they were faced with external or environmental factors, which will be discussed below.

Environmental Factors

Speech-language pathologists identified time constraints as a significant barrier to the implementation of thorough assessments. In particular, industry concerns regarding length of stay (LOS) forces clinicians to complete assessments quickly so they can begin treatment as soon as possible. Daisy reported that she uses an assessment tool that covers a variety of cognitive domains so that she can get a good idea of deficits and begin treatment immediately, as patients will stay in rehabilitation for long. A recent study examining the trends in LOS for stroke inpatient rehabilitation facilities across geographical areas indicated that mean LOS was 17.1 days (SD = 8.7) for Kentucky rehabilitation facilities (Reistetter et al., 2014). A study examining national trends in

inpatient rehabilitation for stroke indicated that between 2002 and 2007, LOS decreased by a total of 1.8 days (from 17.9 in 2002 to 16.1 days in 2007) (O'Brien et al., 2013). As treatment is typically provided 5 days a week, after the initial evaluation session, therapists are left with approximately 10 days to provide treatment. Cora, who worked in a skilled nursing facility (SNF), reported that her facility allots 15 minutes for an evaluation as Medicare regulates that evaluations are unbillable procedures. However, most participants were allotted 60 minutes for an evaluation but identified that a comprehensive evaluation cannot be completed within that time frame. Our findings suggest that third-party payer sources that determine LOS and reimbursement for services significantly influence clinicians' clinical practice.

Participants overwhelmingly reported that high productivity demands impacted their clinical practices. According to Brown (2013), in 2013 full-time speech-language pathologists reported spending 73% of their time in direct treatment, 20% completing documentation and 6% on other activities. Participants in this study reported higher required levels of productivity, ranging from 75% to 90%. Those with lower productivity requirements also reported increased responsibilities in the terms of management, as in assuming 'lead therapist' or 'therapy coordinator' roles. High productivity standards prohibited participants from completing lengthy and comprehensive evaluations. Furthermore, high productivity levels required speech-language pathologists to complete informal evaluation protocols that lend themselves to concurrent documentation and interpretation. Participants identified the clinical importance of thorough evaluations, but were limited by their facilities.

Researchers have cautioned clinicians not to sacrifice quality of assessment and treatment services in reaction to the changing health care climate. Patterson and Chapey (2008) suggest that speech-language pathologists have a responsibility to advocate for the best-quality services for their patients, which includes requesting adequate funding and time to complete appropriate assessments. Brookshire (2003) stated that clinicians "must work to ensure that gains in economy and efficiency do not come at the expense of their patients' impairments and do not compromise their ability to provide the most efficacious treatment for those impairments" (p. 206). Therefore, it seems imperative that clinicians find a way to meet both the standards of their facilities and also the need of the patients they serve. One possible solution is the development of a quick, clinician-friendly assessment protocol for discourse that will allow for online scoring and interpretation. Clinicians in this study reported a need for a quick and easy way to assess discourse production. However, as discourse is a complex task that is highly influenced by contextual factors, the use of a quick, clinician-friendly assessment protocol may not be comprehensive enough to assess discourse production deficits in this population. Another possible solution is for clinicians to consider a different framework for assessment, as the assessment of discourse production deficits may not be suitable for a one-time, static evaluation. Instead, clinicians should consider ongoing and functional assessments that are incorporated into treatment sessions (Olness, Gyger, & Thomas, 2012). For persons with aphasia, Murray and Chapey (2001) suggested that multiple language samples should be elicited and analyzed because language abilities of patients vary across different communication contexts, tasks, and partners. Clinicians should consider

ongoing assessment of discourse production deficits across multiple treatment sessions and environments.

Participants reported limited background in discourse assessment and treatment for adults with neurogenic communication disorders. Participants identified the lack of normative data to be a barrier to the assessment of discourse production. Coelho, Ylvisaker, & Turkstra (2005) suggested that the lack of normative data is "without question, the primary limitation to the use of discourse analyses, particularly for individuals with TBI" (p. 228). Furthermore, participants reported difficulty comparing discourse production following ABI to premorbid levels of communication. However, the assessment of discourse allows clinicians to characterize discourse production, design a treatment plan to improve discourse production, and to measure the effectiveness of the treatment. By eliciting and assessing discourse at the initiation of treatment and at frequent intervals during treatment, clinicians can determine the effectiveness of intervention in terms of overall improvement in discourse production.

It is interesting that participants identified the lack of standardized discourse assessment tools as a barrier to discourse analysis, particularly because participants reported using predominantly hospital-based non-standardized assessment protocols. Due to time constraints, participants reported the need for quick assessments that allowed for concurrent administration, scoring and interpretation. Although participants identified a need for standardized assessment tools for discourse, it appears that a need for development of a concise assessment tool for discourse production may be more imperative and yield greater usage rates by clinicians.

The majority of participants included in the present study reported a treatment focus on cognitive deficits such as attention, memory and thought organization with the hope that improvements in these areas would generalize to discourse production. When discussing a patient who demonstrated difficulty with maintaining topic, Cora stated, "I tried to treat the underlying problem of attention to try to get to the other (topic maintenance of discourse)." However, little is known about the direct relationship between cognitive processes and discourse production and further research is indicated. Research examining treatment for discourse production deficits, both focusing on attention and on discourse processes, have found undesirable results. Youse and Coelho (2009) examined whether attention training would facilitate conversational discourse for two individuals with long-standing TBI using two treatment protocols. They found that neither protocol produced meaningful improvements in attention or conversational discourse. So while improvements on specific cognitive tasks may be documented during treatment, evidence for generalization of these improvements to discourse is lacking and consistent with other studies (Park & Ingles, 2001; Sohlberg et al., 2003; Youse and Coelho, 2009).

Similarly, a treatment study by Cannizzaro and Coelho (2002) examined whether direct treatment for the comprehension of story grammar structure and identification and generation of episode components within stories would increase story grammar generation in discourse production of individuals with closed head injury. Although participants improved the number of complete episodes produced at the conclusion of the treatment, follow-up sessions at one and three months post treatment showed limited maintenance and poor generalization to discourse. Therefore, researchers proposed that

any treatment for specific attention deficits associated with language processing require training that is language-based (Fischler, 2000). Furthermore, Cannizzaro and Coelho (2002) recommended that regardless of whether interventions focus on discourse or cognitive components, treatment should be implemented in a functional and meaningful communication environment. Participants in this study reported that they do not frequently analyze discourse at the initiation or conclusion of treatment. This suggests that speech-language pathologists may not be assessing the effectiveness of treatment on discourse production. More research is needed to determine efficacious treatment programs for discourse production deficits.

Lastly, participants identified a lack of education regarding assessment and treatment protocols for discourse production following ABI. Participants reported that their graduate programs were heavily focused on discourse production in preschool and school-aged language. Only one participant reported learning about structured discourse analysis procedures, used primarily for individuals with aphasia. As recent literature consistently identifies discourse impairments following ABI, graduate programs should include discourse analysis procedures as part of their assessment protocol curriculum.

Limitations

Although data saturation was established, this study may have been limited by including only speech-language pathologists in the Central and Eastern Kentucky region. Discourse production is highly influenced by culture and the inclusion of speech-language pathologists from a variety of cultural backgrounds and geographical regions may have demonstrated different clinician values.

There are several clinical implications identified from the findings. First, our findings suggest that clinicians need to reconsider their assessment framework for individuals with discourse production deficits. Secondly, educational programs regarding assessment and treatment of individuals with ABI should include curriculum on discourse production deficits in adult populations. Lastly, participants largely reported that the focus of assessment and treatment for individuals with ABI has been on cognitive processes, such as attention and memory. However, preliminary research has yet to clearly identify the relationship between cognitive processes and discourse and the preliminary research examining the effect of attention training on discourse production has yielded unpromising results. Future research is warranted to examine the relationship between cognitive processes and discourse production.

Conclusion

The findings of this phenomenological study on the experiences of speech-language pathologists in the assessment and treatment of individuals with ABI, particularly discourse production deficits, identified a gap between the values of speech-language pathologists and their current clinical practice. Although speech-language pathologists identified common discourse production deficits, reflected on the potential impact on a person's quality of life following ABI, and included discourse elicitation in their evaluation protocols, there were several limitations to implementing discourse analysis and treatment into clinical practice. This occurred due to environmental factors of time constraints, lack of education and lack of structured treatment methods.

Chapter 5: The Influence of Selective Attention on the Maintenance of Global Coherence Following Right Hemisphere

Background

Coherence is the appropriate maintenance of some aspect of the topic within the discourse based on the listener's impression of meaning. The term coherence has been used to describe the organizational aspects of discourse at the suprasentential level (Glosser & Deser, 1990). Coherence can be analyzed on two levels; local and global. *Local coherence* refers to the ability for a speaker to maintain the topic from one verbalization to the next (Glosser & Deser, 1990). Local coherence is established through the use of repetition, continuation, elaboration, subordination, or coordination with the topic in the immediately preceding verbalization. *Global coherence* refers to how verbalizations throughout the discourse relate to the topic and contribute to the overall goal or meaning (Glosser & Deser, 1990). Global coherence is based on the listener's perception of the discourse sample.

Studies examining global coherence in both healthy aging and cognitively-impaired have been equivocal. Early work was completed in a closely related field that included the examination of the instances or prevalence of off topic speech (OTS). OTS is defined as extended speech that is lacking in focus or coherence, or speech that begins relevant to the topic but becomes more loosely related (or unrelated) to the topic (Wills et al., 2012). Arbuckle and Gold (1993) examined the relationship between cognition and OTS in the discourse of 222 healthy participants. Participants completed a comprehensive cognitive assessment battery and provided life history narratives that were analyzed for instances of OTS. Results indicated that the older group (73-90 years) performed more

poorly on attention measures and had more instances of OTS compared to the younger group (61-72 years). The authors concluded that the age-related increase in OTS is associated with age-related declines in selective attention and inhibition, rather than declines in language processing.

In a similar study, James et al. (1998) examined OTS in younger (M = 19.4 years) and older (M = 73.1 years) healthy adults. Participants provided personal narratives (e.g., describe your job, describe a memorable vacation) and three picture descriptions. Results indicated that the older group had more instances of OTS compared to the younger group for the personal narratives but not for picture description tasks. The authors hypothesized that personal narratives allow for autobiographical information to invade the participants' thought processes. Participants were unable to prevent emotionally charged and strong but inappropriate responses from gaining control over thoughts.

Although the aforementioned studies did not systematically examine the relationship between OTS and attention, the authors speculated that the age-related increases in OTS occur due to age-related declines in cognitive processes such as attention. Wills et al. (2012) examined the decline in attention associated with healthy aging and its relationship to instances of OTS. Thirty participants comprised five age decade cohorts (40s, 50s, 60s, 70s, and 80s). Participants provided three personal recounts (e.g., last vacation, last holiday) and completed two measures of attention, the Stroop and Comprehensive Trail-Making Test (CTMT; Reynolds, 2002). No age-related increases in the instances of OTS were present. Furthermore, attention was not significantly correlated (and no trend emerged) with OTS scores, regardless of cohort. The authors proposed several notions for why they found no age-related declines. First,

selective and shifting attention scores were collapsed into one attention score. The authors reported linear trends in Stroop scores showing an age-related decline in selective attention scores. The CTMT scores were more difficult to interpret and no linear relationships emerged. The authors concluded that the examination of Stroop scores in isolation may provide useful information for the assessment of age-related declines in attention and discourse.

The early work of Glosser and Deser (1992) examined global coherence in the discourse of middle-aged (46-61 years; *M*= 51.9) and elderly (67-88 years; *M* = 76.2) cognitively healthy adults. Participants completed 10-20 minute interviews in which they were asked to describe his or her family and a work experience. The first significant finding indicated that middle-aged adults had higher global coherence scores compared to the elderly adults. The second significant finding was that the middle-aged group had significantly fewer incoherent verbalizations compared to the elderly group, indicating that the middle-aged group abandoned the topic less often and were less tangential than the elderly group. The authors proposed that changes in linguistic performances observed across the lifespan are the result of disruptions in diffuse cognitive processes, rather than language-specific neurocognitive systems. Similarly Marini et al. (2005) examined the maintenance of global coherence across the lifespan in cognitive healthy adults. Participants, comprised of five age groups (20-24, 25-39, 40-59, 60-74, 75-84 years), provided single picture and sequential picture description narratives. Results indicated that the oldest group had significantly lower global coherence scores compared to all groups except the young elderly group. Results support the findings of Glosser and Deser

(1992), indicating that global coherence declines in healthy aging. However, no attempt to examine the role of cognition in the maintenance of global coherence was made.

To our knowledge, Wright et al. (2013) first examined the cognitive contributions to global coherence in healthy aging. Participants provided discourse samples in the context of stories, personal recounts, and picture description. Older adults (70-87 years; M = 76.9) had lower global coherence scores than younger adults (20-39 years; M = 28.9), although results were task dependent. Correlation analysis revealed that the Stroop task was significantly correlated with global coherence for stories. However, no other correlations were present for recounts and picture description tasks. This finding suggests a relationship exists between selective attention and global coherence, particularly with selective attention, although it may be task dependent. Results did not support the work by James et al. (1998); no significant difference in global coherence between groups was present for recounts. The significant difference in stories is interesting. As stories are typically longer, this suggests that global coherence may be more difficult to maintain in lengthy discourse tasks.

Deficits in the discourse of persons with RHD are thought to be secondary to cognitive impairments, as opposed to a specific language or linguistic impairments. Communication problems in RHD are typically manifested above the sentence level and impact between-sentence processes of discourse, such as global coherence. Studies that have examined the maintenance of global coherence in the discourse of individuals with RHD, traumatic brain injury (TBI), and non-aphasic brain injury (NABI) have been equivocal (Brady et al., 2005; Carlomagno et al., 2011; Hough & Barrow, 2003; Marini et al., 2011; Van Leer & Turkstra, 1999).

Van Leer and Turkstra (1999) examined cohesion and coherence in the narratives of six adolescents with NABI and six cognitively healthy adolescents. Participants provided a description of his or her injury and hospitalization and retold a current event. Discourse samples were scored for local coherence using a 5-point rating scale. Results indicated no statistically significant difference between groups for global coherence. Limitations of the study included small sample size and the use of adolescents, who may be susceptible to more individual differences in global coherence.

In a similar study, Brady et al. (2005) examined the maintenance of global coherence in the narrative and procedural discourse of individuals with RHD. Four discourse samples (three procedural and one picture description task) were collected from 17 individuals with RHD at 1 and 6 months post-stroke and from a healthy control group (n = 41). There was no statistically significant difference in global coherence measures between groups, suggesting that individuals with RHD do not manifest global coherence deficits. Precaution should be taken when examining results as global coherence was only examined in one narrative task. These studies suggest that global coherence is not impacted by NABI and RHD.

Hough and Barrow (2003) examined global coherence, local coherence, cohesion and lexical errors in the narrative discourse of 5 high-functioning individuals with TBI and 15 healthy young adults. Participants provided personal narratives (i.e., describe his or her family and work experience). Discourse samples were scored for local coherence using a 5-point rating scale. Results indicated that individuals with TBI had relatively intact lexical production and cohesion, but had impairments in local and global coherence scores compared to healthy controls. TBI participants also demonstrated more variability

in global coherence scores. Limitations to this study include small sample size and small number of discourse tasks used. They concluded that global coherence is impacted by TBI.

In a similar study, Marini et al. (2011) examined the narrative discourse of 14 individuals with TBI and 14 cognitively healthy adults. Participants completed single and sequential picture description tasks. Discourse was analyzed for the within-sentence processes of productivity, lexical processing, grammatical correctness, and the between-sentence processes of cohesion and global coherence. The TBI group demonstrated reduced cohesion and global coherence, but relatively intact productivity, lexical processing, and grammatical correctness. A clear incongruence between within-sentence processes and between-sentence processes was present, leading the authors to propose a deficit in the interface between cognitive and linguistic processing. NABI participants had more difficulty maintaining coherence and this deficit appeared to be related to cognitive deficits, as opposed to specific linguistic impairments. Similarly, Carlomagno et al. (2011) examined global coherence in the narrative discourse of 10 individuals with NABI and 28 healthy adults. Participants completed single and sequential picture tasks. Results indicated that global coherence scores for NABI participants were significantly lower than healthy controls. These findings suggest that the maintenance of global coherence is impaired following NABI.

Of particular interest to this review, Rogalski et al. (2010) examined coherence using the inhibitory-deficit and limited-capacity models. Local and global coherence in dual-task conditions and the relationship between measures of selective attention and coherence were examined. Local coherence refers to the linkages between individual

utterances or propositions in the discourse to maintain the topic from one verbalization to the next (Glosser and Deser, 1992). Rogalski et al. (2010) hypothesized that participants would demonstrate relatively intact local coherence and reduced global coherence in the dual-task condition and that global coherence would correlate with measures of attention and concentration. Twelve individuals with NABI provided personal narrative discourse samples in single task (talking) and dual task (talking and walking) conditions. Participants provided narrative samples to personally relevant prompts (e.g., "tell me what you like or dislike about the city you grew up in"). During the dual-task condition, global coherence decrements were observed in spite of relatively intact local coherence. This finding supports the limited-capacity model; because global coherence is more cognitively demanding and requires increased effort, it was more susceptible to decrements in dual-task conditions. When examining the relationship between inhibition and global coherence, no relationship, as measured by the Stroop task, was found. Although results of this study provide insight into the relationship between attention and global coherence following NABI, there were notable limitations. First, the maintenance of global coherence was not compared to a control group of healthy participants. Second, the maintenance of global coherence in various discourse tasks was not examined. This study provided initial empirical evidence for previous hypotheses that attention contributes to the maintenance of global coherence.

Marini, Zettin, and Galetto (2014) examined the discourse of individuals with moderate TBI using a multi-level examination as well as examining the relationship between discourse variables and measures of executive functioning using the Wisconsin Card Sorting Task (WCST). Ten participants with moderate TBI, as measured by a

Glascow Coma Scale score of 9 to 13, and twenty healthy controls provided discourse samples and completed a cognitive assessment battery. Participants provided discourse samples in response to single and sequential picture description. Results indicated that individuals with TBI had lower global coherence scores, suggesting a reduced ability to maintain adequate global coherence following brain injury. When examining the correlation between discourse measures and scores on cognitive testing, they found a correlation between performance on the WCST. Marini et al. (2014) suggested that their findings support the possibility of significant involvement of cognitive skills, such as executive functioning, in message generation. Specifically, an impairment in inhibition of irrelevant responses appeared to play a major role in the macrolinguistic impairments observed in participants with TBI.

Equivocal findings regarding the maintenance of global coherence in healthy aging and following NABI, TBI and RHD may be the result of various inter-study factors. Factors include discourse tasks used, demographic variables (e.g., time post onset, age, severity), and analyses procedures used (e.g., 4-point scale, 5-point scale, questionnaire). Future research is needed to examine the maintenance of global coherence following RHD in a variety of discourse tasks, as well as to describe the influence of cognition on the ability to maintain coherence. The influence and relationship of selective attention should also be examined across discourse tasks.

Although researchers have largely claimed that selective attention may contribute to the ability to maintain global coherence in discourse in healthy aging and following NABI, little remains known about the influences of selective attention on global coherence. The primary aim of this study was to identify if there was a relationship

between selective attention and the maintenance of global coherence following RHD. The specific aims were to compare the maintenance of global coherence across discourse tasks and to investigate the relationship between selective attention and global coherence maintenance. It was hypothesized the maintenance of global coherence will be task dependent and that global coherence scores will be lowest in recount tasks. In regard to the relationship between selective attention and global coherence, it was hypothesized that participants will demonstrate lower global coherence scores in the dual task condition and that higher Stroop scores will correlate with higher global coherence scores.

Method

Participants

The study was approved by the University of Kentucky Office of Research Integrity and Institutional Review Board. Participants were recruited through the University of Kentucky Medical Center and Cardinal Hill Rehabilitation Hospital. Potential participants were identified by the principal investigator (PI), who is a clinical speech-language pathologist at the University of Kentucky Medical Center and Cardinal Hill Rehabilitation Hospital (Per diem), or their primary speech-language pathologist. When identified, participants were contacted by the PI or other authorized research assistants and provided information regarding the study. Informed consent was provided by all participants prior to initiation of the study.

Participants met the following inclusionary criteria, per self report and medical chart review: a) had a history of one right hemisphere cerebrovascular accident more than 2 weeks prior to participation in the study; b) had a negative history for previous

traumatic brain injury, stroke, or neurodegenerative disease (e.g., dementia, Parkinson's); c) were between the ages of 40 and 89; d) demonstrated hearing within functional limits, aided or unaided, as measured by the CID List of Every day Speech (Davis & Silverman, 1970); e) demonstrated vision within functional limits, aided or unaided, as indicated by passing a vision screening (Beukelman and Mirenda, 1998); f) were right-handed; and g) were native English speakers.

Experimental Procedures

Experimental tasks were completed in one session and lasted approximately 60 minutes. Experimental tasks were completed at the University of Kentucky Medical Center (n = 1) and Cardinal Hill Rehabilitation Hospital (n = 10). Participants completed screening measures, an attention measure (i.e., Stroop task), and discourse tasks in a single and dual-task condition, as described below. The order of tasks and stimuli were counterbalanced across participants. Discourse tasks were digitally recorded and transcribed verbatim. If the participant stopped within 15 seconds, the examined prompted, "is there anything else you can tell me?" At the time of transcription, all identifying information was removed from transcripts.

Screening Measures

To ensure adequate hearing, either aided or unaided, for participation in the study, participants completed a hearing screening using the CID Everyday Speech Sentences by Davis and Silverman (1978). The examiner read a list of 10 sentences from the list of CID Everyday Speech Sentences (Appendix B). Participants repeated the sentences verbatim. If any errors were made, the participant was judged to fail the hearing screening and did not continue the experimental protocol.

To ensure adequate vision, either aided or unaided, participants completed a vision screening developed by Beukelman and Mirenda (1998) (see Appendix C). Participants were asked to circle the word "good" each time they saw it. Passing criterion was 100% accuracy. If the participant was judged to fail the vision screening then the experimental protocol was discontinued.

Cognitive Measures

Stroop task. Participants completed the Stroop task (Stroop, 1935) which is a measure of the inhibitory process of selective attention. The Stroop has been used extensively in clinical practice and experimental research to assess and quantify selective attention abilities and is considered one of the benchmark measures of attention. The Stroop task consists of three tasks: a word task, a color task, and a color-word task. The word task is a list of words for colors (e.g., red, green, yellow, and blue) printed in black ink. The color task is a list of asterisks in varying colors (e.g., red, green, yellow, and blue). The color-word task is a list of the same color words printed in conflicting colors (e.g., the word "red" might be printed in the color "blue"). For a visual representation, see Figure 5.1. For each task, participants are asked to read all the parts as rapidly as possible by reading the words, naming the colors, or ignoring the printed color word and naming the colors of the ink. Participants are timed and the number of correct responses, incorrect responses, and time to complete the task are documented.

Green	Blue	Red
Red	Green	Blue
Green	Blue	Red
Red	Blue	Green
Green	Red	Blue
Blue	Green	Red

Figure 5.1 Example of Stroop interference task

Dual-Task Conditions. Participants completed discourse measures in a single-task and dual-task condition. During the single-task condition, participants were prompted to provide discourse samples in the absence of competing stimuli. In the dual-task condition, participants listened to previously recorded discourse (restaurant conversation) while providing narrative discourse samples. This method was chosen to mimic real life communication environments, as communication rarely occurs in a quiet, one-to-one environment.

Discourse Tasks

Recounts. A recount is a verbal reiteration of an event and is commonly used in conversational discourse. The examiner demonstrated the task by using a script describing a previous vacation. Once the examiner finished, the participant completed two simple recounts (Tell me what you did last weekend and Tell me about your last vacation) and two complex recounts (Tell me about an illness or injury you have had and Tell me about a problem you had with a friend, coworker, or relative and how you solved that problem). Participants provided one simple and one complex recount in the single-task and one simple and one complex recount in the dual-task condition.

Picture description. Picture description tasks require participants to describe either a single scene or a six-frame cartoon sequence of pictures (see Appendix D) and is commonly used in language assessments. The participant was asked to describe two single pictures (i.e., Cat in the Tree, Birthday) and two six-frame sequential picture tasks (i.e., Argument, Directions) from Nicholas and Nicholas & Brookshire's (1993) picture stimuli. The examiner prompted participants to tell a story with a beginning, a middle, and an end. One single picture and one sequential picture description was completed in the single-task and one single picture and one sequential picture was completed in the dual-task condition.

Story telling. Story telling tasks are highly fictionalized and structured narratives in which participants are asked to tell a story using wordless picture books. The examiner introduced the task by asking the participant to look through the book to get an idea of the story and provided an example using a scripted story. Following the example, participants were asked to tell a story that goes with the pictures for two wordless picture books, Good Dog, Carl (Day, 1985) and Picnic (McCully, 1984). One story was completed in the single-task and one story was completed in the dual-task condition.

Discourse Analysis Procedures

Following completion of orthographic transcription, discourse samples were then segmented into communication units (C-Units). C-units are commonly used to segment oral discourse, as communicators do not often use full sentences during oral discourse tasks. C-units consist of an independent clause and all its modifiers (Loban, 1976a). As follows is an example of a C-unit segmentation:

Pre-c-unit segmented sample

There's a family of mice that live in a house in the forest and one day they decide to pack everyone up a large family of mice into the truck and go out for a picnic the whole family.

C-unit segmented

3. There's a family of mice that live in a house in the forest.
4. And one day they decide to pack everyone up a large family of mice into the truck and go out for a picnic the whole family (Wright and Capilouto, 2009, p. 1299).

Following C-unit segmentation, discourse samples were then scored for global coherence. To calculate global coherence, a four-point rating scale developed by Wright and Capilouto (2009) was used. The four-point scale has been shown to be a valid and reliable tool for measuring global coherence (Wright et al., 2013). The rules for scoring global coherence is presented in Table 5.1. Each C-unit is provided a score of 1 to 4. Overall global coherence scores are determined using the following formula: (additive global coherence score / # of C-units). An example of a previously scored transcript is presented in Appendix E.

Table 5.1

Scoring guidelines for global coherence (Wright and Capilouto, 2009)

Score	Justification
4	The utterance is overtly related to the stimulus as defined by mention of actors/actions/objects present in the stimulus which are of significant importance to the main details of the stimulus. In the case of recounts when a designated topic acts as the stimulus, overt relation is defined by provision of substantive information related to the topic so that no inference is required by the listener.
3	The utterance is related to the stimulus or designated topic but with some inclusion of suppositional (extra) or tangential information that is relevant to the main ideas of the stimulus; *or* substantive information is not provided so that the topic must be inferred from the statement. In recounts, appropriate elaborations that are not essential but related to the topic should be scored a 3.
2	The utterance is only remotely related to the stimulus or topic with possible inclusion of inappropriate egocentric information; may include tangential or reference some element of the stimulus that is regarded as critical.
1	The utterance is entirely unrelated to the stimulus or topic; the utterance may be a comment on the discourse or tangential information is solely used.

Scoring Training

To ensure good inter-rater and intra-rater reliability for conducting global coherence scoring, scorers followed a multi-step training protocol prior to independently scoring transcripts. Training included having the scorer review the discourse stimuli and the scoring procedures. The scoring procedures included excerpts from transcripts that had been scored for global coherence. An explanation was provided for why an utterance was scored the way that it was. As a final step, scorers completed global coherence scoring on two transcripts and compared their results to an answer key. Scorers tallied the number of agreements and disagreements and once they reached 90% or greater agreement, training was considered complete.

Reliability

To ensure adequate intra- and inter-rater reliability for orthographic transcription, C-unit segmentation and global coherence, the following measures were taken. Ten percent of the transcripts were randomly selected for a second transcription to determine intra-rater and inter-rater reliability. Agreements and disagreements were subjected to the following formula: (total agreements / [total agreements + total disagreements] x 100). Reliability for all measures was greater than 90% and judged to be good.

Results

SPSS (v.22) was used for all statistical tests. Preliminary analyses were conducted to ensure that total number of words (TNW) was not significantly different across conditions. The ability to maintain global coherence could negatively be affected by both either a concise or lengthy discourse sample. For example, a concise sample of only 2-3 utterances could have a lower number of cohesive ties as there are few utterances to connect or be less likely to have reduced global coherence as not much information or details are provided. Shapiro-Wilk normality tests indicated that the data for TNW was normally distributed. Therefore, a paired samples *t*-test was conducted to examine the differences in mean TNW between groups. Results indicated that there was no statistically significant difference in TNW between the single task (M = 841.55; SD = 316.38) and dual task (M =836.64; SD = 318.09); t (10) = .097; p = .924) conditions. Therefore, TNW was not accounted for in subsequent analyses.

Shapiro-Wilk normality tests indicated that data for global coherence measures for some discourse tasks were not normally distributed. Therefore, nonparametric measures were used to analyze the data. The first aim of the study was to compare the

maintenance of global coherence across discourse tasks. The nonparametric Friedman two-way analysis of variance (ANOVA) was conducted. Because one discourse sample from each genre (e.g., single picture, sequential picture) was scored in each condition (e.g., single-task vs. dual-task) and discourse genres were counterbalanced across participants, global coherence scores from the isolated condition were used. For example, scores from the Birthday and Cat in the Tree discourse tasks provided in the single-task condition were collapsed into one score. Descriptive statistics are presented in Table 5.2. The Friedman two-way ANOVA provided evidence for significant differences among the five discourse tasks. Results rendered a Chi-square value of 11.64 which was significant, $p = .02$. Pairwise Friedman's tests ($p < .05$) revealed that there was a statistically significant difference in mean global coherence scores between stories and two other discourse tasks. First, mean global coherence scores were lower in single picture tasks compared to stories, X^2 (1) = 5.44, $p = .02$. Second, mean global coherence scores were lower in simple recount tasks compared to stories, X^2 (1) = 6.40, $p = .01$.

Table 5.2
Global Coherence Scores Across Tasks and Conditions

	Condition	
Discourse tasks	Single task mean (SD)	Dual task mean (SD)
Single picture	3.53 (.33)	3.53 (.35)
Sequential picture	3.45 (.59)	3.44 (.48)
Simple recount	3.46 (.41)	3.41 (.25)
Complex recount	3.79 (.22)	3.46 (.32)
Story	3.70 (.24)	3.49 (.48)

SD = Standard Deviation

To investigate the relationship between global coherence and selective attention in the context of a dual-task condition, we used a Friedman two-way ANOVA to compare

mean global coherence between the single-task and dual-task condition for the five discourse genres. The Friedman two-way ANOVA provided evidence for significant differences in global coherence scores among the five discourse tasks in the single-task and dual-task conditions (Table 5.2). Results indicated that mean global coherence scores for complex recounts were lower in the dual-task condition (M=3.46, SD = .32) compared to the single-task condition (M = 3.79; SD = .22), X^2 (1) = 5.44, p = .02. No statistically significant differences in mean global coherence scores were detected for single picture, sequential picture, story, or simple recount discourse tasks.

Spearman's rank correlation coefficients were used to examine the relationship between Stroop scores and mean global coherence scores across discourse tasks to investigate the relationship between selective attention and global coherence using the inhibitory-deficit model. Results indicated that Stroop scores were not significantly correlated with mean global coherence scores for any of the five discourse tasks. Correlation coefficients are presented in Table 5.3.

Table 5.3
Spearman's rho correlation for Stroop scores and discourse tasks

	Stroop Color-Word raw scores	
Discourse Tasks	Correlation coefficient	Significance (p)
Single picture	-.25	.49
Sequential picture	-.50	.14
Simple recount	-.19	.60
Complex recount	-.34	.37
Story	-.57	.11

Discussion

The purpose of the study was to compare the maintenance of global coherence across discourse tasks following NABI and to examine the relationship between selective attention and global coherence. Results of this study partially support our hypotheses and will be discussed in detail below.

Global Coherence Scores Across Discourse Tasks

Results of this study provide rich information regarding the maintenance of global coherence across discourse genres. Mean global coherence scores across discourse genres were examined. We hypothesized that mean global coherence scores would be lowest in recount tasks. Our findings partially supported this hypothesis. Lowest mean global coherence scores were present in sequential picture, simple recount, and single picture description tasks. Global coherence scores were statistically different across tasks, and mean global coherence scores for the story task were statistically higher than mean global coherence scores in single picture and simple recount tasks. In contrast, mean global coherence scores for the complex recount was greater than all other discourse tasks.

There is general agreement in the literature that different discourse genres require different types of cognitive and linguistic skills and abilities (Bliss & McCabe, 2006; Bliss, Armstrong, & Mackenzie, 2005; Wright & Capilouto, 2012). Wright and Capilouto (2012) examined the maintenance of global coherence across discourse tasks in cognitive healthy adults. They found that mean global coherence scores were lower in simple recount tasks compared to discourse tasks of picture description and stories. They suggested that discourse in response to pictures (e.g., single picture, sequential picture, or

story tasks) are constrained by the visual stimulus, whereas recounts are not constrained and are more likely to be influenced by cognitive processes.

Surprisingly, lower mean global coherence scores were present in simple recount tasks compared to complex recount tasks. To our knowledge, this is the first study to include a complex recount task. It was hypothesized that lower global coherence scores would be present in the complex recount task compared to the simple recount tasks but our results did not support this finding. This may be due to the nature of the elicitation methods. For the simple recount tasks, participants were asked to tell a story about their last vacation and last holiday. For the complex recount tasks, participants were asked to tell about a problem or conflict they with a friend or coworker and how they resolved that problem. Because participants were asked to include a resolution in the complex task, this may have prompted them to 'stay on topic' to provide a resolution to their study as opposed to becoming tangential.

In regard to current practices of speech-language pathologists in the assessment of individuals with NABI, Maddy et al. (2015) reported that speech-language pathologists reported that they typically elicit recounts and personal narratives during the patient interview with occasional use of picture description. Our findings support the use of a variety of discourse elicitation tasks. Since the lowest mean global coherence measures were observed in both single and sequential picture description and simple recount tasks, clinicians should include picture description tasks as an adjunct to their current assessment battery. Eliciting personal recounts alone may not identify global coherence decrements following NABI.

The Relationship Between Selective Attention and Global Coherence

The second aim of the current study was to examine the relationship between selective attention and the maintenance of global coherence. To examine the relationship between selective attention and global coherence using the capacity-limited theory, we employed a dual-task condition. We found global coherence decrements in the dual-task condition for complex recounts. It is interesting that mean global coherence scores were highest in the complex recount tasks in the isolated condition, yet were more susceptible to the influence of a dual-task condition. This suggests that there is a reduced ability to inhibit irrelevant information (i.e., background conversation) during dual-task conditions, which negatively impacted participants' ability to maintain adequate global coherence. In a similar study, Rogalski et al. (2010) examined the maintenance of global coherence in a dual-task condition (talking and walking + talking). They reported global coherence decrements in the dual-task condition. They concluded that global coherence must be more cognitive demanding than other discourse processes, such as local coherence, and therefore may be more susceptible to the dual-task condition.

In regard to the present study, global coherence decrements in the dual-task condition were observed only in complex recount tasks. This partially supports our hypothesis, that global coherence deficits would be observed for recounts in the dual-task condition. There was no statistically significant difference in global coherence scores for the simple recount task. The finding that global coherence deficits were observed in the complex recount and not the simple recount may be due to the increased cognitive demands. For the simple recount tasks, participants were asked to describe a recent holiday and vacation. Qualitatively, discourse samples appeared to follow a temporal

sequence and did not invoke complex language structure. Participants provided heaps of information, where they listed information but did not necessarily describe the relationships among characters, actions or ideas in the discourse production (Capilouto et al., 2016). These utterances result in acceptable or high global coherence scores, but may not be full or rich discourse samples. In the complex recount task, participants were asked to describe a conflict they had with a family member, friend or coworker and how they resolved that problem. Qualitatively, discourse samples appeared to be less temporally organized but described relationships and feelings and invoked more complex language samples. Participants were more likely to describe relationships among characters, actions or ideas in the complex recount task. These complex language samples were more susceptible to decrements in global coherence in the dual-task condition than simple recounts, suggesting a higher cognitive load to maintaining adequate coherence.

To investigate the relationship between global coherence and selective attention using the inhibitory deficit model, we employed the Stroop task as a measure of selective attention. Results indicated that there were no statistically significant correlations between mean global coherence scores and performance on the Stroop task. Wright et al. (2013) examined the cognitive contributions to global coherence in healthy aging, as selective attention deficits become apparent in healthy aging. Participants provided a battery of discourse samples, similar to the present study. Older adults (70-87) demonstrated lower mean global coherence scores compared to younger adults (20-39). Using the Stroop task, they examined the relationship between global coherence and selective attention. They reported that the Stroop task was significantly correlated with global coherence scores for stories, but no other discourse tasks or genres. However, no

clinical population was used. The Stroop task has been used extensively to evaluate age-related changes associated with healthy aging but has been used in the field of speech-language pathology less frequently. Therefore, the Stroop task may be more sensitive to age-related changes in attention as opposed to attention deficits caused by brain injury.

A small number of researchers have examined the relationship between cognitive processes and global coherence using standardized measurements of attention and executive functioning. Rogalski et al. (2010) examined the relationship between the maintenance of global coherence and attention using the Stroop and Digit Symbol Test as measures of attention. They reported no correlation between performance on the Stroop and global coherence measures but a strong correlation between scores on the Digit Symbol Test and global coherence. Marini et al. (2011) compared the narrative discourse of individuals with TBI and healthy controls and examined the cognitive contributions to discourse production. Discourse genres included single picture and sequential picture descriptions. Their results indicated that individuals with TBI demonstrated impaired global coherence compared to healthy controls. The TBI group also demonstrated lower scores on the Wisconsin Card Sorting Task (WCST), which is a measure of executive functioning and attention. However, they found no correlation between scores on the cognitive measures and mean global coherence scores. Taken together, these findings suggest that the Stroop task may not be the most valid measure to investigate the relationship between selective attention and global coherence. Future studies examining the underlying cognitive influences to global coherence should include a larger battery of cognitive assessments.

Limitations

There were several limitations to the current study. First, only 11 participants completed the study. Although we found statistically significant differences in global coherence across discourse tasks and dual-task decrements, the study may not have had enough power to fully examine the relationship between selective attention and discourse production. Second, the study included only one standardized assessment of attention. Although the Stroop task has been used extensively in the psychology field, it's clinical use in speech-language pathology has been limited. Future studies should include a variety of attention and executive functioning assessment commonly used in clinical practice.

Clinical implications and Future Research

There are several clinical implications to the current study. First, this study provides further support that the maintenance of global coherence is discourse task dependent and decrements vary across tasks. Mean global coherence scores were lowest in sequential picture, simple recount, and single picture, in that order. Previous research indicates that speech-language pathologists reported using personal recount tasks and infrequently, picture description, to elicit discourse production (Maddy et al., 2015). Therefore, clinicians should include a battery of discourse tasks in their assessment protocols of individuals with NABI.

In addition to including a variety of discourse tasks in their assessment, clinicians should consider their assessment environment. Mean global coherence scores were lower in the dual-task condition than the single-task condition across all tasks, regardless of statistical significance. As many clinicians complete evaluations in quiet offices with

limited distractions, clinicians should consider modifying their assessment environment. Evaluation of discourse could be completed in the presence of artificial distraction, as provided in the current study via dual-task conditions, or in other areas of their facilities (e.g., dining room, rehab gym) that would provide natural communication contexts.

Lastly, Maddy et al. (2015) reported that speech-language pathologists routinely targeted attention in therapy in hopes that improvement in structured attention tasks would generalize to discourse production. Although the current study provides further insight into the relationship between selective attention and global coherence, little is known about the effectiveness of treatment of attention to improve discourse production. Future research is needed to examine treatment efficacy for discourse production following NABI.

Chapter 6: Synthesized Discussion

The principal aim of this dissertation was to investigate the discourse of individuals with non-aphasic brain injury (NABI) and the assessment and treatment practices of speech-language pathologists. The current investigation was completed in three separate studies and the results of each study guided the development of research questions and hypotheses for the subsequent studies. Each study is summarized below and clinical implications are discussed.

Study 1 Aim: To examine the maintenance of the macrolinguistic processes of local coherence, global coherence, and cohesion in the narrative discourse between NABI stroke survivors and healthy controls matched for age, gender and education in the context of a personal recount task.

Study 1 Hypothesis: It was hypothesized that the NABI group would demonstrate impaired global coherence while local coherence and cohesion would be preserved compared to healthy controls.

Study 1 Findings: Results supported hypothesis that the NABI group had impaired global coherence scores compared to healthy controls. There was no statistically significant difference between groups for local coherence and cohesion.

Study 1 Summary:

Study 1 examined the maintenance of the macrolinguistic processes of local coherence, global coherence, and cohesion in the narrative discourse between non-aphasic stroke survivors (NABI) (n=10) and healthy controls (HC) (n=10), closely matched for age, gender, and education, in the context of a personal recount task. Data was extrapolated from larger studies, one examining discourse across the lifespan and one examining the

needs of individuals living with stroke in rural Appalachia. It was hypothesized that the NABI group would demonstrate impaired global coherence in spite of relatively intact local coherence and cohesion.

The findings supported the hypothesis that the NABI group would demonstrate impaired global coherence while maintaining adequate local coherence and cohesion. Although previous research examining discourse production following NABI has been equivocal, this finding adds to the previous literature demonstrating that individuals with NABI have an impaired ability to maintain global coherence in narrative discourse. The ability of individuals to maintain local coherence and cohesion and inability to maintain adequate global coherence following NABI further allows for speculation regarding underlying cognitive mechanisms responsible for the maintenance of global coherence.

Although there were several limitations, this study advanced the understanding of the maintenance of macrolinguistic processes of discourse and identifies that global coherence deficits may be prevalent in the narrative discourse of individuals with NABI. Though discourse production deficits have been well documented in both previous studies and the current study, evidence suggests that speech-language pathologists do not routinely evaluate or treat discourse production deficits.

Study 2 Aim: The purpose of study 2 was to explore the lived experiences of speech-language pathologists relative to clinical practice for assessing and treating cognitive communication disorders of individuals with NABI, with a particular focus on discourse production deficits.

Study 2 Findings: Findings suggested that speech-language pathologists identified common discourse production deficits and hypothesized about the impact on a person's

quality of life. However, external influences negatively impacted participants' practice regarding discourse assessment and treatment. External factors included time constraints, lack of standardized data, and the lack of formalized education regarding discourse assessment and treatment. These findings suggested there is a discrepancy between speech-language pathologists' values and their actual clinical practice related to the analysis and implementation of treatment for discourse production deficits.

Study 2 Summary:

Study 2 explored the lived experiences of speech-language pathologists relative to their clinical practice for assessing and treating cognitive communication disorders of individuals with NABI, with a particular focus on discourse production deficits. A phenomenological approach of inquiry was used to explore the question of interest and to further understand the current clinical practice of speech-language pathologists in relation to NABI. In addition to empirical evidence, scant literature suggests that speech-language pathologists are not routinely assessing or treating discourse production deficits following NABI or RHD, specifically.

Nine speech-language pathologists, working across a variety of rehabilitation settings, participated in the study. The essence of the study was that speech-language pathologists identify discourse production deficits, had at least a surface level understanding of the impact of discourse production deficits on a person's ability to reintegrate into his or her community, and included discourse elicitation tasks in their evaluation protocols. However, speech-language pathologists in the study reported they were not routinely analyzing the elicited discourse samples and were not implementing treatment to improve discourse production deficits. Therefore, there was a disconnect

between the values of clinicians and their clinical practice when assessing and treating individuals with discourse production deficits following NABI.

Barriers to the implementation of discourse assessment and treatment were not surprising. Clinicians reported that time constraints influenced their choice to use a quick, non-standardized assessment protocol to assess a wide range of cognitive functions in a quick, efficient manner. They also described time constraints set forth by decreasing length of stay for patients, reporting that they couldn't spend too much time on assessment but had to begin treatment immediately. Although therapists cannot control for facility based regulations on times allotted for evaluations or length of stay, they can change their framework for assessment to give more focus to discourse production. Participants also cited a lack of knowledge about both discourse analysis procedures and normal discourse production as reasons they do not collect data. The findings of this study can influence educators in both graduate and continuing education roles to incorporate discourse into their curriculum.

Of particular interest to the current line of research was the finding that speech-language pathologists reported assessing and treating deficits of attention with hopes that improvements would generalize into discourse production. However, further research regarding the relationship between selective attention and global coherence in discourse was warranted.

Study 3 Aim(s): There were two specific aims for study 3. The first aim was to investigate the maintenance of global coherence across discourse tasks or genres in the discourse of individuals with NABI. The second aim was to investigate the relationship

between selective attention and the maintenance of global coherence in the discourse of individuals with NABI.

Study 3 Hypotheses: It was hypothesized that the maintenance of global coherence would be task dependent and that global coherences cores would be lowest in recount tasks. It was also hypothesized that there would be a relationship between selective attention and the maintenance of global coherence as evidenced by lower global coherence scores in the dual-task condition and that higher Stroop scores would correlate with higher global coherence scores.

Study 3 Results: Results partially supported the two hypotheses. First, results indicated that mean global coherence scores across discourse tasks were statistically different. Specifically, mean global coherence scores were significantly higher for stories compared to simple recounts and single picture description tasks. Second, mean global coherence scores in the dual-task condition were lower for all discourse tasks compared to the single-task condition. There was a statistically significant difference between mean global coherence scores for complex recounts, with decrements in the dual-task condition. There was no correlation between selective attention as measured by performance on the Stroop task and any of the five discourse tasks.

Study 3 Summary:

Study 3 assessed the maintenance of global coherence and the relationship between selective attention and global coherence in the narrative discourse of individuals with NABI. Eleven participants completed the study. Participants provided the following discourse measures in a single-task (isolated condition or quiet environment) and dual-

task (presence of background conversation) condition: single picture description, sequential picture description, simple recount, complex recount and story tasks.

Regarding the maintenance of global coherence across discourse tasks, results indicated that mean global coherence scores varied across discourse tasks. Mean global coherence scores were lowest in sequential picture (*M*=3.45; *SD*=.59), simple recount (*M*=3.46; *SD*=.41), and single picture description tasks (*M*=3.53; *SD*=.33) and higher in story (*M*=3.70; *SD* = .24) and complex recount tasks (*M*=3.79; *SD*=.22). Mean global coherence scores in stories were statistically significantly higher than single picture description tasks ($p < .05$) and simple recount tasks ($p < 05$).

To investigate the relationship between selective attention and the maintenance of global coherence, we employed two measures. First, we compared mean global coherence scores for the five discourse tasks between a single task (isolated, quiet environment) and a dual-task (distraction) condition. Results indicated a statistically significant difference between conditions for complex recounts. Mean global coherence scores in the dual-task condition were significantly lower for complex recount tasks compared to the single-task condition. Although no statistically significant differences between conditions were found for single picture description, sequential picture description, simple recount, and story tasks, mean global coherence scores were lower in the dual-task condition. This finding suggests that global coherence maintenance is influenced by increased demands of selective attention.

The second measure employed to investigate the relationship between selective attention and global coherence was the Stroop task. It was hypothesized that as Stroop scores increased, mean global coherence scores would increase. The findings of this

study did not support this hypothesis. Results indicated no statistically significant correlations between performance on the Stroop test and the maintenance of global coherence. This finding was similar to previous studies examining the relationship between global coherence and selective attention using the Stroop as a measure of attention (Marini et al., 2011; Rogalski et al., 2010) following NABI. Because global coherence measures were lower in the dual-task condition, but no significant relationships between performance on the Stroop and global coherence measures were identified, this suggests that the Stroop task may not be a sensitive assessment for attention deficits following NABI.

This study provided evidence to suggest that the maintenance of global coherence varies across discourse tasks and that increased attention demands negatively influences the ability to maintain good global coherence. This finding suggests that clinicians should include a battery of discourse measures in their assessment protocols. Although preliminary evidence supports the hypothesis that selective attention influences global coherence maintenance, further research is warranted to gain a deeper understanding of this relationship.

Clinical Implications

There are several clinical implications to the present line of research. First, discourse deficits, particularly global coherence deficits, are prevalent following NABI and have the potential to negatively affect a person's ability to reintegrate in his or her community. This has been supported in literature examining functional outcomes following stroke. Clark et al. (2002) and Mackenzie & Chang (2002) have suggested that the recovery of discourse abilities is critical in achieving a good quality of life following

stroke. Communication problems following stroke have the ability to manifest in the chronic stages of recovery and cause individuals to withdraw from social situations. The therapists who participated in the present study identified the potentially devastating effects that discourse deficits have on individuals recovering from stroke. Therefore, speech-language pathologists should be incorporating discourse assessment and treatment in their clinical practice if discourse deficits are present and have the potential to negatively impact reintegration and quality of life.

It is interesting to note that although participants in the first study demonstrated impaired global coherence compared to healthy controls, none of them reported that they were currently receiving speech therapy services. For participants in study 3, the majority of participants did not receive speech therapy consults for speech and language assessment and treatment while admitted in acute care and were currently receiving speech therapy services in an inpatient rehabilitation facility for cognitive communication deficits. As communication deficits following NABI may not be easily identified in basic communication interactions, the lack of referral for speech therapy in acute care is concerning. Patients who are discharged home following acute care, as opposed to an inpatient rehabilitation facility, are therefore unlikely to receive speech therapy services. The identification of patients with discourse production impairments and cognitive communication impairments is critical in the early stages of recovery to ensure that patients receive necessary assessment and intervention.

Second, findings from the present dissertation suggest that there are many barriers to the clinical implementation of discourse analysis and treatment. These barriers include a lack of understanding of what normal discourse production is and a lack of pre-service

education regarding discourse deficits following NABI. Graduate education programs need to not only include education regarding sentence level discourse production deficits commonly found following aphasia and the use of standardized assessment measures for cognition, but also include information regarding discourse analysis and treatment for individuals with NABI. This includes both normal discourse production in adults, tools to measure discourse production, and treatment methodologies to improve discourse production, although the latter is not well identified in the literature.

Clinicians cited time constraints, both due to facility regulated time constraints on time spent on evaluation and general length of stay of patients, to influence the fact that they do not routinely collect or analyze discourse production. However, these methods are not more time consuming than administering and scoring lengthy standardized assessment measures. If therapists believe that discourse production deficits have the potential to have devastating effects for individuals with NABI, then they need to revise their assessment framework to include discourse. The elicitation and analysis of connected speech should not be limited to a one-time static evaluation, but can be dynamic and ongoing throughout the treatment process. In study 2, it was proposed that clinicians can elicit and analyze discourse production to describe discourse performance, design treatment, and then assess the effectiveness of the treatment. This process should be ongoing throughout the treatment program.

Speech-language pathologists reported that they targeted attention directly in therapy to indirectly improve topic maintenance, or global coherence, as treating the underlying cognitive domains using structured tasks was more comfortable to them than treating discourse. Findings from this study provide preliminary evidence to suggest that

the maintenance of global coherence is influenced by selective attention abilities. NABI participants demonstrated lower global coherence scores for all discourse tasks in the dual-task condition, suggesting an influence of selective attention abilities. Therefore, clinicians should consider their assessment environments when working with individuals with NABI as discourse production in a quiet speech office may not highlight global coherence deficits. Clinicians can alter their assessment environment to provide artificial distraction to simulate real world communication environments or even complete speech and language evaluations in a naturally distracting environment (e.g., the therapy gym, the dining room, the patient's kitchen table). Unexpectedly, no significant correlation between measures on the Stroop task and global coherence was identified. Therefore, clinicians cannot solely rely on attention measures to provide information regarding discourse performance.

In regard to treatment for global coherence deficits following NABI, Coelho (2007) claimed that the development and investigation of theory based treatments for discourse production are needed. A comprehensive literature search for treatment studies for global coherence yielded no results. Therefore, studies based in the theory that selective attention impacts global coherence are needed. Clinicians and researchers are challenged with the development of treatment programs to improve global coherence. The effectiveness of those treatments could be examined using a single-subject research design and the effect of treatment on quality of life could be examined using qualitative methodologies. This is consistent with our recommendation that the analysis of discourse production and the effectiveness of treatment can be dynamic and ongoing throughout the treatment process.

Future Research

Although the findings of this line of research suggest that selective attention influences the maintenance of global coherence, further studies are needed to fully examine this relationship. Future studies are needed to examine the influence of selective attention in natural communication environments. In regard to treatment, little remains known regarding the efficacy of treatment of discourse production deficits. Clinicians in this study lacked the knowledge of discourse specific treatment methods or programs. This is not surprising as a comprehensive literature search revealed little in regard to treatment for global coherence.

Therefore, based on the findings of the present study and the extensive literature review, I believe that individuals with NABI lack an awareness of their deficits. The first goal of treatment should be to make individuals aware of what constitutes good discourse production. This includes education regarding the elements of good discourse (e.g., cohesion, coherence), how those are maintained in discourse production, and how the maintenance of these elements of discourse impacts the listener's perception of the discourse. Treatment should then focus on the production of discourse narratives, using a variety of different discourse stimuli (e.g., picture description, recount, stories). Discourse samples should be recorded and transcribed verbatim. Following transcription, the clinician and patient with NABI should analyze and score discourse samples together. This will allow the patient to learn how to self-monitor discourse production. Explanations of errors of discourse production (e.g., a tangential comment not related to the stimulus) and instances where good discourse production is maintained (e.g., the participants providing details overtly related to the topic) should be provided by the

clinician. The clinician can then provide another opportunity to provide the same discourse task and compare performance on the second sample to the first sample. Following this specific training protocol, clinicians should then begin to implement treatment for generalization by incorporating the same techniques in a variety of communication environments (i.e., moving from the treatment room to a variety of communication environments). Clinicians and researchers can assess the effectiveness of this treatment program by collecting and comparing data on discourse production in each treatment session.

Conclusion

This line of research advances the understanding of discourse production deficits following NABI. Global coherence is one process of discourse that is impacted following NABI. Speech-language pathologists reported that they had a basic understanding of discourse characteristics following NABI, they collected discourse samples, and reported on the negative implications discourse deficits pose on an individual's ability to reintegrate into his or her community following NABI. However, environmental factors influenced their clinical practice in relation to assessment and treatment for discourse production deficits. Clinicians reported that they felt more comfortable treating the cognitive domain of attention and hoped that it would generalize and result in improved discourse production. This study provided preliminary evidence to suggest that selective attention influences the maintenance of global coherence. Future studies are needed to further examine this relationship and the effectiveness of treatment for global coherence deficits following NABI.

Appendix A

Predetermined Interview Protocol

1. Describe your current assessment protocol for individuals with NABI.
2. Describe how you design a treatment plan for individuals with NABI following your assessment.
3. How do you define discourse?
4. Does neurological injury impact discourse production and what impact does this have on community reintegration?
5. How do you elicit and analyze discourse production of individuals with NABI?
6. What aspects of discourse production do you think contribute most to how effective the speaker is?
7. Describe your education regarding discourse production elicitation and analyses.

Appendix B

CID List of Everyday Speech Sentences (Davis and Silverman, 1970).

1. It's time to go.
2. If you don't want these old magazines, throw them out.
3. Do you want to wash up?
4. It's a real dark night so watch your driving.
5. I'll carry the package for you.
6. Did you forget to shut off the water?
7. Fishing in a mountain stream is my idea of a good time.
8. Fathers spend more time with their children than they used to.
9. Be careful not to break your glasses.
10. I'm sorry.

Appendix C

Word Scanning/Cancellation Task for Vision Screening (From *Augmentative and Alternative Communication*. Copyright © 1998 by David Beukelman & Pat Mirenda.)

Circle the word *good* each time you see it. Read left to right.

good

breath	good	take	moth	home	good
bye	one	good	good	bee	shine
good	good	baby	house	shirt	good
see	nose	good	good	hope	fine
good	show	tired	pies	seem	good

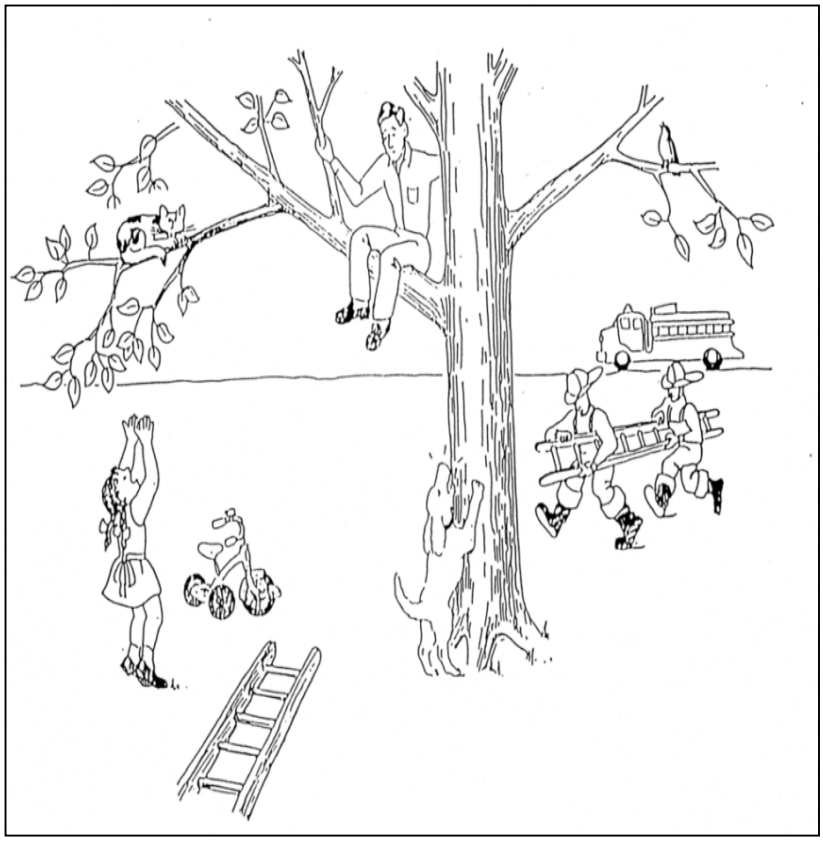
good	table	shine	carpet	good	good	team
paste	good	glue	time	girl	gone	good
good	born	shout	socks	pick	tone	glow
glow	good	point	there	see	good	pass

good	table	shine	carpet	good	good	team
paste	good	glue	time	girl	gone	good
good	born	shout	socks	pick	tone	glow
glow	good	point	there	see	good	pass

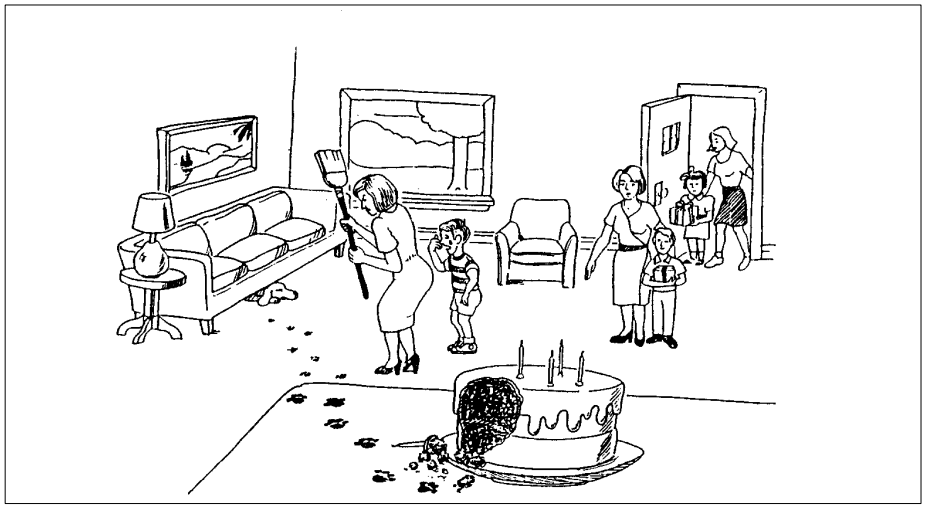
Appendix D

Single and Sequential Picture Stimuli

Cat in the Tree

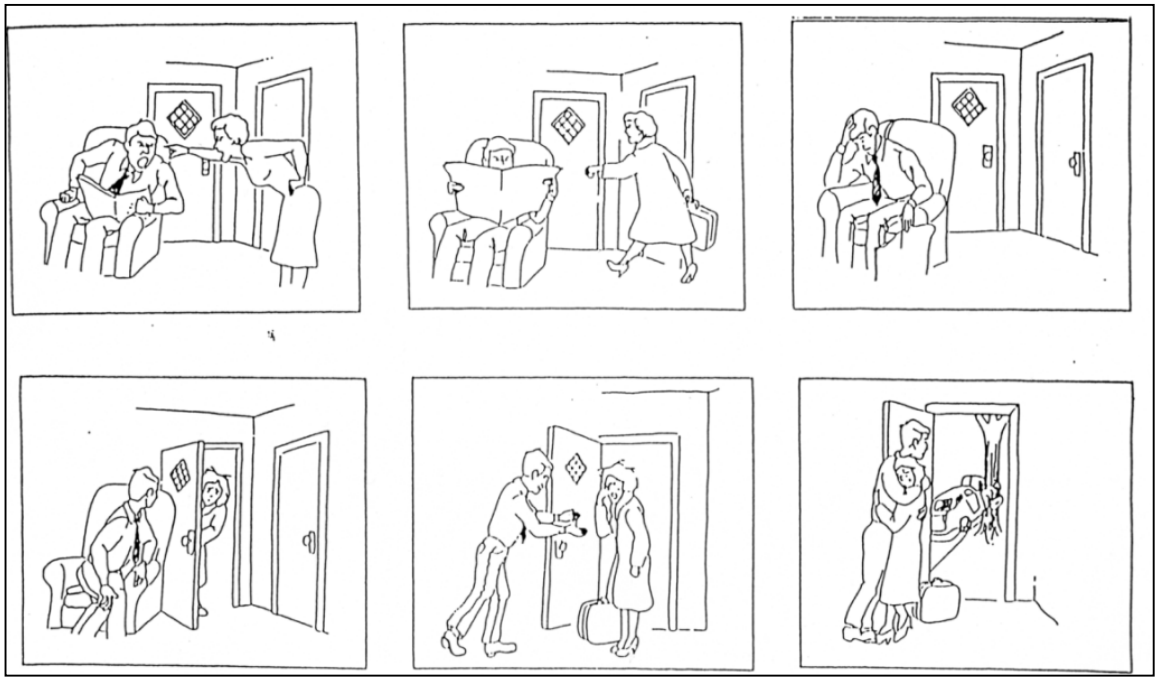


The Birthday

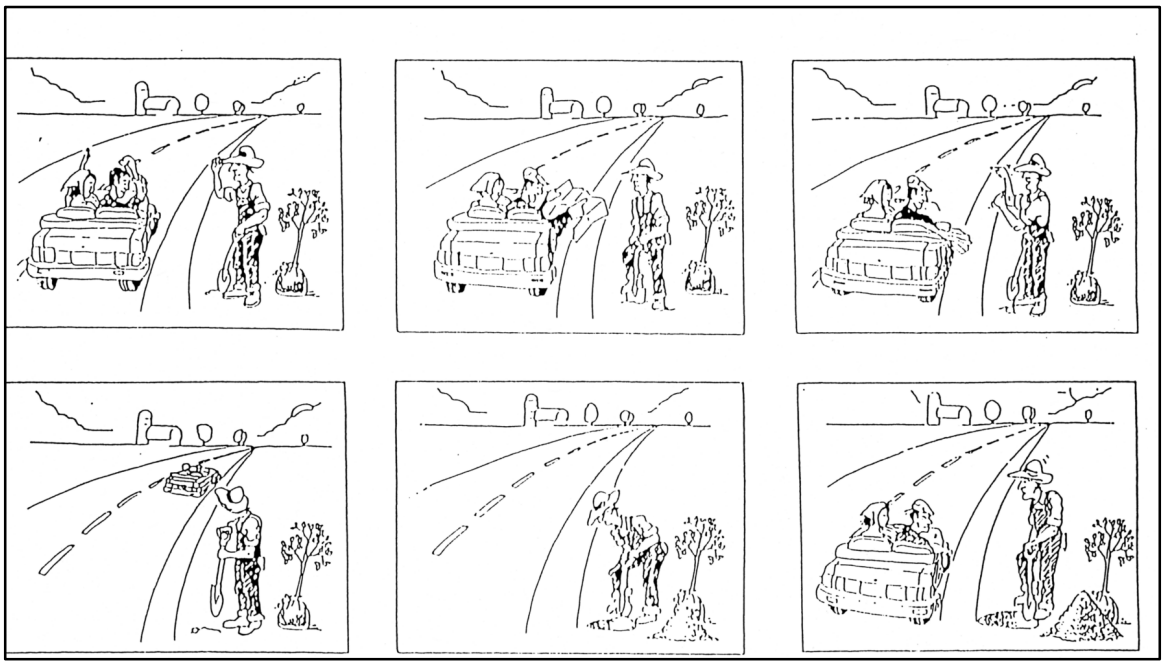


Appendix D (continued)

The Argument



Directions



Appendix E
Example of Transcript Scored for Global Coherence

Rating	Line	Stories: "Picnic" Transcript	Explanation
3	1	I hadn't really figured out what I wanna call these animals	Related to the topic but tangential
3	2	Habits hobbits or uh I don't know	Same as above
3	3	They kinda uh really don't look like much of an animal	Tangential/extraneous
2	4	Mouse *I don't like mouses*	Inserting opinion (inappropriately egocentric) that really has nothing to do with the topic. Not scored a one because of the relationship with "mouse" to the general topic"
3	5	And so anyway we'll call them hobbits	Same as lines 1 and 2 above
4	6	They're all getting ready to go	
4	7	The whole family's getting together	
4	8	They just decide they really going to go have a great day	
4	9	One of them can drive a truck	
4	10	And they all jump in	

References

Ahern, K. (1999). Ten Tips for Reflexive Bracketing. *Qualitative Health Research,* 9: 407--411.

American Speech-Language-Hearing Association. 2003. Evaluating and treating communication and cognitive disorders: Approaches to referral and collaboration for speech-language pathology and clinical neuropsychology [Technical Report]. American Speech-Language-Hearing Association. Available at www.asha.org/policy.

Arbuckle, T. Y., & Gold, D. P. (1993). Aging, inhibition, and verbosity. *Journal of Gerontology, 48*(5), 225-232.

Armstrong, E. (2000). Aphasic discourse analysis: The story so far. *Aphasiology, 14*(9), 875-892.

Blake, M. L., Duffy, J. R., Myers, P. S., & Tompkins, C. A. (2002). Prevalence and patterns of right hemisphere cognitive/communicative deficits: Retrospective data from an inpatient rehabilitation unit. *Aphasiology, 16*(537-548).

Bliss, L. S., & McCabe, A. (2006). Comparison of discourse genres: Clinical implications. *Contemporary Issues in Communication Science and Disorders, 33*, 126-137.

Bloom, R. L., Borod, J. C., Santschi-Haywood, C., Pick, L. H., & Obler, L. K. (1996). Left and right hemispheric contributions to discourse coherence and cohesion. *International Journal of Neuroscience, 88*(1-2), 125-140. doi: 10.3109/00207459608999818

Brady, M., Armstrong, L., & Mackenzie, C. (2005). Further evidence on topic use following right hemisphere brain damage: procedural and descriptive discourse. *Aphasiology, 19*(8), 731-747.

Brookshire, R. (2003). *Introduction to Neurogenic Communication Disorders* (6th ed.). St. Louis, MO: Mosby.

Brookshire, R. H. (2003). *Introduction to neurogenic communication disorders* (6th ed.). St. Louis, Mo.: Mosby.

Brown, J. (2013). On the pulse: SLPs feel continued pressure on clinical judgment. *The ASHA Leader, 18*, 30-31.

Brownell, H., Gardner, H., Prather, P., & Martino, G. (1995). Language, communication, and the right hemisphere. In H. Kirshner (Ed.), *Handbook of neurological speech and language disorders*. New York: Marcel Dekker.

Bryan, K. (1988). Assessment of language disorders after right hemisphere damage. *British Journal of Disorders of Communication, 23,* 111-125.

Cannizzaro, M. & Coelho, C. (2002). Treatment of story grammar following traumatic brain injury: a pilot study. *Brain Injury*, *16*(12), 1065-1073.

Capilouto, G., Wright, H., & Maddy, K. (2016). Microlinguistic processes that contribute to the ability to relay main events: influence of age. *Neuropsychol Dev Cogn B Aging Neuropsychol Cogn, 23*(4), 445-463.

Capilouto, G., Wright, H., & Wagovich, S. (2005). CIU and main event analysis of the structured discourse of older and younger adults. *Journal of Communication Disorders, 38*(6), 431-444.

Carlomagno, S., Giannotti, S., Vorano, L., & Marini, A. (2011). Discourse information content in non-aphasic adults with brain injury: A pilot study. *Brain Injury, 25*(10), 1010-1018.

Carlson, M., Hasher, L., Connelly, S., & Zacks, R. (1995). Aging, distraction, and the benefits of predictable location. *Psychology and Aging, 10*(3), 427-436.

Chapey, R. (2008). *Language intervention strategies in aphasia and related neurogenic communication disorders* (5th ed.). Philadelphia: Lippincott Williams & Wilkings.

Cherney, L., & Canter, G. (1993). Information content in the discourse of patients with probable Alzheimer's Disease and patients with right brain damage. *Aphasiology* 21: 123-234.

Christensen, S., Wright, H., Ross, K., & Capilouto, G. (2009). What makes a good story? The naïve rater's perception. *Aphasiology, 2*3, 898-913.

Clarke, P., Marshall, V., Black, S., & Colantonio, A. (2002). Well-being after stroke in canadian seniors: Findings from the Canadian study fo health and aging. *Stroke, 33*, 1016-1021.

Clarke, P., Marshall, V., Black, S., & Colantonio, A. (2002). Well-being after stroke in canadian seniors: Findings from the Canadian study fo health and aging. *Stroke, 33*, 1016-1021.

Coelho, C., & Flewellyn, L. (2003). Longitudinal assessment of coherence in an adult with fluent aphasia: A follow-up study. *Aphasiology, 17*(2), 173.

Coelho, C., Ylvisaker, M., & Turkstra, L. (2005). Nonstandardized assessment approaches for individuals with traumatic brain injuries. *Seminars in Speech and Language, 26*(4), 223-241.

Cooper, P. (1990). Discourse production and normal aging: Performance on oral picture description tasks. *Journal of Gerontology, 45*, 210-214.

Craik, F. I. M., & Salthouse, T. A. (2007). *The handbook of aging and cognition* (3rd ed.). New York, NY: Psychology Press.

Creswell, J. (2007). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. Thousand Oaks: Sage Publications.

Creswell, J., & Plano Clark, V. (2011). *Designing and Conducting Mixed Methods Research*. Los Angeles: SAGE Publications.

Davis, G., O'Neil-Pirozzi, T., & Coon, M. (1997). Referential cohesion and logical coherence of narration after right hemisphere stroke. *Brain & Language, 56*(2), 183-210.

Davis, H., & Silverman, S. (1970). *Hearing and deafness* (3d ed.). New York,: Holt Rinehart and Winston.

Day, A. (1985). *Good dog, Carl* (1st ed.). La Jolla Calif.: Green Tiger Press.

de Lira, J., Ortiz, K., Campanha, A., Bertolucci, P., & Minett, T. (2011). Microlinguistic aspects of the oral narrative in patients with Alzheimer's disease. *International Psychogeriatrics, 23*(3), 404-412.

Doody, O., & Noonan, M. (2013). Preparing and conducting interviews to collect data. *Nurse Researcher*, *20*(5), 28-32.

Duff, M., Proctor, A., & Haley, K. (2002). Mild traumatic brain injury (MTBI): assessment and treatment procedures used by speech-language pathologists. *Brain Injury*, *16*(9), 773-787.

Duong, A., Giroux, F., Tardif, A., & Ska, B. (2005). The heterogeneity of picture-supported narratives in Alzheimer's disease. *Brain Lang, 93*(2), 173-184.

Duran, P., Malvern, D., Richards, B., & Chipere, N. (2004). Developmental trends in lexical diversity. *Applied Linguistics, 25*(2), 220-242.

Eggins, S. & Martin, J. (1997) Genres and registers of discourse. In T. A. van Dijk (ed.) *Discourse as Structure and Process,* 230-256. London: Sage.

Ellis, C., Henderson, A., Wright, H., & Rogalski, Y. (2016). Global coherence during discourse production in adults: A review of the literature. *Interational Journal of Language and Communication Disorders, 41*(4), 359-367.

Ellis, C., Dismuke, C., & Edwards, K. (2010). Longitudinal trends in aphasia in the United States. *NeuroRehabilitation, 27*, 327-333.

Ewing-Cobbs, L., Brookshire, B., Scott, M., & Fletcher, J. (1998). Children's narratives following traumatic brain injury: Linguistic structure, cohesion, and thematic recall. *Brain & Language*, *61*, 395-419.

Fischler, I. (2000). Attention, resource allocation, and language. In Nadaeu, S., Gonzalez, R., & Crosson, B. (Eds) *Aphasia and language: Theory to practice,* 348-370. New York: The Guilford Press.

Galski, T., Tompkins, C., & Johnston, M. (1998). Competence in discourse as a measure of social integration and quality of life in persons with traumatic brain injury. *Brain Injury*, *12*(9), 769-782.

Gibbs, G. (2007). *Analysing qualitative data*. Thousand Oaks, CA: Sage Publications.

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Publication Company.

Glosser, G. (1993). Discourse production patterns in neurologically impaired and aged populations. In H. H. Brownell & Y. Joanette (Eds.), *Narrative discourse in neurologically impaired and normal aging adults* (pp. 191-211). San Diego, CA: Singular.

Glosser, G., & Deser, T. (1990). Patterns of discourse production among neurological patients with fluent language disorders. *Brain and Language, 40*, 67-88.

Glosser, G., & Deser, T. (1992). Comparison of changes in macrolinguistic and microlinguistic aspects of discourse production in normal aging. *Gerontology: Pyschological sciences, 47*(4), 266-272.

Go, A. S., Mozaffarian, D., Roger, V. L., Benjamin, E. J., Berry, J. D., Blaha, M. J., . . . Stroke Statistics, S. (2014). Heart disease and stroke statistics--2014 update: a report from the American Heart Association. *Circulation, 129*(3), e28-e292.

Gold, D., Andres, D., Arbuckle, T., & Zieren, C. (1993). Off-target verbosity and talkativeness in elderly people. *Canadian Journal on Aging--La Revue Canadienne du Vieillissement, 12*(1), 67-77.

Goodglass, H., Kaplan, E., & Barresi, B. (2001). *Boston Diagnostic Aphasia Examination*. Baltimore, MD: Lippincott, Williams, & Wilkins.

Goodglass, H., Kaplan, E., & Barresi, B. (2001). *Boston Diagnostic Aphasia Examination* (Third ed.). Baltimore: Lippincott, Williams, & Wilkins.

Groenewald, T. (2008). Memos and memoing. In Given, L. (Ed) *The SAGE encyclopedia of qualitative research rethods,* 505-506. Thousand Oaks, CA: SAGE Publications.

Halliday, M., & Hasan, R. (1976). *Cohesion in English*. London: Longman.

Hartley, L., & Jensen, P. (1991). Narrative and procedural discourse after closed head injury. *Brain Injury,* 5(3), 267-285.

Hasher, L., & Zacks, R. (1988a). Working memory, comprehension, and again: A review and a new view. *The Psychology of Learning and Motivation, 22*, 193-223.

Hasher, L., & Zacks, R. (1988b). Working memory, comprehension, and aging: A review and a new view. In G. Bower (Ed.), *The Psychology of Learning and Motivation* (Vol. 22, pp. 193-226). New York: Academic.

Hasher, L., & Zacks, R. T. (1979). Automatic and effortful processes in memory. *Journal of Experimental Psychology: General, 108*(3), 356-388.

Hasher, L., Lustig, C., & Zacks, R. T. (2007). Inhibitory mechanisms and the control of attention. In A. Conway, C. Jarrold, M. Kane, A. Miyake & J. Towse (Eds.), *Variation in Working Memory* (pp. 227-249). New York: Oxford University Press.

Hasher, L., Zacks, R., & May, C. (1999). Inhibitory control, circadian arousal, and age. In D. Gopher & A. Koriat (Eds.), *Attention and peformance XVII* (pp. 653-675). Cambridge, MA: MIT Press.

Hough, M. S., & Barrow, I. (2003). Descriptive discourse abilities of traumatic brain-injured adults. *Aphasiology, 17*(2), 183-191.

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigour in qualitative case-study research. *Nurse Researcher*, *20*(4), 12-17.

James, L., Burke, D., Austin, A., & Hulme, E. (1998). Production and perception of "verbosity" in younger and older adults. *Psychology and Aging, 13*(3), 355-367.

Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, N.J.: Prentice-Hall.

Kane, M., Hasher, L., Stoltzfus, E., Zacks, R., & Connelly, S. (1994). Inhibitory attentional mechanisms and aging. *Psychology and Aging, 9*(1), 103-112.

Kaplan, E., Goodglass, H., & Weintraub, S. (2001). *Boston Naming Test-2 (BNT-2)*. Austin, TX: Pro-Ed.

Kar, B., & Srinivasan, N. (2013). Development of selection and control In B. Kar (Ed.), *Cognition and Brain Development: Converging evidences from various methodologies*. Washington: American Psychological Association.

Kelly-Hayes, M., Besier, A., Kase, C., Scaramucci, A., D'Agostino, R., & Wolf, P. (2003). The influence of gender and age on disability following ischemic stroke: The Framingham Study. *Journal of Stroke and Cerebrovascular Disease, 12*, 119-126.

Kemper, S., Herman, R., & Nartowicz, J. (2005). Different effects of dual task demands on the speech of young and older adults. *Neuropsychology, Development, and Cognition. Section B, Aging, Neuropsychology and Cognition, 12*(4), 240-358.

Krahn, F. (1980). *The great ape : being the true version of the famous saga of adventure and friendship*. Harmondsworth, Eng. New York: Penguin Books.

Kramer, A., Humphrey, D., Larish, J., Logan, G., & Strayer, D. (1994). Aging and inhibition: beyond a unitary view of inhibitory processing in attention. *Psychology and Aging, 9*, 491-512.

Loban, W. (1976). *Language development: Kindergarten through grade twelve*. Urbana, IL: National Council of Teachers of English.

Mackenzie, A., & Chang, A. (2002). Predictors of quality of life following stroke. *Disabilities Rehabilitation, 20*, 259-265.

Mackenzie, C. (2000). Adult spoken discourse: The influences of age and education. *International Journal of Language and Communication Disorders, 35*, 269-285.

Mackenzie, C., Brady, M., Norrie, J., & Poedjianto, N. (2007). Picture description in neurologically normal adults: Concepts and topic coherence. *Aphasiology, 21*(3-4), 340-354. doi: 10.1080/02687030600911419

Maddy, K., Howell, D., & Capilouto, G. (2015). Current practices regarding discourse analysis and treatment following non-aphasic brain injury: A qualitative study. *Journal of Interactional Research in Communication Disorders, 6*(2), 211-236.

Malia, K., Law, P., Sidebottom, L., Bewick, K., Danzinger, S., Schold-Davis, E., Martin-Scull, R., Murphy, K., & Vaidya, A. (2004). Recommendations for best practice in cognitive rehabilitation therapy: Acquired brain injury. Available from www.cognitive-rehab.org.uk.

Marini, A., Boewe, A., Caltagirone, C., & Carlomagno, S. (2005). Age-related differences in the production of textual descriptions. *Journal of Psycholinguistic Research, 34*(5), 439-463.

Marini, A., Galetto, V., Zampieri, E., Vorano, L., Zettin, M., & Carlomagno, S. (2011). Narrative language in traumatic brain injury. *Neuropsychologia, 49*, 10: 2904-2910.

Marsh, N., & Knight, R. (1991). Relationship between cognitive deficits and social skill after head injury. *Neuropsychology, 5*(2), 107-117.

Marsh, N., Knight, R., & Godfrey, H. (1990). Long-term psychosocial adjustment following very severe closed head injury. *Neuropsychology, 4*, 13-27.

McCully, E. A. (1984). *Picnic* (1st ed.). New York: Harper & Row.

McDowd, J., & Shaw, R. (2000). Attention and aging: A functional perspective. In F. Craik & T. Salthouse (Eds.), *The handbook of aging and cognition* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

McNeil, M., Doyle, P., Hula, W., Rubinsky, H., Fosset, T., & Matthews, C. (2004). Using resource allocation theory and dual-task methods to increase the sensitivity of assessment in aphasia. *Aphasiology, 18*(5/6/7), 521-542.

Mentis, M., & Prutting. C. (1987). Cohesion in the discourse of normal and head-injured adults. *Journal of Speech & Hearing Research, 30*, 88-98.

Miles, M., & Huberman, A. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks: Sage Publications.

Miller, J., & Iglesias, A. (2012). SALT: Systematic Analysis of Language Transcripts. Software for the Analysis of Oral Language. Middleton, WI: SALT Software, LLC.

Morrone, I., Declercq, C., Novella, J., & Besche, C. (2010). Aging and inhibition processes: The case of metaphor treatment. *Psychology and Aging, 25*(3), 697-701.

Murakami, T., Hama, S., Yamashita, H., Onoda, K., Hibino, S., Sato, H., . . . Kurisu, K. (2014). Neuroanatomic pathway associated with attentional deficits after stroke. *Brain Research, 1544*, 25-32.

Murray, L. L. (1999). Attention and aphasia: Theory, research, and clinical implications. *Aphasiology*, *13*(2), 91-111.

Murray, L., & Chapey, R. (2001). Assessment of language disorders in adults. In R. Chapey (Ed). *Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders,* 55-126. Philadelphia: Williams and Wilkins.

Myers, P. (1993). Narrative expressive deficits associated with right hemisphere damage. In Brownell, H., & Joanette, Y. (Eds). *Narrative Discourse in Neurologically Impaired and Normal Aging Adults*, 279-196. San Diego, CA: Singular Publishing Group.

Myers, P. (1999). *Right hemisphere damage disorders of communication and cognition.* London: Singular Publishing Group.

Nicholas, L., & Brookshire, R. (1993). A system for quantifying the informativeness and efficiency of the connected speech of adults with aphasia. *Journal of Speech and Hearing Research, 36*(2), 338-350.

O'Brien, S., Xue, Y., Ingersoll, G., & Kelly, A. (2013). Shorter length of stay if associated with worse functional outcomes for medicare beneficiaries with stroke. *Journal of the American Physical Therapy Association, 93*, 1592-1602.

O'Donnell, B. (2002). Forms of Attention and Attentional Disorders. *Seminars in Speech and Language, 23*(2), 99-106.

Öhman, A. (2005). Qualitative methodology for rehabilitation research. *Journal of Rehabilitation Medicine, 37*(5), 273-280.

Olness, G. (2005). *Discourse genre and verb performance in picture-elicited discourse of adults with aphasia.* Paper presented at the Clinical Aphasiology Conference, Sanibel, FL.

Olness, G., & Ulatowska, H. (2011). Personal narratives in aphasia: Coherence in the context of use. *Aphasiology, 25*(11), 1393-1413.

Ovbiagele, B., Goldstein, L., Higashida, R., Howard, V., Johnston, S., Khavjou, O, . . . Stroke, C. (2013). Forecasting the future of stroke in the United States: a policy statement from the American Heart Association and American Stroke Association. *Stroke, 44*(8), 2361-2375.

Park, N., & Ingles, J. (2001). Effectiveness of attention rehabilitation after an acquired brain injury: a meta-analysis. *Neuropsychology, 15*(2), 199-210.

Peach, R., & Shapiro, L. (2012). *Cognition and acquired language disorders : An information processing approach*. St. Louis, Mo.: Elsevier.

Rabbitt, P. (1965). Age and discrimination between complex stimuli. In A. T. Welford & J. E. Birren (Eds.), *Behavior, aging, and the nervous system* (pp. 35-53). Springfield, IL: Charles C. Thomas.

Rabbitt, P. (1965). An age-decrement in the ability to ignore irrelevant information. *Journal of Gerontology, 20*, 233-238.

Rabbitt, P. (1968). Age and the use of structure in transmitted information. In G. A. Talland (Ed.), *Human aging and behavior* (pp. 75-92). New York: Academic Press.

Rehak, A., Kaplan, J., & Gardner, H. (1992). Sensitivity to conversational deviance in right-hemisphere damaged patients. *Brain and Language, 42*, 320-336.

Reistetter, T., Karmarkar, A., Graham, J., Eschbach, K., Kuo, Y., Granger, C., Freeman, H., & Ottenbacher, K. (2014). Regional variation in stroke rehabilitation outcomes. *Archives of Physical Medicine and Rehabilitation, 95*(1), 29-38.

Reynolds, C. (2002). *Comprehensive Trail-Making Test manual*. Austin, TX: Pro-Ed.

Rogalski, Y., Altmann, L., Plummer-D'Amato, P., Behrman, A., & Marsiske, M. (2010). Discourse coherence and cognition after stroke: a dual task study. *J Commun Disord, 43*(3), 212-224.

Rossman, G., & Rallis. S. (1998). *Learning in the Field: An Introduction to Qualitative Research*. Thousand Oaks, CA: Sage.

Rowles, G., & Schoenberg, N. (2002). *Qualitative Gerontology: A Contemporary Perspective*. New York: Springer Pub.

Schneider, P., Dube, R., & Hayward, D. (2005). The Edmonton Narrative Norms Instrument. Retrieved March 14, 2011, from http://www.rehabmed.ualberta.ca/spa/enni

Shilling, V., Chetwynd, A., & Rabbitt, P. (2002). Individual inconsistency across measure of inhibition: An investigation of the construct validity of inhibition in older adults. *Neuropsychologia, 40*, 605-619.

Ska, B., Duong, A., & Joanette, Y. (2004). Discourse impairments. In Kent, R. (Ed) *The MIT Encyclopedia of Communication Disorders,* 302-304. Cambridge, MA: The MIT Press.

Ska, B., Duong, A., & Joanette, Y. (2004). Discourse impairments. In R. D. Kent (Ed.), *The MIT encyclopedia of communication disorders* (pp. 302-304). Cambridge, MA: The MIT Press.

Sohlberg, M., Avery, J., Kennedy, M., Ylvisaker, M., Coelho, C., Turkstra, L., & Yorkston, K. (2003). Practice guidelines for direct attention training. *Journal of Medical Speech Language Pathology, 11*(3), xix--xxxix.

Srivastava, P., & Hopwood, N. (2009). A practical iterative framework for qualitative data analysis. *International Journal of Qualitative Methods* 8 (1): 76--84.

Stapleton, T., Ashburn, A., & Stack, E. (2001). A pilot study of attention deficits, balance control and falls in the subacute stage following stroke. *Clinical Rehabilitation, 15*(4), 437-444.

Stoltzfus, E., Hasher, L., Zacks, R., Ulivi, M., & Goldstein, D. (1993). Investigations of inhibition and interference in younger and older adults. *Journal of Gerontology: Pyschological Sciences, 48*(4), 129-188.

Stroke Statistics. (2010). Retrieved 9/2/14, from http://www.strokeassociation.org/STROKEORG/AboutStroke/Impact-of-Stroke-Stroke-statistics_UCM_310728_Article.jsp

Stroop, J. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18*, 643-662.

Sturm, W., Schnitker, R., Grande, M., Huber, W., & Willmes, K. (2011). Common networks for selective auditory attention for sounds and words? An fMRI study with implications for attention rehabilitation. *Restorative Neurology and Neuroscience, 29*, 73-83.

Tesch, R. (1990). *Qualitative research: Analysis Types and Software Tools*. New York: Falmer Press.

Trunk, D., & Abrams, L. (2009). Do younger and older adults' communicative goals influence off-topic speech in autobiographical narratives? *Psychol Aging, 24*(2), 324-337.

Trupe, E., & Hillis, A. (1985). Paucity vs verbosity: Another analysis of right hemisphere communication deficits. In R. H. Brookshire (Ed.), *Clinical Aphasiology,* 83-96. Minneapolis, MN: BRK Publishers.

Tuckett, A. (2004). Qualitative research sampling: the very real complexities. *Nurse Researcher, 12*(1), 47-61.

Turkstra, L., Coelho, C., & Ylvisaker, M. (2005). The use of standardized tests for individuals with cognitive-communication disorders. *Seminars in Speech and Language, 26*(4), 214-222.

Ulatowska, H., & Olness, G. (2004). Discourse. In R. D. Kent (Ed.), *The MIT encyclopedia of communication disorders*. Cambridge, MA: The MIT Press.

Ulatowska, H., & Olness, G. (2004). Discourse. In Kent, R. (Ed) *The MIT Encyclopedia of Communication Disorders,* 300-302. Cambridge, MA: The MIT Press.

Van Leer, E., & Turkstra, L. (1999). The effect of elicitation task on discourse coherence and cohesion in adolescents with brain injury. *Journal Of Communication Disorders, 32*(5), 327-348.

van Manen, M. (1990). *Researching Lived Experience*. Albany, NY: SUNY Press.

Wills, C., Capilouto, G., & Wright, H. (2012). Attention and off-topic speech in the recounts of middle-age and elderly adults: A pilot investigation. *Contemporary Issues in Communication Science and Disorders, 39*, 105-113.

Wingfield, A., & Stine-Morrow, E. (2000). Language and Speech. In F. Craik & T. Salthouse (Eds.), *The handbook of aging and cognition* (2nd ed., pp. 359-416). Mahweh, NJ: Lawrence Erlbaum.

Wright, H., Capilouto, G., & Koutsoftas, A. (2013). Evaluating measures of global coherence ability in stories in adults. *International Journal of Language Communication Disorders, 48*(3), 249-256.

Wright, H., Fergadiotis, G., Koutsoftas, A., & Capilouto, G. (2010). Coherence in stories told by adults with aphasia. Procedia Social and Behavioral Sciences, *6*, 111-112.

Wright, H., Fergadiotis, G., Stoltzfus, M., & Capilouto, G. (2012). *Cohesion and local coherence in narrative across the lifespan.* Paper presented at the Annual Meeting of the International Neuropsychological Society, Toronto, CA.

Wright, H., Koutsoftas, A., Capilouto, G., & Fergadiotis, G. (2013). Global coherence in younger and older adults: Influence of cognitive processes and discourse type. *Aging, Neuropsychology, and Cognition: A Journal on Normal and Dysfunctional Development*, 1-23.

Wright, H., & Capilouto, G. (2009). Manipulating task instructions to change narrative discourse performance *Aphasiology, 23*(10), 1295-1308.

Yorkston, K., & Beukelman, D. (1980). An analysis of connected speech samples of aphasic and normal speakers. *Journal of Speech and Hearing Disorders, 45*(1), 27-36.

Youse, K., and Coelho, C. 2009. Treating underlying attention deficits as a means for improving conversational discourse in individuals with closed head injury: a preliminary study. *NeuroRehabilitation, 24*(4), 355-364.

Vita
Katherine McComas Maddy, MS, CCC/SLP

EDUCATION

Master of Science
Marshall University, Huntington, WV (May 2007)
Master of Science – Communication Disorders

Bachelor of Science
Marshall University, Huntington, WV (May 2005)
Bachelor of Science – Communication Disorders, Minor – History

PROFESSIONAL EXPERIENCE

2013 – Present	Speech-Language Pathologist, University of Kentucky Chandler Hospital, Lexington, KY
2007 – 2013	Speech-Language Pathologist, Stroke Program, Cardinal Hill Rehabilitation Hospital, Lexington, KY
2008 - 2010	Speech-Language Pathologist, PRN, FiveStar Rehabilitation, Lexington, K**Y**
2005 – 2007	Adjunct Instructor of self-paced English Communications, Mountwest Community & Technical College, Huntington, WV

SCHOLARLY ACTIVITY

Danzl, M., Harrison, A., Hunter, E., Kuperstein, J., Violet, S., **Maddy, K.**, & Campbell, S. (2016). "A lot of things passed me by:" Rural stroke survivors' and caregivers' experience of receiving education from healthcare providers. *Journal of Rural Health, 32*(1), 13-24.

Capilouto, G., Wright, H., & **Maddy, K.** (2016). Microlinguistic processes that contribute to the ability to relay main events: influence of age. *Aging Neuropsychology and Cognition, 23*(4), 445-63.

Maddy, K., Howell, D., & Capilouto, G. (2016). Current practices regarding discourse analysis and treatment following non-aphasic brain injury: A qualitative study. *Journal of Interactional Research in Communication Disorders, 6*(2), 211-236.

Maddy, K., Capilouto, G. J., & McComas, K. L. (2014). The effectiveness of semantic feature analysis: An evidence-based systematic review. *Annals of Physical Medicine and Rehabilitation, 57*(4), 254-267.

Danzl, M., Hunter, E., Campbell, S., Sylvia, V., Kuperstein, J., **Maddy, K.,** Harrison, A. (2013). "Living with a ball and chain": The experience of stroke for individuals and their caregivers in rural Appalachian Kentucky. *Journal of Rural Health, 29*(4), 368-382.