Comparing the treatment effect of conversational and traditional aphasia treatments based on conversational outcome measures

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COMPARING THE TREATMENT EFFECT OF CONVERSATIONAL AND TRADITIONAL APHASIA TREATMENTS BASED ON CONVERSATIONAL OUTCOME MEASURES

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

Communication Sciences and Disorders

by
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B.A., Hendrix College, 2004
M.A., Louisiana State University, 2007
May, 2012
DEDICATION

This work is dedicated to my parents who have always supported me and taught me to love learning.
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LIST OF ABBREVIATIONS

A = Aphasia
AAT = Aachen Aphasia Test
AC = Auditory Comprehension
ACTS = Auditory Comprehension Test
ASHA = American Speech and Hearing Association
ASHA FACS = American Speech and Hearing Association Functional Assessment of Communication Skills
BDAE = Boston Diagnostic Aphasia Examination
CADL = Communicative Assessment of Daily Living
CA = Conversation Analysis
CAPPA = Conversation Analysis Profile for People with Aphasia
CICF = Conversational Interaction Coding Form
CIU = Correct Information Unit
CP = Conversation Partner
CRUI = Communication Readiness and Use Index
Ctx = Conversation Therapy
HELPSS = Helm Elicited Language Program for Syntax Stimulation
ICF = International Classification of Functioning and Disability
IRC = Initiations, Responses, & Continuations
LR = Lexical Retrieval
MPC = Measure of Participation in Conversation
MSC = Measure of Skill in Supported Conversation
PI = Primary Investigator
PICA = Porch Index of Communicative Abilities
PWA = Person/People With Aphasia
PWI = Psychological Well Being Index
RAs = Research Assistants
R/F = Repair/Revision & Feedbacks
S = Syntax
SALT = Systematic Analysis of Language Transcript
SAQOL = Stroke and Aphasia Quality of Life Scale
SSD = Single Subject Design
TTI = Turn Taking Interchange
Ttx = Traditional Stimulation Therapy
WAB = Western Aphasia Battery
WHO = World Health Organization
ABSTRACT

This prospective Phase I single-subject (ABABA) study repeated across 4 participants with quasi-randomized treatment order investigated the treatment effects of conversation and traditional stimulation treatments on conversational outcomes. Treatment was administered for 10 sessions (2 one-hour weekly sessions) per treatment type. Primary conversational outcomes included 6-minute conversations coded for pragmatic behaviors and percent Correct Information Units (CIUs). Traditional stimulation probes included auditory comprehension, lexical retrieval, and syntax probe performance. Secondary outcome measures represented the domains of the ICF (WHO, 2001) model with the addition of quality of life. These included the Western Aphasia Battery (Kertesz, 2007), the American Speech Language and Hearing Association’s Functional Assessment of Communication Scale (Frattali, Holland, Thompson, Wohl, & Ferketic, 1995), the Conversation Analysis Profile for People with Aphasia (Whitworth, Perkins, & Lesser, 1997), and the Stroke and Aphasia Quality of Life Scale (Hilari, Byng, Lamping, & Smith, 2003).

Results indicated there was a treatment effect for syntax abilities following traditional stimulation therapy for the participants who received this treatment first. The two participants who received traditional stimulation therapy first demonstrated improved conversational outcomes. The participant with moderate aphasia who received conversation therapy first demonstrated an effect for conversation therapy. Visual trends indicated three out of the four participants demonstrated the highest gains in conversational abilities during or following conversation therapy. Percent CIUs increased over time in three participants despite order of treatment. No significant group changes were demonstrated after traditional or conversation
therapy on secondary outcome measures. These results provide a template for conducting and measuring conversational therapy.
CHAPTER 1.
INTRODUCTION

In the United States, there are 37.9 million people 65 and older, a number expected to double to 71.5 million by 2030 (Administration on Aging, 2008). “Chronic diseases, which affect older adults disproportionately, contribute to disability, diminish quality of life, and increase health- and long-term-care costs” (Center for Disease Control and Prevention, 2003, p. 101). One of the most prevalent disabling diseases is stroke. According to the American Stroke Association (ASA) 795,000 Americans suffer from a stroke each year (ASA, 2009). It is the number one cause of serious long-term adult disability (National Stroke Association, 2009). With the rise in the aging population, the risk of stroke is ever more prevalent since stroke risk doubles every decade after the age of 55. In addition, recent research has found that strokes are occurring in a younger population and the majority of strokes now are mild to moderate in neurological impairment (Wolf, Baum, & Tabor Connor, 2009). People with milder strokes present a unique problem since they are quickly discharged from rehabilitation because they are capable of performing basic activities of daily living, but are still struggling to participate in life roles (Wolf, Baum, & Tabor Connor, 2009).

When a stroke causes damage to the language areas in the left hemisphere of the brain, the result is aphasia, “an acquired communication disorder caused by brain damage, characterized by an impairment of language modalities: speaking, listening, reading, and writing; it is not the result of a sensory or motor deficit, confusion, or a psychiatric disorder” (Hallowell & Chapey, 2008, p. 3). About 1,000,000 people in the United States are afflicted with aphasia (NIDCD, 2009). Each year, 100,000 people acquire aphasia making it more common than
Parkinson’s disease, cerebral palsy, or muscular dystrophy (National Aphasia Association, 2009). There are two stages of recovery in aphasia, an early stage in which the effects of spontaneous recovery plus intervention yield the greatest effects, and the late or chronic phase where impairments may be long-lasting but improvement can still be demonstrated (Cherney & Robey, 2008).

The ability to communicate verbally makes us uniquely human. Language connects us to one another as “the currency of relationships” (Parr, Byng, Gilpin, and Ireland, 1997). At the heart of language is conversation, the everyday language we use to connect to each other. When the ability to communicate is stripped away by aphasia, ones’ identity may be taken as well. People with aphasia (PWA) can have chronic impairments that lead to long-term disability. Consequently this can lead to depression, social isolation, loneliness, loss of autonomy, and ultimately diminish quality of life (Simmons-Mackie, 2008; Parr, 2001).

To address the disabling effects of aphasia, speech-language pathologists (SLPs) seek to rehabilitate PWA. Rehabilitation for aphasia became widespread in the United States after World War II (Hinckley, 2002). Since that time, there has been a significant amount of research into the nature of the disorder and its treatment. The ultimate goal of rehabilitation is to produce changes that allow people to participate in their everyday life roles (Rodriguez & Gonzalez-Rothi, 2008). More notably, “enjoyable, effective conversation is fundamental to everyday communicative functioning, and consequently is the ultimate aim of speech pathology interventions with individuals with aphasia” (Armstrong & Mortensen, 2006, p. 185). In accord, the American Speech Language and Hearing Association’s (ASHA) Scope of Practice states “the overall
objective of speech-language pathology services is to optimize the individual’s ability to communicate and swallow, thereby improving quality of life” (ASHA, 2007, p. 5).

The World Health Organization’s (WHO), International Classification of Functioning and Disability (ICF) model is used to discuss the areas in which aphasia therapy has been focused (WHO, 2001). The framework of the ICF provides a model for discussing health status and disability and may be used by researchers and clinicians to conceptualize the disabling nature of the disorder. In the case of aphasia, the ICF provides a way to delineate the roles that aphasia treatment play in decreasing the language disorder’s disabling effects. The body structures and functions domain of the ICF examines physiological functions and anatomical parts of the body (WHO, 2001). In aphasia, this domain of the ICF is used to define the impairments of the brain that manifest as linguistic deficits. The activities and participation domains includes limitations and restrictions. Activity limitations “are difficulties an individual may have in executing activities” (WHO, 2001, p. 123). Participation restrictions are the difficulties one has engaging in life situations (WHO, 2001, p. 123). Aphasia can significantly hinder a person in executing daily life activities such as writing a check or ordering from a restaurant. Moreover, aphasia can inhibit a person from participating in life roles and situations such as carrying on a conversation.

Traditional aphasia therapy targets the impairment domain of the ICF (Simmons-Mackie & Kagan, 2007) to remediate specific linguistic deficits. It has been thought that if each element of language improves, then these skills will generalize to everyday language for overall communication improvement. This model of therapy has emerged from a medical model of treatment, implying that aphasia can be cured (Simmons-Mackie, 2000).
The most widely used traditional approach in aphasia rehabilitation is the stimulation approach, which employs multimodality stimulation to remediate reading, writing, auditory comprehension and verbal expression (Coelho, Sinotte, & Duffy, 2008). Typically stimulation therapy is clinician-directed, uses decontextualized materials, and presents stimuli in a rigid request-response-feedback format.

Systematic reviews and meta-analyses of studies indicates that traditional aphasia therapy indicate is effective. Therapy produces greater changes in language than if no treatment is received, including the effects of spontaneous recovery (Holland, Fromm, DeRuyter, & Stein, 1996; Robey, 1994; Robey, 1998). Efficacious treatment has been defined as bringing about a change in specific language functions as assessed by outcome measures (Robey & Schultz, 1998) such as the Western Aphasia Battery (WAB) (Kertesz, 1982), the Porch Index of Communicative Ability (PICA) (Porch, 1967), and the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass & Kaplan, 1983). The majority of these efficacy studies have assessed no further than the impairment domain and therefore ignore the impact aphasia has on activities and participation (Basso, Capitani, & Vignolo, 1979; Holland, et al., 1996; Holland & Halper, 1996; Poeck, Huber, & Willmes, 1989; Shewan & Kertesz, 1984; Wertz, et al., 1981; Wertz, et al., 1986). Moreover, the linguistic gains made in traditional therapy do not generalize to everyday language as researchers and clinicians have assumed (Simmons-Mackie, 2008). There is evidence that language functions have failed to generalize to untrained stimuli (DeDe, Parris, & Waters, 2003; Ennis, 2001; Fink, et al., 1995; Raymer, Thompson, Jacobs, & LeGrand, 1993; Thompson, 1989) or produce any real changes in the everyday settings that impact a person’s quality of life (Lyon, 2000; Thompson, 1989). Thus far, there have been no studies found that
directly assess generalization of stimulation treatment effects to conversational outcomes—the real crux of communication.

To address some of these issues, a functional model of service delivery model that incorporates the use of functional communication tasks, at the activity domain of the ICF is emerging. Examples include simulations of real life tasks such as role-playing various scenarios encountered in real life such as writing checks, using the telephone, or making a grocery list (Worrall & Frattali, 2000). Despite improvement on these functional tasks, PWA still experience isolation, loss of confidence, decreased roles, and limited chances for communication (Parr, Byng, Gilpin, & Ireland, 1997). Like the traditional approaches, the functional approaches do not directly target natural conversation (Simmons-Mackie, 2000) and the focus remains on language structure.

In the past decade the functional approach has been expanded to become the social model, which emphasizes social participation and quality of life in PWA. Social approaches to aphasia management include enhanced compensatory-strategy training, conversation therapy, conversational coaching, group therapy, partner training, counseling and psychosocial support, and advocacy and social action (Simmons-Mackie, 2008). One of the goals of the social approaches is to address natural communication through the exercise of interactional and transactional purposes of language use. Conversation studies have developed quantitative and qualitative methods to examine conversational discourse between PWA and their conversation partners. Conversation analysis is a qualitative methodology that has been used to describe the nature of aphasic discourse (Booth & Perkins, 1999; Heeschen & Schegloff, 1999; Wilkinson, 1999) and to guide intervention (Armstrong & Mortensen, 2006; Beeke, Maxim, & Wilkinson,
Numerous studies have incorporated the use of training conversation partners to communicate with PWA (Fox, Armstrong, & Boles, 2009; Hopper, Holland, & Rewega, 2002; Kagan, Black, Duchan, Simmons-Mackie, & Square, 2001; Lyon, et al., 1997). Many of these studies address changes in communication style of the conversation partner and do not address the PWA. Furthermore, no studies found have evaluated conversation therapy’s effects on development of successful strategies and enhancement of conversational success.

**Statement of the Problem**

Despite the numerous approaches to aphasia treatment, many questions remain unanswered. We still do not know which therapies work best for which individuals, what the optimal dosage of intervention is, or how the therapeutic effects can be maintained (Raymer, et al., 2008). We have moved from one approach to the next without vetting treatment types to determine which treatments produce the greatest gains in everyday language usage, namely conversation.

Healthcare reimbursement is shrinking (Simmons-Mackie, 2008) and the number of rehabilitation sessions a person may receive averages 4-10 (Sarno, 2004). Therefore, it is important to determine whether one course of treatment or another is optimal to achieve the ultimate goal for PWA - successful conversation. To address the need to identify which aphasia treatments produce the greatest gains in conversation, this study’s purpose is to examine the effects of traditional stimulation aphasia therapy and conversation therapy on conversational and traditional variables.
CHAPTER 2.
LITERATURE REVIEW

World Health Organization’s Model of Rehabilitation

The World Health Organization’s (WHO), International Classification of Functioning and Disability (ICF) (2001) is a conceptual framework that provides a universal language for discussing health related status and disability (see Figure 1).

![ICF Model Diagram](image)

Figure 1. ICF model conceptualizing aphasia therapy types and focus on language.

This framework integrates components of medical and social models of rehabilitation to create a biopsychosocial perspective that takes into account the body, the individual, and society.
There are two parts of the ICF, Functioning and Disability and Contextual factors. The ICF describes functioning and disability in terms of an interactive process between a person’s health condition and contextual factors. Functioning and Disability encompasses body structures/function/impairment, activity and participation. Body functions are “the physiological functions of body systems,” whereas, body structures “are anatomical parts of the body” (WHO, 2001, p. 12). Thus, impairments are problems in body function or structure as a significant deviation or loss. Aphasia has traditionally been defined as a language deficit due to impairments of body structure and function (Simmons-Mackie & Kagan, 2007). The majority of aphasia assessments and intervention have been at the impairment domain (Cruice, 2008; Simmons-Mackie & Kagan, 2007).

Activity is defined as “the execution of a task or action by an individual” and participation “is involvement in a life situation” (WHO, 2001, p. 14). These domains are discussed in terms of two qualifiers, performance, what a person does in their current environment and capacity, how a person executes a task or action. When there is a problem in one of these domains there is a limitation or a restriction. Activity limitations “are difficulties an individual may have in executing activities” (WHO, 2001, p. 14). Under the umbrella of Activity and Participation there is a chapter devoted to communication. Communication within the activity domain is “producing words, phrases, and longer passages in spoken messages with literal and implied meaning, such as expressing a fact or telling a story in oral language” (WHO, 2001, p. 134). PWA can have chronic impairments that can limit activity (e.g. filling out a medical form, calling for help, asking questions, following directions). Assessments at the
activity domain have included the language used in functional life tasks and measures of
discourse. Intervention at the activity domain emphasizes tasks relevant to daily activities.

Participation restrictions are defined as “problems an individual may experience in
involvement in life situations” (WHO, 2001, p.14). Communication within the participation
domain includes “language, signs and symbols, receiving and sending messages, carrying on a
conversation, and using communication devices and techniques (WHO, 2001, p. 135). At the
societal participation domain a conversation is used for getting a message across and interacting
with others (Kagan, et al., 2004). The ICF defines a conversation as “starting, sustaining and
ending an interchange of thoughts and ideas, carried out by means of spoken, written, sign, or
other forms of language, with one or more people one knows or who are strangers, in formal or
casual settings”(WHO, 2001, p. 135). PWAs’ impairments can restrict participation in their life
roles (e.g., not participating in social interactions, not taking care of their healthcare, not having a
job, not being a homemaker any longer) (Simmons-Mackie & Kagan, 2007). Consequently this
can lead to depression, social isolation, loneliness, loss of autonomy, and ultimately diminish
quality of life (Parr, 2001; Simmons-Mackie, 2008). The participation domain has not received
as much attention in aphasia treatment and outcomes. There are few assessments that measure a
person’s satisfaction with their life roles. Interventions at the participation domain are designed
to promote conversation outcomes to enhance participation in life roles.

A critical component of the ICF is Contextual factors. Contextual factors do not address
the health condition directly, but take into account environmental and personal factors that may
either facilitate or create barriers to independence for the person with a given health condition, in
this case, PWA. Environmental factors include the individual’s immediate environment and the societal environment. Personal factors include gender, age, background, lifestyle, and education.

The ICF is mandated by the American Speech and Hearing Association’s Scope of Practice (ASHA, 2007) as a framework for describing the dynamic role of a speech-language pathologist in prevention, assessment, treatment and research of communication disorders. The scope of the ICF allows one to holistically treat the person with a communication disorder. Since ASHA adopted the ICF, researchers and clinicians in Communication Disorders have begun thinking about treatments that go beyond the impairment and activity domains in communication rehabilitation, into the participation domain, but much work remains to advance this new effort.

While the ICF does not explicitly discuss quality of life, the framework allows one to take into consideration the person’s subjective experience of their perceived quality of life.

Quality of life for adults with acquired communication and swallowing disorders is determined by the individual, as well as being construed in the clinical sense as psychological well-being and social-health-related quality of life. Quality of life reflects the whole life experience for the individual, of which the presence and the consequences of the communication and/or swallowing disorder is a part (not the whole). It is self-evaluated in the context of the person’s life, in consideration of the influence of the following factors: emotional health, physical functioning, age, gender, coping skills (personal factors); and caregiver welfare, family and friends’ support, society’s attitudes towards communication and swallowing, family and friends’ communicative competence, knowledge of the disorder, and physical access and communication access in the community (environmental factors). In the clinical domains, the areas of functional communication ability, overall speech, language and/or swallowing functioning, and social networks and activities deserve exploration for performance, importance, satisfaction, personal meaning, and current and future aspirations (Cruice, 2008, p. 46).

Kagan and colleagues (2008) have adapted the ICF for aphasia called the Framework for Outcome Measurement (A-FROM) to highlight quality of life. This framework provides a different schematic than the ICF to distinguish the importance of quality of life. It is argued in
this paper that while that may be a useful framework, it is not part of a universal language in rehabilitation such as the ICF. Therefore, for the purpose of this paper, the ICF framework will be used with the added focus on quality of life.

To understand the different approaches to aphasia therapy, the following literature review will be divided into three sections that follow the structure of the ICF as illustrated above (see Figure 1). The sections will include: a review of aphasia treatment efficacy and a description of traditional approaches to aphasia therapy; an analysis of the functional approaches to aphasia therapy; and a review of the social approaches to aphasia therapy and the role of conversation as a goal and stimulus of treatment.

**Efficacy and Effectiveness of Aphasia Therapy**

In 1972, Darley challenged the field to answer the question does “language rehabilitation accomplish measurable gains in language function beyond (that which) can be expected to occur as a result of spontaneous recovery” (p. 7). Aphasiologists have since been attempting to determine if aphasia treatment is efficacious (Basso, et al., 1979; Butfield & Zangwill, 1946; Lincoln, et al., 1984; Poeck, et al., 1989; Sarno, Silverman, & Sands, 1970; Shewan & Kertesz, 1984; Vignolo, 1964). Treatment efficacy as stated in Robey and Shultz (1998), is defined by the Office of Technology Assessment (OTA) as “the probability of benefit to individuals in a defined population from a medical technology applied for a given medical problem under ideal conditions of use” (OTA, 1978, p. 16). On the other hand, effectiveness is defined by the OTA as “the probability of benefit to individuals in a defined population from a medical technology applied for a given medical problem under average conditions of use (OTA, 1978, p.16).
Darley’s question has been difficult to answer because of several factors: skeptics believe spontaneous recovery is the sole instrument resulting in change; ill designed studies; little or no use of control groups; and the limited number of randomized control trials (Lincoln, et al., 1984; Wertz, et al., 1981; Wertz, et al., 1986).

In the first randomized trial of aphasia treatment, Wertz and colleagues (1981) examined the effects of individual versus group aphasia treatment across five Veterans Administration Medical Centers. Sixty-seven people four weeks post-stroke-onset participated in the study. They were randomly assigned to either individual therapy or group therapy. The individual therapy group received stimulation response treatment manipulating speech and language deficits. The group therapy participants received language stimulation from social interaction with no direct manipulation of speech and language deficits. Treatment was administered 8 hours per week for each group. Each participant was assessed every 11 weeks until 48 weeks post-onset using a comprehensive test battery. Measures included: the PICA for aphasia; Token Test for auditory comprehension ability; Word Fluency Measure for word-finding; motor speech evaluation; and Coloured Progressive Matrices for nonverbal intelligence; Conversational Rating to determine conversational ability; Informant’s Rating of Functional Language for functional language ability. Language improvements in the 4th to 48th weeks were demonstrated in each group. The investigators concluded that treatment was efficacious for both group and individual treatment following spontaneous recovery.

In another randomized trial, Wertz et al. (1986) investigated differences in clinic, home, and deferred language treatment for aphasia at five Veteran’s Administration Medical Centers. Participants were randomly assigned to one of the following three groups: 12 weeks of treatment
by a speech-language pathologist followed by 12 weeks of no treatment; 12 weeks of home treatment by a trained volunteer, followed by 12 weeks of no treatment; or 12 weeks of deferred treatment followed by 12 weeks of treatment by a speech-language pathologist. Language treatment was administered for 8-10 hours per week in the form of stimulus-response aimed to enhance comprehension, expression, reading and writing. The PICA was used as the outcome measure for language performance. After the first 12 weeks, the clinic treated group improved significantly greater on the PICA than the other two groups. At the conclusion of the study at 24 weeks there were no significant differences in the three groups. The deferred treatment group made significant gains following treatment, indicating that delayed treatment does not affect improvement potential. The researchers concluded that aphasia treatment resulted in greater language gains than aphasia going untreated.

Holland, Fromm, DeRuyter, & Stein (1996) conducted a systematic review of aphasia literature to evaluate the evidence of treatment efficacy for aphasia. The levels of evidence from large group studies were examined. The levels of evidence are divided into three Classes by the American Academy of Neurology (AAN, 1994). A Class I study is defined as evidence that comes from one or more well-designed randomized clinical control trials. A Class II study is evidence that comes from one or more well-designed randomized study, including case-control, cohort, etc. Class III studies are evidence from expert opinion, nonrandomized historical controls, or case studies (AAN, 1994). While there have been numerous studies, only three were classified as Class I randomized control studies (Lincoln, et al., 1984; Wertz, et al., 1981; Wertz, et al., 1986), two were classified as Class II studies (Hartman & Landau, 1987; Poeck, et al., 1989), and the remaining were Class III studies. The majority of these studies have concluded
that aphasia treatment results in greater changes in language than if no treatment was administered.

Along with large studies, there have been a plethora of small group, single subject designs, or single case efficacy studies. Generally these studies conclude that there are improvements noted in language abilities in PWA as a result of treatment (Holland, et al., 1996). The majority of these studies have concluded aphasia treatment is efficacious using traditional impairment outcome measures. As noted by Holland et al. (1996), few studies have measured intervention effects using functional outcome measures.

More recently, the weight of evidence from effect sizes in aphasia efficacy studies has been quantified using meta-analyses. In a meta-analysis of 21 studies, Robey (1994) found treatment initiated in the acute stages yielded a moderate effect size which was twice as great an effect than in those left untreated. Treatment begun during the chronic phase also illustrated improvement for treated versus untreated with a small effect size.

In a more extensive meta-analysis by Robey (1998), 55 aphasia treatment studies were coded for amount of treatment, type of treatment, severity, and type of aphasia. Better outcomes were found at all stages of recovery in treated individuals versus untreated. As previously found by Robey (1994), the greatest effect was demonstrated when treatment was initiated in the acute phase. Treatment length of greater than 2 hours per week of treatment yielded greater gains than shorter durations. Multimodality therapy was the most frequently named type of therapy, which yielded a larger effect size than the overall averages for other treatment types. Greater gains were noted for people with severe aphasia. Differential effects of treatment for different types of aphasia could not be determined due to the minimal number of studies. It was concluded that
treatment was generally effective. Consistent with previous reviews, the outcomes measures used to determine efficacy were the PICA, the WAB and the BDAE.

While it has been concluded that aphasia treatment generally produces greater gains in language abilities following treatment as opposed to no treatment, the focus now narrow to determine which interventions are most beneficial, for which patients, and produce the greatest amount of change in everyday life situations.

**Traditional Aphasia Therapy**

Traditional aphasia therapy has been embedded in a medical model approach to aphasia management. The dominant focus of the medical model has been on illness. Traditional aphasia therapy has taken the form of other types of medical care, which includes diagnosis, treatment, and discharge. The use of terms such as “patients,” “cure,” and “experts” has been borrowed from medicine (Simmons-Mackie, 2008). This approach to aphasia management has shaped the practice of aphasia intervention to strive for “curing” aphasia with restorative therapies directed by the “expert” clinician. Traditional aphasia therapy targets the domain of the body structure and function of the ICF (McCormack & Worrall, 2008). Therapy is clinician-directed through the use of static non-interactive tasks that target the linguistic forms of language (Sarno, 2004). The goals of treatment have been aimed at treating the underlying linguistic deficits with anticipation that restored skills will transfer to use in everyday communication events.

There are numerous types of traditional aphasia treatments at this domain including the stimulation approach and cognitive neuropsychological approaches, which are based on various theories, such as restorative and models of normal language respectively. The most frequently cited aphasia treatment has been the stimulation approach (Coelho, et al., 2008; Murray & Clark,
Hildred Schuell pioneered the stimulation approach in the 1970’s and since then it has been one of the prevailing schools of thought and frequently used aphasia treatments in the United States. This approach is still widely used today and continues to be taught in our graduate schools. Thus, the tenets of this approach (Coelho, et al., 2008) will be the focus in this paper.

The stimulation approach can be defined as “the approach to treatment that employs strong, controlled, and intensive auditory stimulation of the impaired symbol system as the primary tool to facilitate and maximize the patient’s reorganization and recovery of language” (Coelho, et al., 2008, p. 406). This approach derives from a behavioral model and therefore is concerned with the function of stimuli, either increasing the likelihood of an accurate linguistic response or decepting it. Thus patients are presented with a hierarchy of stimuli/tasks that will stimulate specified components of the underlying language deficit (Murray & Clark, 2006). This format of request-response-evaluation is clinician directed.

Schuell (1964) believed language is the result of interactions between complex cerebral and subcortical activities. “Although the language mechanism can exist separately from input and output modalities, our primary language processes are acquired and organized through complex, interacting sensory systems and sensorimotor processes. Notably, auditory processes are at the apex of those interacting systems that aid in acquisition, processing, and control of language” (Coelho, et al., 2008, p. 404). Schuell, Jenkins, and Jiminez-Pabon (1964) defined aphasia as “a general language deficit that crosses all language modalities and may or may not be complicated by other sequelae of brain damage” (p. 113). Schuell thought language was not lost in the face of aphasia; rather the language system was working at reduced capacity. Therefore,
the goal of the stimulation approach is to stimulate the new integrations for language through the auditory modality. Schuell and colleagues have outlined the general principles for remediation with additions by Brookshire (1997). They are as follows:

1. Auditory stimulation should be used because many patients with aphasia have auditory deficits. The auditory modality may be used in conjunction with other modalities
2. The stimulus must be adequate. The difficulty of the task should be at the patient’s working level or right below maximum performance
3. Repeat sensory information
4. Each stimulus should elicit a response which helps shape the next stimulus
5. When a response is not elicited then the patient needs more stimulation not feedback on the correctness or incorrectness of the response
6. Maximum number of responses should be elicited
7. Show the patient their progress and give feedback
8. Treatment should be systematic and intense
9. Sessions should begin with a “warm-up” of relatively easy tasks
10. A variety of treatment materials should be employed
11. New materials and procedures should be outgrowths of previously introduced procedures.

Based on these tenets, treatment is conducted in a hierarchy that includes: Point-To Tasks, Following Directions, Yes/No Questions and Sentence Verification, Response Switching, Repetition Tasks, Sentence or Phrase Completion, Verbal Association, Answering Wh- questions,
Connected Utterances in Response to Single Words, Retelling, Self-initiated or conversational verbal tasks, reading and writing (Coelho, et al., 2008).

The stimulation treatment efficacy literature has found that in general, treatment results in improved language abilities. There have been a plethora of studies employing the stimulation approach, however, detailed treatment descriptions are sparse, making replication difficult. Schuell (1964) and her colleagues have documented the positive effects of the approach. The following studies provide sufficient detail to demonstrate treatment efficacy.

Basso, Capitani, and Vignolo (1979) evaluated the effects of stimulation therapy with 162 PWA and 119 controls. PWA were in the acute, post-acute, and chronic phases. Treatment focused on the modalities of auditory comprehension, oral expression, writing, and reading. Individual therapy was administered three times a week for five consecutive months. Improvement in each of these modalities was tested six months after the onset of therapy. Scores on each modality ranged from 0 (no communication) to 4 (very good communication). Each score was weighted based on performance on other tasks. No standardized measures were used in this study. Improvements in these modalities were found to be significantly higher in the treated group versus the untreated group.

Poeck, Huber, and Willmes (1989) investigated the efficacy of intense language treatment to determine if it produces greater gains beyond spontaneous recovery and to determine if therapy is beneficial 12 months post-onset. Ninety-two PWA composed the history control group. Sixty-eight participants with aphasia received treatment for an 18-month period. All were right-handed native German speakers with a vascular etiology that was homogenous with that of the control group. Participants in the treated group were either in the early group (1-4 months post-onset) or
the late group (4th to 7th and 7th to 12) month post-onset. The chronic group was 12 months and beyond post-onset. There was no comparison control group for the chronic group. Language was measured using the Aachen Aphasia Test (AAT; Huber, Poeck, & Willmes, 1984). Severity levels in the early treated and untreated groups were comparable. However, in the late phase, aphasia severity was more severe among the treated group. Treatment was administered for 6-8 weeks, for a total of nine one-hour sessions each week. These sessions were divided into five individual sessions and four group sessions. Individual sessions were language-oriented treatment and group sessions were dialogue interactions. Spontaneous recovery was accounted for by using data from 92 untreated patients in a previous study by the authors. Each participant’s level of treatment gain was calculated using the following: “The difference between a patient’s T score at the beginning of the treatment period and her/his T score at the end of the treatment period was adjusted for spontaneous recovery by subtracting the corresponding mean T-score difference obtained in the spontaneous recovery study” (Poeck, et al., 1989, p. 473). These corrections were made for the early and late phase groups on the subtests of the AAT and the overall severity score from the AAT. Performance differences from the beginning of treatment to the end were compared to the critical difference derived from the spontaneous recovery data using single case analysis methods. Of the treated participants in the early phases, 78% demonstrated gains on one or more subtest or profile level as a result of treatment. In the late phase, 46% of participants demonstrated language gains. In the chronic phase, no spontaneous recovery corrections were applied, and 68% of participants demonstrated significant improvement.
The early phase had significant gains on all subtests and overall profile level for both the treated and untreated group. In the late and chronic groups, significant yet smaller gains were found except on the Token Test. The early post-onset group demonstrated significantly higher gains on the Token test, repetition, and profile level than the control group. There was no significant difference found between the late treated and control groups. This finding could be because those in the late untreated group were more severe than those in the late chronic group. Researchers found improvement was not contingent on age, duration, site of lesion, or impairment of intelligence measured using standardized batteries.

Shewan and Kertesz (1984) evaluated the effects of language recovery following three treatments in PWA. One hundred people 2 to 4 weeks post-onset who suffered from a left CVA were administered treatment for a year. All types of aphasia classifications based on the WAB were included as well as all severity levels. A battery of outcome measures which included the WAB (Kertesz & Poole, 1974) and the Auditory Comprehension Test (ACTS) (Shewan, 1979) was administered at the initiation of the study and at 3, 6, and 12 months following the initial test. Participants were randomly assigned to one of three groups and were evenly distributed for aphasia type and severity. The first two groups received speech-language therapy from speech-language pathologists. The first group received treatment based on psycholinguistic principles. The second group received stimulation-facilitation therapy. The third group received unstructured stimulation facilitation therapy focused on psychological support provided by nurses. Two measures from the WAB were used to determine significant positive effects, the Language Quotient (LQ) which takes into account all of the scores from the oral and written subtests and the Cortical Quotient (CQ) which is a measure of cortical functioning including
Praxis and construction subtests. The authors claimed that while no formal measure of functional communication was administered, increases in the WAB and the ACTS scores reflect changes in language performance and thus functional communication as well. This claim is further validated by the authors because as stated, the WAB is derived from the Boston Diagnostic Aphasia Examination (Goodglass & Kaplan, 1972) which was found to correlate highly with the Communication Abilities in Daily Living (CADL) (Holland, 1980). In addition, Ross and Wertz (1999) also studied the relationships among various language impairment tests and the CADL. They found a similar high correlation and argued that perhaps the CADL was not a measure of language function, but rather another measure of language impairment.

All treated groups performed better on the LQ and the CQ than untreated. Both groups treated by trained speech pathologists made significant language gains. Whether one type of therapy over the other is more efficacious was not resolved due to the small sample size.

In the two previously discussed studies by Wertz and colleagues (1981,1986) the stimulation approach was employed. These studies provide further evidence of the efficacy of the stimulation approach for improving language function on standardized aphasia batteries. Furthermore, the stimulation approach has become the standard with which to compare other therapies (Coehlo et al., 2008). For example, Pulvermuller and colleagues (2001) examined the efficacy of constraint induced therapy using a control group of participants with aphasia who received “conventional” stimulation therapy.

There is evidence for the efficacy of the stimulation approach, suggesting that what we do brings about a change in language impairment, as measured by standardized aphasia tests. This, however, is not good enough because few studies have attempted to examine if improvements on
standardized measures are reflected in everyday communication situations (Herbert, Best, Hickin, Howard, & Osborne, 2003). “More research is necessary to determine the validity of these commonly used therapy procedures, particularly in terms of whether or not treatments evoke improvements in patients’ understanding during their daily communication interactions and activities” (Murray & Clark, 2006, p. 322).

It has been stated that the language gains made in traditional therapy do not generalize to everyday language, as has been widely assumed (Simmons-Mackie, 2008). Some researchers have found that language functions have not generalized to untrained stimuli (DeDe, et al., 2003; Ennis, 2001; Fink, et al., 1995; Raymer, et al., 1993; Thompson, 1989) or produced any real changes in everyday settings (Lyon, 2000; Thompson, 1989). Thus far, there have been no traditional studies that directly assess generalization of treatment effects to conversational outcomes—the real crux of communication.

**Functional Approaches to Aphasia Therapy**

**Pragmatics**

The view of how breakdowns of language form and structure are exhibited in a person fails to recognize how PWA use language to interact with others (Blonder, 2000). Consideration of language use as opposed to structure defines that study of pragmatics. Pragmatics has evolved over time. Davis and Wilcox (1985) define it as “the study of relationships between language behavior and the contexts in which it is used” (p.1). They further subdivide context into external and internal. External context refers to the situation in which language is used, and internal context as the speaker’s emotions and world knowledge (Davis & Wilcox, 1985). Yule (1996) defines pragmatics as the study of the relationships between linguistic forms and the users of
these forms. Further, Jay (2003) notes that pragmatics focuses on how social situations affect language processes.

The foremost voice on pragmatics and the philosophy and principles governing conversation is the philosopher H.P. Grice who proposed that unspoken principles govern human interaction and how we understand and interpret what others are trying to convey through language. Grice (1975) made a distinction between what a speaker intends, suggests, or implies. These implicatures orient the hearer to infer what is meant when not explicitly stated (as expressed in the semantics of the utterance) based on the context, background knowledge, and assumptions in a given situation. To reconcile the disparity between what is said and what is intended, Grice proposed underlying principles at work. One general principle is the Cooperative Principle, which states: “make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged” (Grice, 1975, p.45). Therefore, conversational implicatures are inferences made by a conversational partner based on the assumption of the cooperative principle (Ahlsén, 2008).

In further recognition that language use has a function beyond the structure of the sentence, Austin (1962) and Searle (1969) proposed that language should be as explained by reference to its purposeful uses or speech acts. They were interested in the linguistic goals associated with everyday language, for example, that language can be used to request, promise, apologize, comment, etc. (Cummings & Phil, 2007). Austin (1962) discussed an utterance in terms of its illocutionary force and perlocution. The locution refers to what is said, the force as the intention, or what it can do, and the perlocution as the effect an utterance has on a hearer. In contrast to Grice’s (1975) conversational implicatures that focus on the difference between what
is said and what is intended, speech act theory is focused on the actions intended by a speaker and executed by a listener (Austin, 1962; Searle, 1969). To understand the act of an utterance, Searle (1969) examined its overall communicative function; not its semantic or syntactic forms. His intention was to conceive a classification of speech acts as the basic unit of communication. Thus, this approach analyzes the utterance in relation to the context. Examples of speech acts include assertions, questions, requests, and commands. Speech act theory has been a useful tool in speech-language pathology as a form of discussing and encoding utterance meaning (Lesser & Milroy, 1993). It is not a comprehensive model that encompasses a set of principles that can explain the intentions of all utterances. Searle (1969) even criticizes the theory for not being able to account for complex discourse found in conversation.

The focus on pragmatics has permeated the field of speech-language pathology and specifically clinical aphasiology since the late 1970s and 1980s. In the 1980s the pragmatic approach led to a rise in ‘pragmatic protocols’. Prutting and Kirchner (1987) devised a ‘Pragmatic Protocol’ to examine 30 speech act parameters; however they found that this classification was incomplete because no precise boundaries could be determined. They subsequently developed a revised model that takes into account verbal aspects, paralinguistic aspects, and non-verbal aspects of communication. Despite using the taxonomy of speech acts, they did maintain that organization of pragmatic abilities is a useful clinical tool for differential diagnosis of language disorders.

During this time aphasiologists began discovering that irrespective of linguistic abilities, PWA exhibited pragmatic abilities that were relatively spared, giving them some measure of communicative competence (Holland, 1991). Ulatowska and Olness (2007) discuss pragmatic
skills as not hinged solely on linguistic ability, but how a person organizes and structures information. They report that people with aphasia are capable of doing the following:

- maintain the skills necessary for selecting and organizing information. These skills include maintained knowledge of the canonical structure of various discourse types, memory and attention skills necessary to select relevant information, awareness of their interlocutors’ knowledge, and ability to draw on paralinguistic and contextual sources as a means of tailoring information for a conversational partner (Ulatowska & Olness, 2007 p. 149).

Consequently, they conclude that pragmatic skills are spared to some degree in aphasia. There are a plethora of studies that demonstrate that communicative competence is preserved to a degree in PWA (Doyle, Goldstein, & Bourgeois, 1987; Holland, 1991; Kimbarow & Brookshire, 1982; LeDorze & Nespoulous, 1989; Schienberg & Holland, 1980). So much so, that this observation is referred to as commonplace knowledge by Holland (1991). To capitalize on some of these preserved abilities, there was a shift towards a pragmatic approach in the assessment and treatment of aphasia, with concentration on dyadic communication interactions (Carlomagno, Blasi, Labruna, & Santoro, 2000).

The way PWA use language has also focused on discourse. “Discourse is achieved in terms of more global issues such as overall success in conveying meaning, appropriateness of particular patterns of language to a particular situation, topic maintenance, and turn-taking, with social context being an integral part of the framework and the analysis” (Armstrong, 2000, p. 876). Ulatowska, Allard, and Chapman (1990) proposed three basic types of discourse: narrative, procedural, and conversational. Narrative discourse includes descriptions of events that have happened in the past with specific details of the setting, action, and resolve. Procedural discourse involves descriptions of how to complete steps in a process. Conversational discourse is the exchange of utterances between conversational partners and can include narrative and
procedural discourse features. Fewer studies have focused on conversational discourse than procedural and narrative (Ulatowska, et al., 1990). Spontaneous speech has predominately been measured using a narrative picture elicitation task (Blonder, 2000) such as the cookie theft picture from the BDAE (Holland & Hinckley, 2002). This type of task fails to examine the interactional use of language because it is inevitably a monologue.

**Functional Approaches**

In response to the earlier narrow focus on solely treating linguistic deficits and the recognition of the relatively preserved pragmatic communicative competence in PWA, current interventions target function because language components training did not transfer to real life contexts (Holland, 1982; Sarno, 1969). Functional approaches to aphasia treatment focus on the activity domain of the ICF, specifically the use of compensatory strategies and the communicative tasks of daily living are the focus (Holland, 1991; Holland & Hinckley, 2002; Worrall & Frattali, 2000). Functional activities include simulated scenarios such as: writing a check, answering a phone, making a grocery list, and role-playing tasks such as ordering food from a restaurant (Aten, 1986; Holland, 1991; Worrall & Frattali, 2000). Despite the emphasis on daily tasks employed in functional approaches, functional activities fall short because they do not elicit communicative interaction beyond the transaction being completed in the activity.

There are several assessments that measure functional communicative abilities (i.e., communication situations in everyday life) (Frattali, Holland, Thompson, Wohl, & Ferketic, 1995; Lincoln, 1982; Lomas, et al., 1989; Sarno, 1969). For instance, the goal of the Communicative Abilities of Daily Living (CADL) (Holland, 1980; Holland, Frattali, & Fromm, 1999) was to move beyond traditional aphasia language tests to examine how language is used in
a broader, more natural context. The theoretical framework from the CADL is derived from Hymes’ (1972) concept of communicative competence, Bales’ (1950) holistic view of communication, and speech act theory (Austin, 1962; Searle, 1960). The CADL assesses ten categories, but of specific interest are items that simulate typical daily life activities through role-playing with the use pictures and props. The clinician plays various roles such as a receptionist or a doctor. The types of scenarios include: going to the doctor, buying items at a store, and looking for information at an office. This measure has been found to predict the communicative abilities of PWA in everyday situations (Holland, 1980). Nevertheless, the CADL has been found to correlate highly with the WAB and the BDAE, which suggests that it tests some of the same skills of language structure. The CADL still only focuses on the getting the message across and not on the interaction seen in natural communication (Beeke, et al., 2007). Improvement on language tests and functional tasks have still left PWA feeling isolated, loss of confidence, and with limited communication opportunities (Parr, 1997) because people are still unable to participate in their life roles.

**Social Approaches to Aphasia Therapy**

The social model for aphasia therapy grew from the functional approach. This model for aphasia treatment aims to address the social consequences of aphasia and enhance social communication. Additionally, there is a focus on social participation in life events and reducing barriers to participation (Simmons-Mackie, 2000). Therefore, the ultimate goal is to enhance the quality of communicative life in PWA. Thus, the social model is aligned with the participation domain of the ICF (WHO, 2001). The traditional view of aphasia therapy from the medical model is to treat the impairments of aphasia with concentration on the illness. Aphasia, however,
is not usually curable and it results in long-term consequences. These consequences can ultimately leave PWA isolated, lonely, with reduced ability to participate in activities, and changes in life roles (Parr, 2007). Traditional aphasia therapy excludes addressing the social and psychosocial consequences, therefore perpetuating the problem and only addressing a splinter of the issue. In contrast, the social model focuses on broader aspects of the experience of living with aphasia and promoting health and well being. Contrary to traditional aphasia therapy, the social model demands client-directed therapy to ensure that intervention is relevant to each PWA’s life goals and personal roles. Moreover, the social model was derived to meet the third party payers’ demands for evidence of functional outcomes that reflect changes in the everyday lives of PWA. Lastly, consumers have demanded having input in the therapies they receive (Simmons-Mackie, 2008).

The social model of aphasia is a philosophical and conceptual framework for the assessment and intervention of aphasia. Encompassed within this model are social approaches to aphasia therapy. There have been a numerous studies in the past two decades devoted to research and development of social approaches (Elman & Bernstein-Ellis, 1999; Hopper, et al., 2002; Kagan, et al., 2001; Parr, 2001; Parr, 2007; Pound, Duchan, Penman, Hewitt, & Parr, 2007; Simmons-Mackie, 2000; Simmons-Mackie & Damico, 2007; Simmons-Mackie, Kearns, & Potechin, 2005; Worrall & Frattali, 2000). The tenets of the social approach are as follows:

management is designed to 1) address both information exchange and social needs as dual goals of communication; 2) address communication within authentic, relevant, and natural contexts; 3) view communication as dynamic, flexible, and multidimensional; 4) focus on the collaborative nature of communication; 5) focus on natural interaction, particularly conversation; 6) focus on personal and social consequences of aphasia; 7) focus on adaptations to impairment; 8) embrace the perspectives of those affected by aphasia; and 9) encourage qualitative as well as quantitative measures (Simmons-Mackie, 2008, p. 292).
At the heart of social approaches, the desired outcome is successful conversational interaction. Traditional approaches have seldom assessed natural conversation or directly targeted it during intervention (Simmons-Mackie, 2000). Conversely, monologues have been the most predominant source of connected speech samples in aphasia diagnosis and treatment (Goodglass & Kaplan, 1983; Holland & Hinckley, 2002; Nicholas & Brookshire, 1993). The use of monologues solely focuses on the correct content and form of language. Yet, this is only one part of communication. Simmons-Mackie (2008) states “through communication we not only exchange information, but also develop and maintain an identity and sense of self, fulfill emotional needs, provide connections with other people, and promote our membership in groups” (p. 293). There are several social approaches to aphasia management, including enhanced compensatory-strategy training, conversation therapy, conversational coaching, group therapy, partner training, counseling/psychosocial support, and advocacy and social action (Simmons-Mackie, 2008). For the purpose of this study, studies using conversation will be reviewed.

**Conversational Approaches**

Conversation is the heart of human communication (Armstrong & Mortensen, 2006; Clark & Wilkes-Gibbs, 1986). Through naturalistic observation, Davidson, Worrall, and Hickson (2003) found the most frequent communication activity of older adults and PWA was conversation at home and in social groups. Although they found the frequency of conversation was reduced for PWA. Unfortunately, this discourse style has not been trained in traditional aphasia therapy. Research has found that some speech-language pathologists relegate conversation as something to do as a break from the real therapy (Simmons-Mackie, 2000).
Often times, if conversation is attempted it is in the form of an interview. The communication style that is typical in traditional aphasia therapy is in the format of Request-Response-Evaluation (RRE) (Simmons-Mackie, Damico, & Damico, 1999). The clinician requests the PWA to perform a task, the PWA responds, then the clinician evaluates the response with an encouraging statement such as “that’s good.” This constrains the discourse to a structured unnatural form of communication not representative of adult communication. “Natural conversation—the everyday, ordinary talk that serves both social and transactional goals— involves varied discourse structures, creative discourse devices, varying social stances, and shifting social roles” (Simmons-Mackie, 2008, p. 293). There has been an increase in assessments and interventions oriented in the social approach that target the goals of conversation through various forms.

**Conversation Analysis**

The conversational interactions between PWA and communication partners have frequently been analyzed using Conversation Analysis (CA). This is a qualitative methodology used to systematically analyze naturally occurring communication (Beeke, et al., 2007). It has been used to describe the nature of the communication of a person with aphasia, as an assessment tool, and as a guide for intervention.

The nuances of interaction during communication with PWA are captured using CA. Researchers have examined the use of sequential utterances in aphasic conversation (Wilkinson, 1999), the manifestations of agrammatism in conversation (Heeschen & Schegloff, 1999), joint word searching and turn completion (Oeschlaeger & Damico, 2000), and repair (Lindsay & Wilkinson, 1999; Perkins, 2003).
There are several assessments that employ CA. One is the Conversational Analysis Profile for People with Aphasia (CAPP A) (Whitworth, Perkins, & Lesser, 1997). It consists of two parts, an interview with a communication partner (CP), and a conversational sample. The interview is designed to determine the relationship between the perceptions of the PWA and their communication partner and the strategies used in conversation, and then subsequently surveys the premorbid and current interactional styles and communication opportunities of the PWA. The second half of the assessment is a 10-minute conversation sample recorded in the home of the person with aphasia and their communication partner. Subsequently, the clinician analyzes the sample for linguistic abilities, initiation, turn taking, repair, and topic management.

Another CA assessment tool is Supporting Partners of People with Aphasia in Relationships and Conversation (SPPARC) (Lock, Wilkinson, & Bryan, 2001). The SPPARC requires the analysis of a video-recorded conversation sample of a person with aphasia and their conversation partner. The sample is then analyzed by a clinician for the following: trouble and repair, turns and sequences, topic, and overall conversation. Consequently the information from the analysis is used to guide intervention. These approaches to aphasia assessment are attractive because of the ecological validity of the data obtained.

Furthermore, CA has been used as a source of intervention to modify the communication behaviors of PWA or their communication partner. Booth and Perkins (1999) used CA to examine the conversations of a person with aphasia and his brother to identify repair strategies being used by both individuals. The conversations were analyzed using the CAPP A (Whitworth, et al., 1997). The results of the CA were used to give personalized advice to the brother of the PWA. This advice was presented in a group format with three other caregivers. The topics of
the group were strategies for dealing with the linguistic deficits during interaction, psychosocial consequences, and the use of collaborative repair. The CAPPA was administered pre- and post-therapy. Results revealed a significant decrease in repairs made by the PWA.

CA has also been used to analyze the interactions of PWA and their conversational partner to provide a basis for intervention (Burch, Wilkinson, & Lock, 2002; Heeschen & Schegloff, 1999; Lock, et al., 2001). Boles (1997) used CA to determine if progress had been made following a seven week (2 one hour sessions weekly) communication partners training therapy. Four conversational dyads of PWA and their partners were observed by the primary investigator while having a conversation. The investigator made observations throughout the conversation and made recommendations for particular techniques that would be helpful in providing improved conversation for each dyad. Conversations were recorded and transcribed and analyzed using the following verbal output measures: frequency of words, utterances in T-units, and conversational repairs. Other assessments were also administered including the WAB, the CADL, the Communication Readiness and Use Index (CRUI), and the Psychosocial Well-Being Index (PWI). Two participants were found to have positive changes on the assessments as well as the measures of verbal output. The other two participants were found to have little change on the assessments and no change in verbal output measures. CA provided more specific information about what was occurring in conversation than the results of the traditional assessments. These findings were used to modify treatment goals for the dyads. Boles (1997) also found that the most changes were reflected in participants who were not very far post-stroke and had moderate aphasia. People with mild aphasia did not demonstrate as much improvement.
Other qualitative methods to assess conversation besides CA have been employed. For instance, Armstrong and Mortensen (2006) examined the use of a systematic framework referred to as speech function network by Eggins and Slade (2004) for analyzing everyday conversation in PWA. The categories for discourse were: open/sustain, continue/react, respond/rejoin and some related supporting/confronting moves. The conversations of three PWA and their familiar conversation partner without aphasia were analyzed using this method. This systematic flow chart of each utterance allows one to see where the person with aphasia is successful and unsuccessful as well as the behaviors of the conversation partner. This information can then be used to make therapeutic goals for the person with aphasia.

**Conversation Partner Training**

Numerous studies have used other methods to target conversation that have included the PWA’s conversation partner. Simmons-Mackie, Kearns, and Potechin (2005) trained the caregiver of a PWA to reduce “nonfacilitative behaviors”. Training was found to be successful in reducing those behaviors and was found to generalize to untrained conversations, thus, improving the conversational interaction. In a study by Lyon and colleagues (1997), communication partners and PWA were trained in two phases. The first phase was conducted in the clinic where the clinician trained the communication partner to use strategies to maximize interaction with the PWA. The second phase consisted of the communication partner and the PWA participating in a chosen activity in the environment. Performance was assessed using the standardized measures of the BDAE, the CADL, and the Affect Balance Scale, informal measures included the CRUI and the PWI, created by the investigator. No significant differences
were found on the standardized measures. The CRUI and the PWI did reveal significant differences.

Supported conversation for Adults with Aphasia was developed by Kagan (1998, 1999) as a theoretically driven approach to train conversational partners to reveal the inherent competence of PWA. In a randomized trial, Kagan, Black, Duchan, Simmons-Mackie, and Square (2001) compared a group of twenty volunteers who were trained on “Supported Conversation for Adults with Aphasia” with a control group of twenty volunteers who were only exposed to PWA. The study was designed to test if training volunteers improves their conversation skills and if this subsequently improves the communication of the partner with aphasia. Conversations were videotaped, transcribed, and analyzed using the “Measure of Participation in Conversation for Adults with Aphasia.” The trained volunteers were found to be significantly better than the untrained volunteers. Direct training with PWA was not conducted, however positive change were noted in their conversational abilities.

Four participants with moderate-severe expressive aphasia and their partners participated in a training program using the principles of supported conversation for PWA to improve conversational interaction (Cunningham & Ward, 2003). Each case was a single subject ABA design. During the first A phase a 15 minute conversation of a personally relevant topic was videotaped. Conversations were analyzed for frequency of nonverbal behaviors (props, gestures, writing, drawing, touch) and conversational interactions (trouble source, repair, initiation, interruptions). Both the PWA and the conversation partner completed the Visual Assessment of Self-Esteem Scale (VASES) (Brumfitt & Sheeran, 1999) and the conversation partners filled out the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The
intervention phase included five 90 minute sessions conducted at the participant’s home. The sessions were composed of education on supported conversation techniques, video feedback, and role-playing scenarios. The same outcome assessments were administered in the second A phase. The results did not show any significant improvements but there were some positive trends as a result of the intervention despite substantial variability. The outcome measures did not reveal consistent changes.

The majority of conversation partner training studies have used people with moderate-severe aphasia and Broca’s aphasia (Boles, 1998; Booth & Perkins, 1999; Hickey, Bourgeois, & Olswang, 2004; Hopper, Holland, & Rewega, 2002; Kagan, Black, Duchan, Simmons-Mackie, & Square, 2001), while few have examined people with mild aphasia. Fox, Armstrong, and Boles (2009) conducted a conversation partner training with a woman with mild aphasia and her husband. There were four baseline sessions, 14 treatment sessions and two follow-ups. Ten-minute conversation samples were video-taped and taken during each phase of the study. Treatment goals were based on areas of concern identified by the couple and observations made by the investigator. Conversations were measured using the Measure of Skill in Supported Conversation (MSC) and the Measure of Participation in Conversation (MPC) (Kagan, et al., 2004) and transcribed and analyzed using the following goal behaviors: interruptions, probe questions, repair sequence, topic initiation, trouble-indicating behavior, and writes/draws. The couple was also asked to rate their satisfaction following each conversation. Both partners rated improvement in their satisfaction following treatment. Ratings on the MPC and MSC both improved post-treatment. Some changes were noted on the goal behaviors. Fox, Armstrong, and
Boles (2009) reported that the goal behaviors were difficult to examine to determine which aspects were affected by treatment.

Hopper, Holland and Rewega (2002) used conversational coaching to teach conversation strategies to PWA and their communication partners. The effect of conversational coaching was evaluated with multiple baseline single subject design with two people with chronic aphasia and their spouses. Number of main concepts conveyed in conversation and performance on the CADL-2 (A Holland, et al., 1999) were used as outcome measures. The PWA watched a 2-3 minute videotape of reality television. After the video, the PWA met with their spouse and the clinician to describe what they had seen. This was conducted for the baseline and treatment. Before the initiation of treatment the clinician showed the couple a video of their conversation during baseline. The clinician illustrated strategies that were successful and unsuccessful. During treatment the clinician intervened when there was a communication breakdown or miscommunication to coach the couple in verbal and nonverbal strategies to enhance communication. Treatment was administered for ten sessions. The percentage of main concepts successfully communicated was measured and compared during baseline and treatment. Variable baseline data were demonstrated in both dyads, however the percentage of main concepts was significantly higher post-treatment than during baseline. One of the PWA had significantly higher CADL-2 scores following treatment. Social validation rating by students on the quality of the conversations was higher post treatment than pre treatment.

Conversation partner training has been used with familiar conversation partners as well as volunteers to train partners how to change their conversational interactions to enhance communicative success for PWA, and with positive outcomes (Turner & Whitworth, 2006). This
is an extremely valuable area of work that furthers the social approach to life participation of PWA. Conversation partner training has focused on the collaborative and interactive nature of conversation, however, little has been done focusing on strategies to teach the person with aphasia how to have a more successful conversation. Traditional therapies train the person on the impairments but can we train conversational skills in the PWA and get better conversational success?

**Conversation Therapy**

Conversation therapy is defined by Simmons-Mackie (2000) as “direct, planned therapy that is overtly designed to enhance conversational skill and confidence” (p. 170). It does not just mean one simply has a conversation with the PWA. Conversation is the goal, the stimulus and the approach. While the overall goal of conversation therapy is to improve conversational success, each person should achieve this through individual goals. To enhance skill and confidence in conversation, the dual goals of conversation- the transactional and the interactional- are addressed. Example goals may include: initiating topics, holding turns, shifting turns to the next speaker, using continuers (i.e., head nods) or interest markers (i.e., mhm, oh really, nice) (Simmons-Mackie, 2000), and a variety of speech acts such as arguing, joking, storytelling, and gossiping (Simmons-Mackie, 2008). Simmons-Mackie (2000) states the therapist “must understand, reinforce, and expand on discourse devices and promote communication that is socially and contextually appropriate” (p. 173). The medium of therapy should be as much of a social conversational context as possible to ensure transfer of skills to natural social conversation. While conversation therapy has been described in the literature, there is little if any research that addresses the treatment effect of conversation therapy for PWA.
There are, however, a growing number of studies that have examined the interactional discourse structures of PWA and their partners during conversation (Hengst, 2003; M. Oelschlaeger & J. Damico, 1998; Perkins, 2003; Simmons-Mackie & Damico, 1999). For instance, Hengst, Frame, Neuman-Stritzel, and Gannaway (2005) examined the use of reported speech, where someone quotes or paraphrases the speech of another person. They found this to be a common discourse structure used by both people with mild-moderate aphasia and their communication partners. Simmons-Mackie, Kingston, and Schultz (2004) reported on the use of participant frames (the stances people take in a conversation) in a conversation between a person with severe aphasia and a communication partner. Oelschlaeger and Damico (1998) examined the use of joint production during a conversational interaction between a person with aphasia and their spouse. These studies have led to further understanding of the nature of conversational discourse between a person with aphasia and their communication partner.

Despite that, there have been no systematic studies on the treatment effect of training conversational skills in individual therapy between the clinician and PWA. In addition, there has been little focus on individuals with mild-moderate aphasia who still report they have difficulty in having a successful conversation. Furthermore, there have been no studies examining the order of treatment types. We do not know if impairment based therapy to train the linguistic impairments is needed as building blocks first before addressing conversational skills. We also do not know if it is possible to successfully train conversational strategies without training specific linguistic deficits.
Purpose of Study/Research Questions

Based on the literature review, this study aims to investigate the treatment effect of traditional stimulation therapy and conversation therapy. The following research questions will be addressed:

1. Is there a treatment effect for traditional stimulation aphasia therapy (Ttx)?
2. Do traditional tasks produce gains in conversation?
3. Is there a treatment effect for conversation therapy (Ctx)?
4. Does traditional stimulation therapy first followed by conversation therapy second, or conversation therapy first followed by traditional stimulation therapy second produce better conversational outcomes?
5. Do participants demonstrate improvement on:
   a. linguistic skills based on comparison of pre-, post-, and post-post administrations of the Western Aphasia Battery-Revised (Kertesz, 2007)?
   b. functional communication skills based on comparison of pre- and post- and post-post treatment on the ASHA Functional Assessment of Communication Skills (Frattali et al., 1995)?
   c. quality of life based on comparisons of pre-, post-, and post-post administrations on the Stroke and Aphasia Quality of Life Scale (Hilari, Byng, Lamping, & Smith, 2003)?
   d. conversational abilities with the primary conversation partner based on comparisons of pre-, post-, and post-post administrations of the Conversational Analysis Profile for People with Aphasia (CAPPA; Whitworth, et al., 1997)?
Research Hypotheses

Based on the established research questions, five experimental hypotheses were developed.

Hypothesis 1: It is hypothesized that participants will demonstrate a treatment effect for traditional therapy. Gains in auditory comprehension, lexical retrieval, and syntax skills will be higher during and post therapy than the baseline scores.

Hypothesis 2: It is hypothesized that working on traditional tasks in therapy will not result in measurable gains in conversation.

Hypothesis 3: It is hypothesized that participants will demonstrate a treatment effect for conversation therapy. For conversational variables, it is hypothesized that participants will demonstrate a reduction in repairs/revisions, feedback and restatements, and increases in initiations, responses, and continuations. It is also hypothesized that correct information units (CIUs) will increase after conversation therapy.

Hypothesis 4: For participants that receive traditional therapy followed by conversation therapy, it is hypothesized that higher gains in conversation will be demonstrated after the initiation of conversation therapy. For the participants who receive conversation therapy followed by traditional therapy, it is hypothesized that gains in conversation will be greater following conversation therapy and will not be maintained during traditional therapy.
Hypothesis 5:

a. It is hypothesized that linguistic skills based on the Western Aphasia Battery-Revised (Kertesz, 2007) will improve after traditional therapy but not after conversation therapy.

b. It is hypothesized that functional communication skills based on comparison of pre- and post- and post-post treatment on the ASHA Functional Assessment of Communication Skills (Frattali et al., 1995) will improve following conversation therapy and no change will be demonstrated after traditional therapy.

c. It is hypothesized that quality of life on the Stroke and Aphasia Quality of Life Scale (Hilari, Byng, Lamping, & Smith, 2003) will improve following conversation therapy and no change will be demonstrated after traditional therapy.

d. It is hypothesized that conversational abilities with primary conversation partner using the Conversational Profile for PWA (Whitworth, et al., 1997) will improve following conversation therapy and there will be no change following traditional therapy.
CHAPTER 3.

METHODS

This study was designed as a Phase I (Robey & Schultz, 1998), mixed methods, A-B-A-B-A single-subject design, replicated across participants to examine the treatment effects of traditional stimulation aphasia therapy and conversation therapy for people with chronic aphasia. The Louisiana State University (LSU) Institutional Review Board for the protection of human subjects approved the study proposal prior to enrollment of participants and data collection. Informed consent was collected from all participants prior to any data collection.

Participants

Four people with mild to moderate aphasia were recruited for the study. Aphasia classifications (i.e., Broca’s, Wernicke’s, Conduction, etc.) were not used because they have been subject to debate. It is estimated that as many as 25-70% of people cannot be accurately classified based on their language profile. People classified in a group do not necessarily present with the same deficits. Furthermore, people can change classifications as they progress in recovery. The characteristics of each classification overlap. Classifications can vary based on diagnostic tool (Murray & Chapey, 2008). Therefore, no classifications were used, only severity level.

PWA were recruited from the LSU Speech Language and Hearing Clinic, outpatient centers and area stroke support groups. Flyers and brochures were distributed to local public places including churches, senior communities, volunteer centers, speech and hearing clinics, Speech-Language Pathologists, physicians’ offices, and other rehabilitation centers.

All participants met the following inclusionary criteria: 1) first time, acquired left hemisphere focal lesion resulting from a cerebrovascular accident (CVA), in the language
processing centers of the brain, as determined by medical records obtained by investigator; 2) at least 6 months post-onset at the time of initial testing; 3) between the ages of 18-89; 4) native English speaker; 5) right hand dominant; 6) with no other history of or active neurological disorders, language disorders, substance abuse, or psychiatric illness per caregiver report; 7) at least a high school level of education; 8) adequate vision and hearing based on screening assessments; 9) mild to no apraxia of speech; 10) community-dwelling; and 11) not receiving any other speech or language therapy for the duration of the current study.

During the recruitment phase, the Primary Investigator (PI) called potential participants to determine interest in and eligibility for study participation. Eligible participants were scheduled for an initial appointment where they received informed consent and underwent a more extensive screening.

The study took place at the Louisiana State University Speech, Language, and Hearing Clinic (LSU SLHC). At the initial appointment, the PI described the study to the participants and had them sign an IRB-approved informed consent form. Each participant, with the help of his/her caregiver and/or the PI, completed a background questionnaire. Next, the PI determined eligibility by administering the following screenings and assessments:

- Western Aphasia Battery-Revised (WAB-R; Kertesz, 2007): Severity of aphasia was determined using the WAB Aphasia Quotient (AQ). People with an AQ of 60-93 (mild-moderate) were eligible for the study. The WAB is a widely used test for adults with acquired neurological impairment. It was standardized using 365 people with aphasia and 161 controls. The WAB has a high degree of concurrent validity, correlation $r= .96$. Interrater reliability and test-retest reliability are high
The Aphasia Quotient (AQ) examines spontaneous speech, auditory verbal comprehension, repetition, and naming and word finding.

- **Hearing Screening:** The participant passed a pure tone air conduction hearing screening (aided or unaided) at 40dB SPL @ 500, 1000, 2000, and 4000 Hz in at least one ear using a portable audiometer. This threshold level is commonly used in aphasia research (Wertz et al., 1986).

- **Edinburgh Handedness Inventory (Oldfield, 1971):** This is a brief questionnaire to determine hand dominance. This inventory provides a quantitative measure of handedness normed on a normal population of 1100 people. A score $\geq 40$ indicates right hand dominance. Test retest reliability was (.86) (McMeekan & Lishman, 1975). (See Appendix A).

- **Rosenbaum Vision Pocket Screener (Rosenbaum, 1982):** This screener is a widely used card displaying letters and numbers used to assess visual acuity. It is used in place of the Snellen eye chart when testing at 20 feet is not practical. The card is held 14 inches away and the participant is asked to read aloud the smallest line of letters and numbers. This was used to determine if the participant has 20/100 vision (corrected or uncorrected), adequate to complete the tasks in treatment. (See Appendix B).

- **Clock drawing:** This task was used as a mini-screener for cognitive decline. Clock drawing employs all cognitive domains (attention, memory, executive function, language, and visuospatial skills) (Helm-Estabrooks, 2001). It has been found to be a sensitive measure to detect declines in cognition (Borson, Scanlan,
The scoring procedures were used from the clock drawing task found on the Cognitive Linguistic Quick Test (CLQT) (Helm-Estabrooks, 2001). This test was normed using a clinical sample of 38 participants with a diagnosis of stroke, closed head injury, and Alzheimer’s disease. Clock drawing scores significantly differed between the clinical and nonclinical populations, \( t = 5.14, p < .01 \), and had high test-retest reliability (.74). Criterion cut scores of 0-8 (moderate-severe) will be used to determine cognitive decline. The highest score is 13. A score of moderate and below was chosen as acceptable criteria because allowances can be made for those with hemiparesis. Participants who scored an 8 or below were not be included in the study.

The PI administered and scored all screening assessments according to standardized procedures for each measure. If a participant did not meet the inclusion and exclusion criteria they were excused from the study. Four participants qualified of the eight people screened. Participants who passed the screening were invited to enroll in the study.

Table 1. Participant Characteristics

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Post-Onset</th>
<th>Years of Education</th>
<th>AQ</th>
<th>Handedness</th>
<th>Hearing</th>
<th>Vision</th>
<th>Clock Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>P01</td>
<td>M</td>
<td>74</td>
<td>2;10</td>
<td>24</td>
<td>91.5</td>
<td>Right</td>
<td>Pass</td>
<td>Pass</td>
<td>WNL</td>
</tr>
<tr>
<td>P02</td>
<td>M</td>
<td>64</td>
<td>5;4</td>
<td>18</td>
<td>92.5</td>
<td>Right</td>
<td>Pass</td>
<td>Pass</td>
<td>WNL</td>
</tr>
<tr>
<td>P03</td>
<td>M</td>
<td>78</td>
<td>8;4</td>
<td>22</td>
<td>85.6</td>
<td>Right</td>
<td>Pass</td>
<td>Pass</td>
<td>WNL</td>
</tr>
<tr>
<td>P04</td>
<td>F</td>
<td>53</td>
<td>3;3</td>
<td>16</td>
<td>72.9</td>
<td>Right</td>
<td>Pass</td>
<td>Pass</td>
<td>Mild</td>
</tr>
</tbody>
</table>
**Setting and Investigators**

This study took place in an LSU SLHC treatment room. Three second-year speech pathology master’s students, blind to the study’s purpose, served as research assistants (RAs) for the study. Following training from the PI, the RAs administered the remaining assessments and treatment, to control for investigator bias. The PI, a licensed speech-language pathologist observed all sessions via discrete observation equipment.

**Experimental Design**

The purpose of this study was to determine if traditional stimulation therapy generalizes to conversation and to determine if conversation therapy produces better outcomes in conversation than traditional stimulation therapy does. This study was a single subject A-B-A-B-A design repeated across participants. Participants received two treatments, Traditional stimulation therapy (Ttx) and Conversation therapy (Ctx) to answer the experimental questions. Treatments were administered in the following manner: pre-testing and baseline probes (A₁ phase); Ttx (B₁ phase); post-Ttx (A₂ phase); Ctx (B₂ phase); and post-Ctx (A₃ phase). Half of the participants received the treatment order as described above (see Figure 2) and the other half received Ctx first in the B₁ phase followed by Ttx in the B₂ phase (see Figure 3).

![Figure 2. Schema for Participants 01 & 03](image)
Participants received treatment two times per week, 60 minutes per session for 10 sessions each treatment type. In total, participants received 20 sessions of treatment in addition to nine baselines sessions. Missed sessions were made-up. Ten sessions per treatment type was chosen to simulate the current level of care PWA receive. Per Medicare (2011), individuals receive an average of 10 outpatient speech therapy sessions in a year. The minimum treatment dosage (i.e. treatment intensity) to demonstrate a treatment effect is two hours a week. However the optimal intensity is greater than five hours a week according to Robey (1998). Again, the minimum dosage (i.e. intensity) was established because it is typical of what PWA receive during outpatient rehabilitation.

Primary outcome measures for the two treatments were efficacy data obtained from probes administered once a week at the beginning of the first session. This was done to gain information on retention and generalization of skills learned in therapy the previous week. These items were untrained stimuli. No cues or training were provided during probe administration.

Secondary outcome measures were administered pre-treatment, post-first treatment, and post-second treatment. These outcome measures represent domains of the ICF model (WHO, 2001). A quality of life measure was also administered in line with current practices in the social model of aphasia treatment.
Procedures

Baseline Phase One

During the first session of the baseline phase (A1), participants were administered the following secondary outcome measures.

Test Battery – Secondary Outcome Measures

• Impairment: The WAB-R, administered during the initial screening session, was used to determine changes in linguistic abilities (previously described).

• Activity: The Functional Assessment of Communication Skills for Adults (ASHA FACS) (Frattali, et al., 1995) is an outcome measure for adults with speech, language and cognitive communication disorders. It was used to measure functional communication activities. It is a 44-item questionnaire based on observation and caregiver input. The following domains are assessed: social communication, communication of basic needs, reading, writing, number concepts, and daily planning. Two scales are used to rate functional communication. The first one is a 7-point scale for Communicative Independence (level of independence), and the second is a 5-point scale of qualitative dimensions of communication (nature of functional deficit). In a study of 58 participants with aphasia and traumatic brain injury, high inter- and intra-rater reliability were found (.90). The ASHA FACS when compared to other measures of language and cognition demonstrated moderate external validity (.76). Item scores demonstrated high correlation with the overall domain score. The overall scores were found to distinguish between mild/moderate and moderate/severe impairments. In addition, scores for the two
populations of aphasia and traumatic brain injury were found to be distinct (Frattali, et al., 1995).

- Participation: The Conversation Analysis Profile for People with Aphasia (CAPPA) (Whitworth, et al., 1997) was used as a qualitative measure to determine the aphasia’s impact on discourse between the PWA and their primary conversation partners. The CAPPA is composed of two parts, interviews and a conversation sample. In the present study, one interview was conducted with the PWA to assess their perceptions on how their conversation partners handle their language difficulties. Pre- and post-stroke communication styles were assessed including how much they talk (i.e. talkative, reserved), with whom they regularly converse, what type of activities they participate in, and what do they like to talk about. The same interview questions were also given to the conversational partners to gain their perspective. Frequency responses were recorded as frequently, occasionally, never/almost never. Questions relating to problem of severity are rated as 0 = not a problem, 1 = a bit of a problem, and 2 = a big problem. In the second part of the CAPPA, a 10-minute conversational sample between the PWA and a conversation partner was analyzed. During the baseline and withdrawal periods, the participant and caregiver were given a digital recorder and instructions for use to record a natural conversation that occurred in their home. The PI analyzed the sample for linguistic abilities, repair, initiation and turn taking, and topic management. As a result, the information gathered from the sample was used to examine what, if any, conversational strategies were employed and how successful these strategies were in conversation. The information from the interviews and the conversation sample were
evaluated to determine if a relationship existed between the dyad’s perceptions of communication and what actually occurred during conversation.

- Quality of Life: The Stroke and Aphasia Quality of Life (SAQOL-39) (Hilari, et al., 2003) measures quality of life in four domains (physical, psychosocial, communication, and energy). Relationships between communication disability and quality of life have been reported (Cruice, 2008). In the present study, the format was an interview of 39 items using two response scales. The first scale has a 1-5 range with 1 denoting ‘could not do it at all’ and 5 is ‘no trouble at all.’ The second scale is also a 5-point scale with 1 indicating ‘definitely yes’ and 5 ‘definitely no.’ The psychometric properties were tested on 95 people with aphasia at least one year post-onset. The SAQOL-39 has good acceptability with minimal missing data and no floor or ceiling effects. Internal consistency is .93, test-retest reliability is .98, and has high construct validity (Hilari, et al., 2003).

Three baseline probes for all primary outcome measures were obtained over the first three sessions. The following is a description of the probes used as the primary outcome measures throughout the study.

**Probes – Primary Outcome Measures**

Probe items were administered throughout all phases of the study. There were three types of traditional treatment probes (auditory comprehension, lexical retrieval, and syntax) and one type of conversational probe. The following is a description of each.

**Auditory Comprehension:** Probes for the AC task consisted of one short story (obtained from aphasia workbooks) ranging in length from 3-6 sentences. The RA read the story aloud at a
normal speaking rate followed by 4 yes/no questions pertaining to the story. The scoring procedures were used from the BDAE. The participant must correctly answer two opposing (yes and no) questions correct to get a score of one. This type of short story task with follow-up yes/no questions was chosen because it is a moderately difficult comprehension task, as illustrated on the BDAE (See Appendix C).

**Lexical Retrieval:** Probe items for LR were a confrontational naming task of 10 items. Confrontational naming requires the person to verbally name visually presented pictures of objects and actions. This task is typically assessed on aphasia batteries because of its relative difficulty for PWA (Patterson & Chapey, 2008). Research has found PWA may have difficulty naming both nouns and verbs (Wambaugh, Doyle, Martinez, & Kalinyak-Fliszar, 2002). Participants were asked to provide a one-word response to describe a visually presented picture depicting nouns and actions. Half of the items depicted nouns and the other depicted verbs. Scoring procedures were administered using the guidelines from Wambaugh, Cameron, Kalinyak-Fliszar, Nessler, and Wright (2004). The participant had 15 seconds to respond and the final response was scored. A multidimensional scoring system was used to score responses (See Appendix D). Responses were counted as correct if the participant scored a 7 or higher (7=self-corrected, 9=accurate and immediate) on the multidimensional scoring system. For graphing purposes, scores were reported as correct or incorrect.

**Syntax:** Probes for syntax were 5 verbally produced sentences using the stimuli and procedures from the Helm Elicited Language Program for Syntax Stimulation (HELPSS) (Helm, 1981). HELPSS was designed to treat syntax production in people with nonfluent aphasia. The HELPSS has identified a hierarchy of eleven sentence types. Three moderate level sentence
types (levels 3-5) were used as probes, which include: Wh-interrogative (i.e. What are you eating?), declarative transitive (i.e. He builds houses), and declarative intransitive (i.e. He laughs). Each probe was presented in a story response format with a corresponding line drawing. The level B was used to elicit a response, which is not direct repetition; the PWA had to produce the response. For example, a probe might be “When my friend sees a sad movie, he does what?” The appropriate response would then be “He cries.” Scoring procedures were modified as follows: 1 point for plausible, complete and correct sentences, .5 if plausible, relevant response but incomplete sentence, and 0 for an incorrect response.

Conversation: On the questionnaire the participant completed during the screening session, one question was devoted to finding out the person’s interests and hobbies. These interests and hobbies were used as conversational prompts so they were personally relevant to each participant to ensure a high level of interest and knowledge on the topic.

At the start of each session, traditional probes were administered followed by a 6-minute language sample on a pre-determined topic of interest to the participant. Six minutes was found to be an acceptable length for a conversational sample (Boles & Bombard, 1998). Each phase (baseline, treatment, withdrawal, etc.) had an average of 6-minute conversation samples. The Semantic Context continua guidelines were (Norris & Hoffman, 1993) used by the RAs to manage conversational interactions. The RAs probed for responses along the continua, simple to most complex (labeling/description, interpretation/inference, and evaluation). The RAs asked questions that required the person to discuss labels and descriptions of the objects and actions involved in the topic at hand. Further, the RAs probed for underlying cause and effect relationships between actions and objects, and for sequences of events. An evaluation question

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was posed by the RAs for the PWA to have the opportunity to comment on their personal thoughts and emotions on the topic.

All conversation samples were audio recorded and then transcribed using conventions of the Systematic Analysis of Language Transcripts, Version 8.0 (SALT; Miller, 2004) by trained research assistants, blinded to the purpose of the study. These RAs were undergraduate students majoring in Communication Sciences and Disorders with little exposure to PWA. They were all trained and had experience performing SALT transcriptions through required coursework. However, the PI also provided further training by reviewing SALT guidelines and practicing transcriptions with RAs. Once the RAs’ competency was established they began independent transcription. Any ambiguous situations were discussed and solved with the PI at weekly meetings.

The PWA’s utterances were broken into communication units (C-units). A C-unit is an independent clause and its modifiers (Miller, 2004). The PWA’s utterances were analyzed for both the quantity of percent correct intelligible and relevant words using Correct Information Units (Nicholas & Brookshire, 1993), and for the pragmatic function of the utterance. A modified version of the Conversational Interaction Coding Form (CICF) (Algeo & Pimentel, 2006; Garrett & Pimentel, 2007) (See Appendix E) was used. Algeo and Pimental (2006) developed the CICF measure and found high intra- and inter-rater reliability among two trained raters. Intraobserver reliabilities were 87% for CIUs, 85% for turn-taking interchanges, and 78% for modality. Interobserver reliabilities were 86% for CIUs, 81% for interchanges, and 67% for modality. The CICF evaluates three parameters, CIUs, Turn-taking interchanges, and Modality. The last parameter was not used because all participants used the verbal modality. The CICF
examines ten utterances, however, all of the PWA’s utterances were coded in the current study. CIUs were coded as correct intelligible words relevant to the topic at hand. Rules for counting CIUs were taken from the CICF (See Appendix E). A modified Turn-taking Interchange (TTI) from the CICF was used to analyze the pragmatic function of the utterances. The TTI on the CICF were coded in terms of an initiation, response, repair/revision, and feedback. An additional interchange of continuation was added to complete the types of turn taking interchanges possible (See Appendix E for descriptions). Continuation was defined as a continuation of a response adding more information in subsequent turn (see Figure 4).

Figure 4. CICF utterance codes
Totaling the correct intelligible relevant words and dividing it by the total number of words spoken was used to obtain a percent of CIUs. The number of each type of turn taking modality was calculated and divided by the total number of utterances to obtain a proportion of each type for each conversation sample. Then, the TTI categories thought to represent positive conversational interactions were combined (IRC; Initiation, Response, & Continuation) into one variable; and those thought to negatively impact communicative interaction (R/F; Repair/Revisions & Feedback) were combined into another variable.

**Treatment-Traditional (B₁ phase)**

The traditional stimulation treatments of auditory comprehension, lexical retrieval, and syntax selected for investigation (AC, LR, S) were all hierarchical tasks aimed at restoring specific linguistic functions. AC tasks focused on enhancing the participant’s ability to comprehend verbal auditory information presented in increasing length and complexity. AC stimulation tasks were presented using several hierarchical tasks, which include: point to tasks (i.e. point to an item named by function, point to an item described by several descriptors), following directions, yes/no questions (simple questions to short stories), sentence verification, and response switching (point to the door, give me the cup) (Coelho, et al., 2008).

Lexical retrieval tasks concentrated on increasing the participant’s ability to generate the name of objects, actions, events, and relationships. Tasks included: confrontation naming, opposites, rhyming, semantic category naming, and synonyms.

The goal of syntax tasks was to increase the participant’s verbal productions. A hierarchy of tasks included: answering wh- questions, correctly arranging sentences with different parts of
speech, tense, and word class, defining words, using sentences with a preselected word or phrase, describing pictures, and retelling a story (Coelho, et al., 2008).

The goals for traditional tasks were relevant to each participant’s current level of functioning.

**Baseline Phase Two (Post-Traditional) (A₂ phase)**

During phase A₂ post-test measures (WAB-R, ASHA FACS, SAQOL-39, and CAPPA) were administered as well as three baseline probes for AC, LR, S and C over three days. This was done to determine the maintenance of therapeutic effects. No therapy was conducted during this week.

**Treatment-Conversation (B₂ phase)**

Conversation therapy was not only the medium in therapy, but also the goal. It was explicit therapy aimed to improve conversational abilities. The information gained from the pre-test of the CAPPA was used as goals to guide intervention strategies for conversation. These goals included: enhancing message exchange using strategies such as gesturing, writing or drawing, initiating topics, holding turns, using continuers such as head nods or uhmm (Simmons-Mackie, 2000), and transitioning from one topic to another. A variety of speech acts were addressed, such as chit chatting, joking, and story-telling (Simmons-Mackie, 2008). A storyboard was used to aid the participants in including the necessary components when story-telling. All conversational goals were relevant to each participant’s current level of functioning.

Tasks and topics during therapy were client-directed, and therefore relevant to each person’s interests. This was done to increase the likelihood that conversation was natural and not a constrained interview style. As the adult learning literature indicates, life experiences of adults are a rich source for learning, motivation, and participation; adults learn best when they take
responsibility for defining what they want to learn; adults need to know why they have to learn something before they undertake it; and adults are internally motivated to learn things that will help them cope effectively with real-life situations (Kimbarow, 2007).

Baseline Phase Three (Post-Conversation) (A_3 phase)

During phase A_3, post-test measures (WAB-R, ASHA FACS, SAQOL-39, and CAPPA) were administered as well as three baseline probes for AC, LR, S and C over three days. No therapy was conducted during this week.

Data Collection Procedures

Testing and treatment were digitally audio- and/or video-recorded for data collection purposes, and to determine inter-rater reliability. Recording was done in the treatment room. A Sony IC Recorder was used to digitally record audio. Digital recordings were downloaded onto a secured computer with password-protected access for further analysis. All data collected was de-identified and entered into a research study database by participant code. The research database was encrypted and the file was hidden from view for security purposes. The database was backed up after each entry session onto a flash drive that was stored with other research materials. The PI was responsible for maintenance of the database and all raw data. Raw data was stored in a locked file cabinet in the PI’s office. Only the research assistant and the PI had access to the data. The PI and RAs completed the NIH Human Subjects training for obtaining informed consent and abided by the HIPAA rules and regulations for protecting individual’s information.
Treatment Reliability and Fidelity

Ideally, a single clinician (RA) would have implemented the treatment to all four participants to ensure consistency within and across therapy sessions. However, due to scheduling conflicts and participant recruitment challenges, three clinicians delivered therapy to the four participants. The PI observed all treatment sessions live via observation equipment to ensure treatment fidelity. Prior to the initiation of therapy, the graduate RAs received 2.5 hours of study-specific training on assessment administration, treatment delivery, and probe collection. The PI modeled administration of treatment tasks for the RAs. All participants received treatment using the same materials. The traditional tasks were administered in the same stimulus-response-evaluation method. The conversation therapy was delivered in the same manner, in which the RAs discussed the components of the conversation being worked on then it was practiced in a more social conversation context. After each therapy session the PI met with the RAs to discuss the implementation of therapy and how to continue.

The assessments were administered by the RAs and scored by both the RAs and the PI to ensure reliability of assessment scores. Two graduate clinicians, blind to the study’s purpose, scored the AC, LR and S probes. Then 1/3 (6) of each of the probes were randomly selected and analyzed for point-by-point reliability. The total number of agreements were divided by the total number of agreements + disagreements to obtain the reliability score. Any disagreements were settled by the PI. Average inter-rater reliability for all participants was as follows:

<table>
<thead>
<tr>
<th>Auditory Comprehension</th>
<th>Lexical Retrieval</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.8%</td>
<td>94.6%</td>
<td>97.5%</td>
</tr>
</tbody>
</table>

58
As mentioned previously, undergraduate students trained in SALT procedures transcribed the conversation probes. One-third of the 17 (6 samples) were randomly selected and 33.3 % (2 minutes) were re-transcribed. Average inter-rater reliability was 91.4%.

Graduate students were trained to code the samples using the modified CICF and count CIU’s. The PI spent several days training the students and coding samples together to assure comprehension of the task and agreement. Any questions were cleared up at weekly meetings. One-third of the 17 samples (6 samples) were randomly selected and 10% of the utterances were randomly selected and re-scored using point-by-point agreement. The PI conducted the reliability checks. Average inter-rater reliability for all four participants for the TTI was 90.4% and 90% for CIUs.

The PI and two doctoral students experienced in Single Subject Design (SSD) performed visual inspection analyses of graphs. The three raters made judgements about the graphs for traditional probes and conversational probes. Consensus from of 2 out of 3 raters was taken as the final result.
CHAPTER 4.

RESULTS

This study yielded copious amounts of data, therefore repeated probe data were reduced in the following manner. First, effect sizes were determined for all probe data. This is a recognized treatment outcome measure in single subject design research in neurogenic communication disorders to determine the magnitude of an effect (Robey, Schultz, Crawford, & Sinner, 1999). Effect sizes were calculated using the averages of pre-treatment data compared to post-treatment data. They were calculated using the following formula:

\[
\frac{(\text{Mean}_{A2} - \text{Mean}_{A1})}{\text{Standard Deviation}_{A1}}
\]

Effect sizes were interpreted using Cohen’s $d$ benchmarks, 0.2 small effect, 0.5 medium effect, and 0.8 large effect (Cohen, 1988). In addition, visual inspection is commonly used to determine treatment effect (Kearns, 2000). Visual inspection included examining patterns of shifts from one phase to the next, the amount of change in the phases, and the trend and slope of the data (McReynolds & Kearns, 1983). Since visual analyses can be controversial because the illusion of change can lead to a Type I error (Beeson & Robey, 2006) statistical analyses were conducted. Ordinary Least Squares (OLS) regression models (Lewis-Beck & Alford, 1980) were calculated for each participant on the conversational outcome measures. Changes in secondary outcome measures were analyzed using descriptive statistics and the Friedman test (nonparametric correlate to repeated measures ANOVA). The results are presented in the order of the research questions posed in the study. They are summarized in a tabular manner for effect size, visual analyses, and regression results.
**Question 1**

Question 1 asked, “Is there a treatment effect for Ttx therapy?” To answer this question, I examined probe data taken during Ttx and post-Ttx for auditory comprehension, lexical retrieval, and syntax using effect sizes (Cohen’s $d$) and visual analyses (see Appendix F for individual graphs).

Table 2 shows the results of the treatment effect for traditional probes. P01 ($d = 1.1$) and P03 ($d = 2.3$) who received Ttx first demonstrated an effect only for syntax. None of the participants demonstrated an effect for auditory comprehension or lexical retrieval skills.

P01 and P02 demonstrated no effect ($d = 0$) for auditory comprehension. The effect size for P03 was 0 because the baseline was at the ceiling and therefore no standard deviation was obtained. Visual analyses indicated auditory comprehension skills decreased for P03. P04 demonstrated a very large negative change in auditory comprehension abilities ($d = -1.2$).

P01 and P04 both demonstrated very large ($d = -4.4$) and large ($d = -0.7$) negative effects respectively, for lexical retrieval skills. P02 and P03 demonstrated no change in lexical retrieval skills ($d = 0$) comparing before and after Ttx.

P02 and P04’s syntax accuracy decreased, with large ($d = -1.2$) to very large ($d = -8.6$) negative effects, respectively. Overall, the two participants who received Ttx first improved in syntax accuracy. None of the participants demonstrated a treatment effect for auditory comprehension and lexical retrieval.
Table 2. Treatment effect results for traditional probes

<table>
<thead>
<tr>
<th></th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>d</strong></td>
<td>Visual</td>
<td>d Visual</td>
<td>d Visual</td>
<td>d Visual</td>
</tr>
<tr>
<td><strong>Auditory Comp</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 Same</td>
<td>0 Same</td>
<td>0 Dec</td>
<td>-1.2 Dec</td>
</tr>
<tr>
<td><strong>Lexical Retrieval</strong></td>
<td>-4.4 Dec</td>
<td>0 Same</td>
<td>0 Same</td>
<td>-0.7 Dec</td>
</tr>
<tr>
<td><strong>Syntax</strong></td>
<td>1.1* Inc</td>
<td>-1.2 Dec</td>
<td>2.3* Inc</td>
<td>-8.6 Dec</td>
</tr>
</tbody>
</table>

*d = Effect Size
Visual = Results from Visual Analyses
Dec = Decreased
Inc = Increased
* = Effect

**Question 2**

Question 2 asked, “Do traditional tasks produce gains in conversation?” To answer this question, conversational probe data taken during Ttx and post-Ttx were examined using effect sizes (Cohen’s *d*) and visual analyses. The goal was for CIUs and IRC to increase with therapy and R/F to decrease (see Appendix G for individual graphs). Table 3 shows the results of conversational measures during Ttx.

Traditional stimulation therapy did produce gains in conversation for some of the participants. P01 (*d* = 0.8), P02 (*d* = 2), and P03 (*d* = 1.7) demonstrated increases in CIUs following Ttx. Furthermore, P01 and P03 who received Ttx first, showed an increase in IRC (positive conversational interactions) while R/F (negative conversational interactions) was found to decrease. P01 demonstrated a very large IRC treatment effect (*d* = 2.3) and a very large decrease in R/F (*d* = -2.3). P03 also showed a very large increase in IRC (*d* = 2.5) and very large decrease in R/F (*d* = -2.5). The following example is discourse from P01 before and after
therapy. At the beginning there were hesitations, repairs, revisions, and one-word responses.

During this time IRC was low and R/F was higher. Example discourse before therapy:

CP Ok, well I didn’t even know you served in the military.
A (Uh :06) yeah I served in the military[ERR] :06 two years after.
A No.
A X two years, boy.
0:04
A Medical School.

Following therapy there were more and longer responses, fewer one-word responses, and fewer repairs in his discourse. During this time, the positive conversational interactions (IRC) increased and the negative ones decreased (R/F). Example discourse after therapy:

CP when did she come along into your life?
A ok, I got married and divorced in 1988.
CP mhm.
CP ok.
A and I liked her.
A (um 0:05) she X only one.
A I’d been out with the many girls.
A so I liked her.
CP uh-hu.
A she didn’t get married to five years.
CP so you all dated for five years.
A yeah.
CP wow.
A and (0:06) the time was right.
A and we flew to Las Vegas because (0:02) the church didn’t give us the permission.

The other participants who received Ttx last, demonstrated effects that were opposite the intended direction of the therapy goals. P04 showed a small decrease in CIUs \((d = -0.3)\). P02 demonstrated a small decrease in IRC \((d = -0.3)\), while P04 demonstrated a very large decrease \((d = -3.4)\). P02 demonstrated a small increase in R/F \((d = 0.2)\) while P04 demonstrated a large increase \((d = 3.4)\). Reasons for these inverse results will be discussed further on.
In sum, P01, P02, and P03 all demonstrated increases in CIUs as a result of Ttx. The two participants who received Ttx first demonstrated a treatment effect on conversational outcomes following Ttx. The other two participants who received Ttx second demonstrated the opposite effect, and therefore no positive gains were demonstrated on conversational outcomes.

Table 3. Results of Conversational Measures during Ttx

<table>
<thead>
<tr>
<th></th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d</td>
<td>Visual</td>
<td>d</td>
<td>Visual</td>
</tr>
<tr>
<td>CIU</td>
<td>0.8*</td>
<td>Inc</td>
<td>2*</td>
<td>Inc</td>
</tr>
<tr>
<td>Initiation,</td>
<td>2.3*</td>
<td>Inc</td>
<td>-0.3</td>
<td>Slight</td>
</tr>
<tr>
<td>Response &amp;</td>
<td></td>
<td></td>
<td></td>
<td>Dec</td>
</tr>
<tr>
<td>Continuation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair/</td>
<td>-2.3*</td>
<td>Dec</td>
<td>0.2</td>
<td>Inc</td>
</tr>
<tr>
<td>Revision &amp;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback</td>
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</tr>
</tbody>
</table>

$d = \text{Effect Size}$  
$\text{Visual} = \text{Results from Visual Analyses}$  
$\text{Dec} = \text{Decreased}$  
$\text{Inc} = \text{Increased}$  
$* = \text{Effect}$

**Question 3**

Question 3 asked, “Is there a treatment effect for Ctx?” To address this question, conversational probe data taken during Ctx and post-Ctx were examined using effect sizes (Cohen’s $d$) and visual analyses. Again, the goal was for CIUs and IRC to increase with therapy and R/F to decrease (see Appendix H for individual graphs).
P04 demonstrated a treatment effect for Ctx, as illustrated with a very large increase in IRC ($d = 1.8$) and a very large decrease in R/F ($d = -1.8$). P01 ($d = 0.3$) and P04 ($d = 0.9$) both showed increases in CIUs.

P02 ($d = -0.3$) demonstrated a small decrease in CIUs and P03 demonstrated a very large decrease ($d = -2.2$). P01 ($d = -2.6$) and P03 ($d = -4.5$) both demonstrated very large negative effects in IRC. P02 demonstrated no effect for IRC ($d = 0.02$). P01 ($d = 2.4$), P02 ($d = 0.4$) and P03 ($d = 4.5$) all showed increases in R/F. Results can be seen in Table 4.

Overall, P04 demonstrated a treatment effect for Ctx. P01 and P04 both demonstrated increases in CIUs following Ctx. No other participants demonstrated a treatment effect for Ctx.

**Table 4. Results of Conversational Measures during Ctx**

<table>
<thead>
<tr>
<th></th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$d$ Visual</td>
<td>$d$ Visual</td>
<td>$d$ Visual</td>
<td>$d$ Visual</td>
</tr>
<tr>
<td><strong>CIUs</strong></td>
<td>0.3* Inc</td>
<td>-0.3 Slight Dec</td>
<td>-2.2 Dec</td>
<td>0.9* Inc</td>
</tr>
<tr>
<td><strong>Initiation,</strong></td>
<td>-2.6 Dec</td>
<td>0.02 Same</td>
<td>-4.5 Dec</td>
<td>1.8* Inc</td>
</tr>
<tr>
<td><strong>Response &amp;</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Continuation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repair/Revision</strong></td>
<td>2.4 Inc</td>
<td>0.4 Inc</td>
<td>4.5 Inc</td>
<td>-1.8* Dec</td>
</tr>
<tr>
<td><strong>&amp; Feedback</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$d =$ Effect Size  
Visual = Results from Visual Analyses  
Dec = Decreased  
Inc = Increased  
* = Effect
Question 4 asked, “Does Ttx first followed by Ctx second, or Ctx first followed by Ttx second produce better conversational outcomes?” To answer this question Ordinary Least Squares (OLS) regression analysis was conducted (Lewis-Beck & Alford, 1980) to compare shifts in means across the following phase boundaries (A_1-B_1, B_1-A_2, A_2-B_2, B_2-A_3), to determine if statistically significant differences existed. Visual inspection of all results was conducted. Table 5 shows the results for the two participants who received Ttx first followed by Ctx. Table 6 shows the results for the two participants who received Ctx first followed by Ttx.

The results of the OLS indicated Ctx followed by Ttx therapy produced better outcomes in conversation for P04. The mean coefficient from Ctx to post-Ctx for IRC was positive and highly significant (b = 11.73, t = 2.88, p < .01). The mean coefficient from Ctx to post-Ctx for R/F was negative and highly significant (b = -11.73, t= -2.88 p < .01).

P03 had a positive and significant (b = 11.28, t = 2.57, p < .05) coefficient from Ttx to post-Ttx in CIUs, but had a negative and significant (b = -10.25, t = -2.34, p < .05) coefficient for post-Ttx to Ctx. The other participants did not have any significant results for CIUs. (See Table 5 for OLS regression estimates).

P01 had a positive and significant (b = 10.07, t = 1.74, p < .05) coefficient from Ttx to post-Ttx for IRC and a negative and significant (b= -14.91, t= -2.58, p < .05) coefficient from Ctx to post-Ctx. P02 and P03 did not have any significant results for IRC. (See Table 6 for OLS regression estimates).

P01 had a positive and significant (b= 13.98, t= 2.40, p < .05) coefficient from Ctx to post-Ctx for R/F. P02 and P03 did not have any significant results for R/F. (See Table 7 for OLS regression estimates).
In sum, the results from the OLS regression analyses indicated there were two positive significant results during post-Ttx. P01 demonstrated a positive increase in IRC and P03 had an increase in CIUs. None of the participants demonstrated a significant decrease in R/F across any of the time periods.

I conducted visual analyses of the mean graphs (see Appendix I-L). Three of the four participants (P01, P02, and P04) illustrated increases in CIUs over time regardless of treatment order. This indicates that both treatments increased CIUs.

The two participants who received Ttx first followed by Ctx demonstrated two different results. P01 showed an increase in IRC across the treatment time with the highest level achieved during Ctx. P01 showed a decrease in R/F across the treatment time with the lowest level achieved during Ctx. Traditional therapy may not have been warranted for P01. P03 increased to the highest IRC level and decreased to the lowest R/F level during post-Ttx. For this participant, Ttx seemed to have the greatest effect on conversational measures (see Table 8).

The two participants who received Ctx first followed by Ttx demonstrated that Ctx first might be more beneficial to improve conversational abilities than Ttx before or after. P02 showed the highest level of IRC during Ctx and it decreased during Ttx. R/F was at the lowest level during Ctx and increased with Ttx. P04 showed the highest IRC level during post-Ctx, and the lowest R/F level during post-Ctx. Both participants demonstrated decreases in IRC and increases in R/F during and after Ttx (see Table 9).
Table 5. OLS Regression Estimates for CIUs

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>t</td>
<td>b</td>
<td>t</td>
</tr>
<tr>
<td>Baseline (Intercept)</td>
<td>69.20</td>
<td>27.76^</td>
<td>69.23</td>
<td>25.20^</td>
</tr>
<tr>
<td>Traditional therapy</td>
<td>4.00</td>
<td>1.21</td>
<td>2.17</td>
<td>0.60</td>
</tr>
<tr>
<td>Post-traditional therapy</td>
<td>1.57</td>
<td>0.48</td>
<td>7.66</td>
<td>2.11</td>
</tr>
<tr>
<td>Conversation therapy</td>
<td>0.08</td>
<td>0.03</td>
<td>1.77</td>
<td>0.49</td>
</tr>
<tr>
<td>Post-conversation therapy</td>
<td>1.22</td>
<td>0.37</td>
<td>-2.40</td>
<td>-0.66</td>
</tr>
<tr>
<td>N</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.28</td>
<td>0.41</td>
<td>0.44</td>
<td>0.28</td>
</tr>
<tr>
<td>F</td>
<td>1.17</td>
<td>2.08</td>
<td>2.34</td>
<td>1.18</td>
</tr>
<tr>
<td>Prob(F)</td>
<td>0.37</td>
<td>0.15</td>
<td>0.11</td>
<td>0.37</td>
</tr>
</tbody>
</table>

^ *** coefficient significant at the .001 level, one-tailed test
** coefficient significant at the .01 level, one-tailed test
  * coefficient significant at the .05 level, one-tailed test
Table 6. OLS Regression Estimates for IRC

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>t</td>
<td>b</td>
<td>t</td>
</tr>
<tr>
<td>Baseline (Intercept)</td>
<td>52.80</td>
<td>12.07(^*)</td>
<td>69.13</td>
<td>18.02(^*)</td>
</tr>
<tr>
<td>Traditional therapy</td>
<td>-2.40</td>
<td>-0.41</td>
<td>2.18</td>
<td>0.43</td>
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<tr>
<td>Post-traditional therapy</td>
<td>10.07</td>
<td>1.74(*)</td>
<td>-3.38</td>
<td>-0.67</td>
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<tr>
<td>Conversation therapy</td>
<td>2.71</td>
<td>0.47</td>
<td>4.29</td>
<td>0.85</td>
</tr>
<tr>
<td>Post-conversation therapy</td>
<td>-14.91</td>
<td>-2.58(*)</td>
<td>-4.06</td>
<td>-0.80</td>
</tr>
</tbody>
</table>

N        | 17   | 17   | 17   | 17   |
R\(^2\)  | 0.46 | 0.11 | 0.25 | 0.47 |
F        | 2.57 | 0.36 | 1.02 | 2.68 |
Prob(F)  | 0.09 | 0.83 | 0.44 | 0.08 |

\(^*\) coefficient significant at the .001 level, two-tailed test  
\(***\) coefficient significant at the .001 level, one-tailed test  
\(**\) coefficient significant at the .01 level, one-tailed test  
\(*\) coefficient significant at the .05 level, one-tailed test
Table 7. OLS Regression Estimates for R/F

<table>
<thead>
<tr>
<th>Independent variable</th>
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<th>P02</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>t</td>
<td>b</td>
<td>t</td>
</tr>
<tr>
<td>Baseline (Intercept)</td>
<td>47.23</td>
<td>10.73^</td>
<td>24.77</td>
<td>5.83^</td>
</tr>
<tr>
<td>Traditional therapy</td>
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<td>0.41</td>
<td>-2.21</td>
<td>-0.39</td>
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<tr>
<td>Post-traditional therapy</td>
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<td>3.41</td>
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<tr>
<td>Conversation therapy</td>
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<td>1.78</td>
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<tr>
<td>Post-conversation therapy</td>
<td>13.98</td>
<td>2.40*</td>
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<td>0.73</td>
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<tr>
<td>N</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>R^2</td>
<td>0.44</td>
<td>0.14</td>
<td>0.25</td>
<td>0.47</td>
</tr>
<tr>
<td>F</td>
<td>2.39</td>
<td>0.48</td>
<td>1.02</td>
<td>2.68</td>
</tr>
<tr>
<td>Prob(F)</td>
<td>0.11</td>
<td>0.75</td>
<td>0.44</td>
<td>0.08</td>
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^ coefficient significant at the .001 level, two-tailed test
*** coefficient significant at the .001 level, one-tailed test
** coefficient significant at the .01 level, one-tailed test
* coefficient significant at the .05 level, one-tailed test
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<th>Post-Ctx</th>
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<td>Visual</td>
<td>OLS</td>
<td>Visual</td>
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<tr>
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<td>Inc</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>IRC</td>
<td>No</td>
<td>Dec</td>
<td>Pos Sig*</td>
</tr>
<tr>
<td></td>
<td>R/F</td>
<td>No</td>
<td>Inc</td>
<td>No</td>
</tr>
<tr>
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<td>CIU</td>
<td>No</td>
<td>Slight Inc</td>
<td>Pos Sig*</td>
</tr>
<tr>
<td></td>
<td>IRC</td>
<td>No</td>
<td>Inc</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>R/F</td>
<td>No</td>
<td>Dec</td>
<td>No</td>
</tr>
</tbody>
</table>

OLS = Ordinary Least Square Regression Results
Visual = Results from Visual Analyses
Inc = Increase
Dec = Decrease
Pos Sig = Positive Significance
Neg Sig = Negative Significance
* = Statistical Significance
Bolded/Shaded = Best Level Achieved Overall
Table 9. Results of OLS and visual analyses for P02 & P04

<table>
<thead>
<tr>
<th></th>
<th>Ctx</th>
<th>Post-Ctx</th>
<th>Ttx</th>
<th>Post-Ttx</th>
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<td>P02</td>
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</tr>
<tr>
<td>CIU</td>
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<td>No Inc</td>
<td>No Inc</td>
<td>No Inc</td>
</tr>
<tr>
<td>IRC</td>
<td>No Inc</td>
<td>No Dec</td>
<td>No Inc</td>
<td>No Dec</td>
</tr>
<tr>
<td>R/F</td>
<td>No Inc</td>
<td>No Inc</td>
<td>No Dec</td>
<td>No Inc</td>
</tr>
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<td>P04</td>
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<td></td>
</tr>
<tr>
<td>CIU</td>
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<td>No Inc</td>
<td>No Slight Inc</td>
<td>No Dec</td>
</tr>
<tr>
<td>IRC</td>
<td>No Slight Dec</td>
<td>Pos Sig* Inc</td>
<td>No Dec</td>
<td>No Dec</td>
</tr>
<tr>
<td>R/F</td>
<td>No Slight Inc</td>
<td>Neg Sig* Dec</td>
<td>No Inc</td>
<td>No Inc</td>
</tr>
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</table>

OLS = Ordinary Least Square Regression Results
Visual = Results from Visual Analyses
Inc = Increase
Dec = Decrease
Pos Sig = Positive Significance
Neg Sig = Negative Significance
* = Statistical Significance
Bolded/Shaded = Best Level Achieved Overall

**Question 5**

5a. Do the participants demonstrate improvement on linguistic skills based on comparison of pre-, post-, and post-post administrations of the WAB? The WAB AQ scores for participants 01, 03, and 04 were all highest following Ctx. Participant 02’s WAB score was highest at baseline. See Appendix M for individual scores.

A Friedman test was conducted to evaluate differences in medians among the scores at Baseline (median = 88.55), Post-Ttx (median = 86.85), and Post-Ctx (median = 88.45) of all the participants. The test result was not significant, $\chi^2 (2, N = 4) = 3.50, p = 0.17$, and the Kendall
coefficient of concordance of .44 indicates a fair amount of agreement, however the sample size
was too small to draw confident conclusions. Therefore, the coefficient did not yield significant
agreement.

Table 10. Mean Performance and Standard Deviations on the WAB

<table>
<thead>
<tr>
<th></th>
<th>Means</th>
<th>Standard Deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>83.38</td>
<td>8.77</td>
</tr>
<tr>
<td>Post-Traditional Tx</td>
<td>85.15</td>
<td>7.57</td>
</tr>
<tr>
<td>Post-Conversation Tx</td>
<td>87.00</td>
<td>7.57</td>
</tr>
</tbody>
</table>

5b. Do the participants demonstrate improvement in functional communication skills
based on comparison of pre- and post- and post-post treatment on the ASHA FACS? The
communication independence mean scores were highest after Ttx for P02, P03, and P04. P01’s
score was highest after Ctx. See Appendix N for individual scores.

A Friedman test was conducted to evaluate differences in medians among the scores at
Baseline (median = 5.63), Post-Ttx (median = 6.41), and Post-Ctx (median = 6.17) of all of the
participants. The test result was not significant, \( \chi^2 (2, N = 4) = 2.00, p = 0.37 \), and the Kendall
coefficient of concordance of .25 indicates a small amount of agreement, however the sample
size was too small to draw confident conclusions. Therefore, the coefficient did not yield
significant agreement.

Table 11. Mean Performance and Standard Deviations on the ASHA FACS

<table>
<thead>
<tr>
<th></th>
<th>Means</th>
<th>Standard Deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>5.68</td>
<td>.38</td>
</tr>
<tr>
<td>Post-Traditional Tx</td>
<td>6.33</td>
<td>.56</td>
</tr>
<tr>
<td>Post-Conversation Tx</td>
<td>5.97</td>
<td>.77</td>
</tr>
</tbody>
</table>

5c. Do the participants demonstrate improvement on quality of life based on
comparisons of pre-, post-, and post-post administrations on the Stroke and Aphasia Quality of
Life Scale (Hilari, Byng, Lamping, & Smith, 2003)? Participant’s 01 and 02 scores were highest following Ttx. Participant 03’s score was highest following Ctx, and P04’s score was highest at baseline. See Appendix O for individual scores.

A Friedman test was conducted to evaluate differences in medians among the scores at Baseline (median = 3.47), at Post-Traditional Therapy (median = 3.33), and at Post-Conversation Therapy (median = 3.30) of all of the participants. The test result was not significant, $\chi^2 (2, N = 4) = .500, p = 0.78$, and the Kendall coefficient of concordance of .056 did not indicate any agreement.

Table 12. Mean Performance and Standard Deviations on the SAQOL

<table>
<thead>
<tr>
<th></th>
<th>Means</th>
<th>Standard Deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>3.33</td>
<td>.56</td>
</tr>
<tr>
<td>Post-Traditional Tx</td>
<td>3.65</td>
<td>.73</td>
</tr>
<tr>
<td>Post-Conversation Tx</td>
<td>3.36</td>
<td>.44</td>
</tr>
</tbody>
</table>

5d. Do the participants demonstrate improvement on conversational abilities with the primary conversation partner based on comparisons of pre-, post-, and post-post administrations of the Conversational Profile for People with Aphasia (CAPPA; Whitworth, et al., 1997)? The qualitative profile of conversation abilities are summarized below. See Appendix P for individual results and graphs.

Participant 01 had the highest amount of agreement between his report and the conversational analysis following Ttx. After Ctx there was more conflict, indicating that the PWA did not rate an area as a problem but there was evidence for it in the conversation analysis. In addition, the PWA reported having more absent evidence following Ctx. This indicates that
the PWA rated himself as having a problem but it was not evident in the conversation analysis. The CP (Conversation Partner) had the highest level of agreement following Ctx.

The PWA rated himself as having the least difficulty on all variables (linguistic, repair, initiation/turn taking, and topic) following Ttx. The CP reported the least difficulty in the areas of linguistic abilities and initiation/turn taking following Ttx and the least in repair following Ctx. The CP rated topic management the same at baseline and following Ttx and more of a problem following Ctx.

Participant 02 had the highest agreement between his report and conversation analysis following Ttx. After Ctx there was the highest degree of absent evidence, where the PWA reported a problem but there was no evidence in the conversation analysis. The CP had the highest degree of agreement following Ttx.

The PWA rated his problem with linguistic abilities and topic maintenance equally as low following Ttx and Ctx. This was an improvement from the baseline. There was no change in repair following either therapy. The PWA rated his problem with initiation/turn taking lower following Ttx. The CP rated linguistic, repair, and initiation/turn taking problems as lower following Ttx. The CP rated topic maintenance as equally less of a problem following Ttx and Ctx compared to baseline.

Participant 03 had the highest agreement between his report and conversation analysis following Ttx. After Ctx there was the highest degree of absent evidence, where the PWA reported a problem but there was no evidence in the conversation analysis. The CP rated the same level of agreement following Ttx and Ctx. This was an increase from the baseline.
The PWA rated his problem with linguistic abilities and topic maintenance as lower following Ttx and repair, initiation/turn taking as less of a problem following Ctx. The CP rated linguistic, repair, and initiation/turn taking problems as lower following Ttx. The CP rated topic maintenance as less of a problem following Ctx.

Participant 04 had the highest agreement between her report and conversation analysis following Ctx. The CP had the highest level of agreement at the baseline. Following traditional and conversation therapy there were higher levels of absent and conflicting evidence between report and conversation analysis.

The PWA rated her problems with linguistic abilities as lowest at the baseline, repair lowest following Ttx, and initiation/turn taking and topic maintenance lowest after Ctx. The CP rated all variables as less of a problem following Ctx.

See Tables 12 and 13 for a summary of the when the lowest problem ratings were reported by the PWA and his/her conversation partners.

### Table 13. Lowest problem rating by PWA

<table>
<thead>
<tr>
<th></th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linguistic</strong></td>
<td>Ttx</td>
<td>Ttx and Ctx</td>
<td>Ttx</td>
<td>Baseline</td>
</tr>
<tr>
<td><strong>Repair</strong></td>
<td>Ttx</td>
<td>No change</td>
<td>Ctx</td>
<td>Ttx</td>
</tr>
<tr>
<td>**Initiation/   **</td>
<td>Ttx</td>
<td>Ttx</td>
<td>Ctx</td>
<td>Ctx</td>
</tr>
<tr>
<td>Turn taking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Topic         **</td>
<td>Ttx</td>
<td>Ttx and Ctx</td>
<td>Ttx</td>
<td>Ctx</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ttx = Traditional stimulation therapy
Post-Ttx = Post Traditional stimulation therapy
Ctx = Conversation therapy
Post-Ctx = Post conversation therapy
Table 14. Lowest problem rating by Conversation Partners

<table>
<thead>
<tr>
<th></th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
<th>P04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linguistic</td>
<td>Ttx</td>
<td>Ttx</td>
<td>Ttx</td>
<td>Ctx</td>
</tr>
<tr>
<td>Repair</td>
<td>Ctx</td>
<td>Ttx</td>
<td>Ttx</td>
<td>Ctx</td>
</tr>
<tr>
<td>Initiation/Turn taking</td>
<td>Ttx</td>
<td>Ttx</td>
<td>Ttx</td>
<td>Ctx</td>
</tr>
<tr>
<td>Topic Maintenance</td>
<td>Baseline/Ttx</td>
<td>Ttx/Ctx</td>
<td>Ctx</td>
<td>Ctx</td>
</tr>
</tbody>
</table>

Ttx = Traditional stimulation therapy
Post-Ttx = Post Traditional stimulation therapy
Ctx = Conversation therapy
Post-Ctx = Post conversation therapy
CHAPTER 5.

DISCUSSION

This study was designed as a Phase I (Robey & Schultz, 1998), mixed methods, A-B-A-B-A single-subject design, replicated across four participants. There is an organized systematic means of classifying clinical outcome research using a five-phase model defined by Robey and Schultz (1998). A Phase I (pre-efficacy) study is used to determine if a treatment has a therapeutic effect and if so, the magnitude of the effect through determination of effect sizes. This phase includes case studies, exploratory single-subject designs that attempt discovery, small group studies, and retrospective studies. Studies in this phase test hypotheses and may be included as the next step to refinement. In Phase I studies, single-subject designs have played a fundamental role in the development and testing of aphasia treatments (Beeson & Robey, 2006). Currently, single-subject designs are the most frequently used methodology in aphasia research (Thompson, 2006; Togher, et al., 2009).

I designed this study because researchers have not consistently demonstrated that traditional stimulation therapies for PWA generalize to conversation. In addition, very little research exists to demonstrate the treatment efficacy of conversation therapy for PWA. Moreover, no one has compared the two treatment types to determine the effects on conversational outcomes. Nor has any research examined whether treatment order of the two types of therapies affects conversational outcomes. Therefore, the purpose of this study was to examine the treatment effects of traditional stimulation therapy and conversation therapy for PWA. The results of this study are discussed first. The theoretical, research, and clinical
implications are discussed next. Then the limitations of the study are detailed, followed by future directions. The discussion ends with conclusions about the study.

**Question 1**

The purpose of research Question 1 was to determine if there was a treatment effect for Ttx. The results of this study indicated an effect was only found for accuracy of syntax production for the two participants who received Ttx first, P01 and P03. Very large effects were found for both of these participants. None of the participants demonstrated an effect for auditory comprehension or lexical retrieval production.

Previous studies have established that traditional stimulation therapy has an effect on impairment measures such as the WAB, BDAE, and PICA (Holland et al., 1996; Poeck, Huber, & Willmes, 1989; Robey, 1998; Shewan & Kertesz; 1984; Wertz et al., 1981; Wertz et al. 1986). Based on these studies, I hypothesized that participants would demonstrate a treatment effect for Ttx. That is, gains in auditory comprehension, lexical retrieval, and syntax production would be higher during and post therapy compared to the baseline scores. The results of the current study did not entirely support the hypothesis. The inconsistently observed treatment effect could be due to the relatively mild intensity of this study. Robey’s (1998) meta-analysis demonstrated that the minimum intensity of aphasia therapy that affected change equaled two hours per week. We do not, however, know the minimum number of sessions needed to demonstrate a treatment effect; therefore I chose 10 sessions, which is what is currently allowable for reimbursement (Medicare, 2011). This intensity may not be enough to demonstrate a treatment effect in the traditional therapy variables chosen for this study. All of the participants had auditory comprehension skills that were already high or at the ceiling, which may explain why no effect
was demonstrated. In this study, syntax production was the most amenable to the allotted intensity and frequency of treatment when Ttx was administered first.

**Question 2**

The purpose of research Question 2 was to determine if traditional tasks produce gains in conversation. The results indicated that Ttx did produce gains in conversation for some of the participants. CIUs increased with Ttx in P01, P02, and P03 by large to very large effects. These results could be explained by the fact that Ttx emphasizes correct production, which transferred to what was produced during conversation. Positive conversational outcomes were achieved for P01 and P03 following Ttx. P01 and P03 both demonstrated very large increases in IRC and very large decreases in R/F. These results were only found in the participants who received Ttx first. The other two participants, P02 and P04, demonstrated the opposite effects when Ttx was administered second. One explanation of these results could be that for the participants who received Ttx first, the most gains were made because this was the first therapy they received and their newly acquired skills increased immediately from baseline to treatment. P01 and P03 also demonstrated a treatment effect for Syntax during Ttx. Perhaps these skills transferred to having a successful conversation. For those who received Ttx second, it appeared that Ttx was not as successful in increasing IRC and decreasing R/F after they had already received Ctx (see Appendix J and L).

Previous studies on traditional aphasia therapies have not assessed dependent variables other than traditional language measures such as the WAB, BDAE, and the PICA (Holland et al., 1996; Poeck, Huber, & Willmes, 1989; Robey, 1998; Shewan & Kertesz; 1984; Wertz et al., 1981; Wertz et al. 1986), with the exception of Basso, Capitani, and Vignolo (1979) who
evaluated probe performance on traditional tasks. Therefore, it was unknown if gains in therapy transfer to conversation. However, evidence exists which suggests that language functions have not generalized to untrained stimuli (DeDe, et al., 2003; Ennis, 2001; Fink, et al., 1995; Raymer, et al., 1993; Thompson, 1989) or produced any real changes in everyday settings that impact a person’s quality of life (Lyon, 2000; Thompson, 1989). Based on previous literature I hypothesized that working on traditional tasks in therapy would not produce gains in conversation. Yet, the results do not entirely support this hypothesis. This study provides some evidence that when Ttx is administered first, gains in conversation can be achieved. Since no one has assessed if traditional therapy generalizes to conversational abilities, the current findings contribute to the literature.

**Question 3**

The purpose of research Question 3 was to determine if there was a treatment effect for conversation therapy. Results indicated that Ctx improved conversational skills in P04. She demonstrated a very large increase in IRC and a very large decrease in R/F. It should be noted that P04 made improvements in conversation despite a lack of family support. These results may be attributed to the fact that she had the most severe aphasia out of all the participants. This is consistent with the work of Robey (1998) who found that greater gains are made in people with more severe aphasia because they have more opportunity for improvement. There were no other significant effects for the other participants. They may have deficits that were too mild to show an effect during the chosen intensity. The current findings are also consistent with Boles (1997) where he found PWA to make more gains in CA when they presented with moderate aphasia and were not many years post-onset.
I hypothesized that participants would produce better conversations as a result of Ctx. Specifically, participants would demonstrate an increase in initiations, responses, and continuations (positive conversational interactions) and a reduction in repairs/revisions, feedback and restatements (behaviors that interfere with conversation). Two pieces of information led to the formation of this hypothesis. First, the literature on conversation analysis indicated positive changes could be made in the conversations of PWA when specific skills are targeted in the conversation partner (Boles, 1997; Booth & Perkins, 1999). Second, this hypothesis was driven by the notion that if you work on training the actual skill you want to see improve, such as conversation skills, instead of another task like specific linguistic skills there may be improvement. The results supported the hypotheses for one participant. This participant presented with moderate aphasia, the most severe, had one of the more recent post-onsets, and was the youngest participant. Ctx has been described in the literature (Simmons-Mackie, 2000; Simmons-Mackie, 2008), yet there have been no systematic studies on the efficacy of this treatment type. The results of this study contribute to the literature by providing some evidence for a treatment effect for Ctx.

I also hypothesized that percent correct information units (CIUs) would increase as a result of Ctx. Doyle, Goda, and Spencer (1995) found that PWA produced significantly greater percentages of CIUs in a conversational discourse setting than in structured conversation. However, they did find that percent CIUs on the structured discourse tasks had a high level of predictability of performance on conversational discourse tasks. Some of the current results support this hypothesis and the previous literature. A small increase in CIUs was found for P01
and a large increase for P04. These results could be related to the fact that these two participants were the most recent post-onset.

One of the benefits of single-subject design is the ability to provide more detailed information about participants and report subjective observations. Throughout therapy, P01 consistently used the phrase “I can’t do it.” This response may be the result of a negative learning cycle and could be interfering with accurate productions of the treatment target. This idea follows upon the “errorless learning” paradigm (Fillingham, Hodgson, Sage, & Lambon Ralph, 2003). When the participant says “I can’t do it” this utterance dominates the language organization present in the brain at that moment. This results in a lessened probability that the person will be able to organize the components of an utterance that would be related to the conversational topic, rather than an utterance about the person’s perception of his own struggle at the moment. Therefore, I implemented a strategy to combat the interference the phrase might be causing. I asked the participant, when confronted with a word to: stop, breathe, think and come up with any word/phrase related to the topic. The goal was to try to activate the language centers of the brain for appropriate word retrieval, and decrease the interfering phrase. Based on the results, P01 benefited from using the strategy. The strategies used in Ctx for P01 included reducing the times he said “I can’t do it,” introducing a new conversational topic, use of a story board, and expanding utterances beyond ‘good’ and ‘yeah.’ During the last session of Ctx, two unfamiliar students held conversations with P01 in the therapy room. Participant 01 independently initiated conversation topics without hesitation. At the end of Ctx the wife told the PI how nice it was to be able to sit down and have a conversation with her husband.
Participant 02’s Ctx goals were targeted at reducing the amount of empty speech when searching for a word, using topic shift tag phrases, using a story board to include all pertinent information when recounting a story, and using appropriate pronouns and reference terms. His wife reported he was “easier to follow” in conversation at the end of Ctx, though fatigue and time of day often played a large role in the extent of his difficulties.

Participant 03’s Ctx goals were to spontaneously introduce a new conversational topic by identifying a topic shift using transitional phrases, share a story using a storyboard to include all necessary components, increase word retrieval, and maintain a conversation topic by asking WH-questions. He and his wife both reported seeing a small amount of improvement in his conversational skills following Ctx.

Participant 04’s Ctx goals were targeted at initiating new topics, orienting to new topics, topic maintenance, word retrieval, correct pronoun usage, story grammar, grammatical speech, indirect and direct speech acts including chit-chatting, and politeness strategies according to her dialect/culture. During Ctx, P04 was provided an alphabet board and notepad to aid in word retrieval. At the end of Ctx, P04 reported that it was “coming back [her language]” in conversation. She also told the clinician “you made me talk again!” At the end of Ctx her husband reported that she was no longer complacent at home and was much more vocal in expressing her opinions and participating in conversations around the house. These changes reported by the participants were not apparent in the secondary outcome measures.

**Question 4**

The purpose of research Question 4 was to determine which order of treatment would produce the highest gains in conversational outcomes. The results are equivocal. The results
from the two participants who received Ttx first then Ctx yielded two different outcomes. With P01, IRC was found to be positive and significant during post-Ttx; however, it increased across the treatment time and reached the highest level during Ctx and R/F decreased across the treatment time with the lowest level achieved during Ctx. One explanation of these results from this treatment order suggests that Ttx may not be necessary to produce gains in conversation since the best outcomes were illustrated in Ctx. An alternative explanation is that Ttx is needed first to build up specific linguistic skills first and then higher-level conversational skills can be addressed.

Participant 03 demonstrated the most success in conversational measures during post-Ttx. He was the oldest participant at 78, and the most years post-onset at over 8 years. The structure that is inherent in Ttx may be more beneficial for someone at this stage in the recovery process.

The two participants who received Ctx first followed by Ttx demonstrated that Ctx first may be more beneficial to improve conversational abilities than Ttx before or after. Participant 02 demonstrated that IRC was highest and R/F was lowest during Ctx. Participant 02’s conversational skills increased during Ctx and then skills declined when therapy was removed. Similar results were found for P04 where IRC was found to be the highest and significant and R/F was lowest and significant during post-Ctx. It took longer for P04 to assimilate the skills acquired in Ctx and proficiently used them after Ctx was removed during the post period.

For participants who received Ttx followed by Ctx, it was hypothesized that higher gains in conversation would be demonstrated after the initiation of Ctx. The results from P01 support this hypothesis. For the participants who receive Ctx followed by Ttx, it was hypothesized that
gains in conversation would be greater during Ctx and would not be maintained during Ttx. The results from P02 and P04 support this hypothesis.

Results indicated that CIUs went up over time regardless of treatment order for three of the four participants (P01, P02, and P04). These results suggest that both types of therapy had an effect on increasing CIUs in conversation.

There is no research in the aphasia treatment literature that has examined the order effect of treatment. The results of the current study indicate there may, in fact be a treatment order effect; however, additional participants are needed to provide more of an unequivocal answer to this research question.

**Question 5**

The purpose of research questions 5 was to determine if participants demonstrated improvement in secondary outcome measures. There were no statistically significant differences on these measures when the results were analyzed as a group. This result was not unexpected due to the small sample size and the limited amount of time between test administrations. Ten one-hour sessions over the course of five weeks may not be adequate time to demonstrate an effect using these measures.

**Impairment Assessment**

The purpose of research question 5a was to determine if linguistic skills improved on the WAB following Ttx and Ctx. There were no significant group differences between administration times. However, three out of the four participants had the highest AQ scores following Ctx, yet the differences in scores from one time period to the next were nominal. This result was not expected; rather it was hypothesized that linguistic skills would improve after
traditional therapy. The tasks in this linguistic assessment are very different than those used in conversation. However, subtests on the WAB and other traditional impairment assessments have been found to reliably predict transactional success in conversation (Marie, 2008).

**Activity Assessment**

The purpose of research question 5b was to determine if functional communication skills as measured by the ASHA FACS improved following Ttx and Ctx. There were no significant group differences between administration times. Three out of four participants did have higher communication independence mean scores following Ttx. This result was not supported by the hypothesis. I hypothesized that scores would be higher following Ctx and no change would be demonstrated after Ttx because functional communication would be more representative of the tasks used in Ctx than in Ttx.

Some previous literature corroborates these findings. Frattali et al. (1995) found a moderate correlation between the impairment assessment of the WAB and the ASHA FACS. Other researchers have found a correlation between functional and impairment assessments. A correlation has been found between the CADL and the PICA (Frattali, et al., 1995) and the CADL and the WAB (Beke, Maxim, & Wilkinson, 2007; Ross & Wertz, 1999). Aftonomos, Steele, Appelbaum, & Harris (2001) report that the relationship between impairment and functional abilities are still not fully known. The current findings may suggest that improvements made during Ttx are captured by the ASHA FACS assessment because it may be measuring impairment instead of activity.
Another explanation of the nonsignificant group findings is that the functional communication measures that are currently available lack the sensitivity to capture change over time in people with chronic aphasia (Frattali, et al., 1995).

**Quality of Life Assessment**

The purpose of research question 5c was to determine if quality of life scores on the SAQOL improved following Ttx and Ctx. There were no significant group differences between Ttx and Ctx. Two participants were found to have the highest scores following Ttx, one after Ctx and another one at baseline. The majority of these findings contradict the hypothesis that quality of life scores would improve following Ctx and no change would be demonstrated after Ttx. Previous literature has found that improvement on language tests and functional tasks have still left PWA feeling isolated, with a loss of confidence, and with limited communication opportunities (Parr, 1997) because people are still unable to participate in their life roles. PWA’s impairments can restrict participation in their life roles (Simmons-Mackie & Kagan, 2007), which can lead to depression, social isolation, loneliness, loss of autonomy, and ultimately diminish quality of life (Parr, 2001; Simmons-Mackie, 2008). One explanation of these findings is that there was not enough time between test administrations to adequately capture changes in quality of life.

**Participation Assessment**

The purpose of research question 5d was to determine if conversational abilities with the primary conversation partner would improve on the CAPPA following Ttx and Ctx. The social approach to aphasia therapy is closely aligned with participation domain of the ICF (Simmons-Mackie, 2000). At the societal participation domain, a conversation is used for getting a message
across and interacting with others (Kagan, et al., 2004). At the heart of the social approach to aphasia therapy is natural authentic conversation (Simmons-Mackie, 2000). Based on the previous literature it was hypothesized that after Ctx, a participation domain treatment, there would be improvement on the CAPPA and there would be no change after Ttx. The results do not entirely uphold the hypothesis.

P01, P02, and P03 all had the highest level of agreement between what they reported as a problem and the evidence found in conversation analysis following Ttx. They also had the highest degree of absent evidence following Ctx. This indicates they reported having a problem but it was not evident in the conversation analysis. These results may indicate that people are less able to accurately report on their changing abilities/deficits after Ctx.

The CP’s had the highest levels of agreement between report and conversation analysis at different times. The CP for P01 had the highest agreement after Ctx. The CP for P02 had the highest agreement after Ttx. The CP for P03 rated the same level of agreement after Ttx and Ctx. The CP for P04 had the highest level of agreement at baseline.

Linguistic problems were rated the lowest following Ttx for two PWA. Another one rated it as equally low following Ttx and Ctx, and one participant rated it the lowest at baseline. Repair was rated the lowest following Ttx for two PWA. One participant rated no change in repair, and one rated the lowest problem following Ctx. Initiation/turn taking was rated the least amount of a problem after Ttx for two participants and Ctx for two participants. Topic maintenance was rated as the least amount of a problem following Ttx for two participants, Ctx for one participant, and equally low after Ttx and Ctx for another participant.
Three of the conversation partners rated linguistic problems as the lowest following Ttx and one following Ctx. Two of the conversation partners rated repair as the lowest problem following Ctx and the other two following Ttx. Three conversation partners rated initiation/turn the lowest problem following Ttx and one rated it the lowest following Ctx. Two conversation partners rated topic maintenance as the lowest problem following Ctx, one rated it the lowest following Ttx/Ctx, and another following baseline/Ttx.

It would be expected that linguistic problems would be rated lowest after Ttx because this therapy focused on improving specific linguistic deficits. This was found in three out of the four PWA and their conversation partners. Armstrong (2000) described turn-taking and topic maintenance as being important components of discourse. Half of the participants and one conversation partner rated initiation and turn-taking to be less of a problem following Ctx. One participant rated topic maintenance as less of a problem following Ctx and another one rated it as equally low after Ctx and Ttx. Two of the conversation partners rated topic maintenance as less of problem following Ctx and one rate it as equally low after Ctx and Ttx.

Participant 04 and her conversation partner rated the most changes in the conversation variables after receiving Ctx. This finding is consistent with the other results for this participant where she demonstrated a treatment effect after Ctx for IRC, R/F, and CIUs. No treatment effect was found for traditional probes or conversational outcomes following Tx for P04.

Overall, there are few clear patterns in the results of the CAPPA. Perhaps more participants and a longer time between administrations are needed to adequately capture a definitive picture.
Theoretical Implications

“Discourse is achieved in terms of more global issues such as overall success in conveying meaning, appropriateness of particular patterns of language to a particular situation, topic maintenance, and turn-taking, with social context being an integral part of the framework and the analysis” (Armstrong, 2000, p. 876). Conversational discourse is the exchange of utterances between conversational partners (Ulatowska, et al., 1990). While we can define conversational discourse, no one has found a consistent way to measure it. Many people have used Conversation Analysis (CA), a qualitative methodology for analyzing the conversational interactions between PWA and their partners. Conversation analysis has been used to examine a variety of different aspects of conversational discourse, some of which include the use of sequential utterances in aphasic conversation (Wilkinson, 1999), the manifestations of agrammatism in conversation (Heeschen & Schegloff, 1999), joint word searching and turn completion (Oeschlaeger & Damico, 2000), and repair (Lindsay & Wilkinson, 1999; Perkins, 2003). Even within CA, there is no consistency in what sorts of discourse structures are measured. In addition, a number of studies have used other methods than CA to examine the interactional discourse structures between PWA and their partners during conversation (Hengst, 2003; Hengst, Frame, Neuman-Stritzel, & Gannaway, 2005; Oeschlaeger & Damico, 1998; Perkins, 2003; Simmons-Mackie & Damico, 1999; Simmons-Mackie, Kingston, & Schultz, 2004).

While CA and other methods of examining the dyadic relationship between a PWA and a partner have merit, I chose to examine conversational discourse in a different way. The goal of the current study was to examine just the PWA’s utterances to determine if therapy had an effect
on their output. The CICF (Algeo & Pimental, 2006), which examines 10 utterances of the PWA was modified and used to analyze the pragmatic functions and CIUs of all the PWA’s utterances in a conversational discourse sample. The functions of the utterances were coded in terms of Turn Taking Interchanges (TTI). These TTI included initiations, responses, repair/revisions, and feedbacks. An additional TTI referred to as continuation was added in the current study. Continuation was defined as an utterance that was a continuation of a response by adding more information in subsequent turn. The proportion of each type of TTI was calculated and analyzed for each conversational probe. Initially, each type of TTI was analyzed and graphed individually. When each of these were examined separately there were no clear results. Consequently, I decided to look at discourse differently—rather as groups of behaviors instead of individual behaviors. The groups of behaviors were examined by which type of utterances contributed to positive conversational interactions and which types were not useful or contributed to negative conversational interactions. Utterances considered to be positive were Initiations, Responses, and Continuations (IRC). Utterances thought to be negative or not useful were Repair/Revision, and Feedback (R/F). When the data were analyzed by groups of behaviors there were more definitive patterns in how to measure conversational success.

**Research Implications**

Conversational discourse analysis is a complex, dynamic, elusive process. The paradigm used in the current study attempts to capture and measure this process from the perspective of the PWA’s utterances. Clear patterns of the positive and negative conversational utterances can be observed and reliably reported. Oelschlaenger and Thorne (1999) reported that CIUs could not be reliably assessed in conversation. On the contrary, Doyle, Goda, and Spencer (1995), Marie
(2008), and now the current study have reported that this can be reliably done. At this point, this paradigm works well for an experimental design. Nevertheless, it is a time consuming endeavor to train research assistants, transcribe conversation samples, and code utterances for reliable results. Therefore this paradigm works well in controlled research environment; however, it is not practical for clinical application. This paradigm may be useful for designing further treatment studies that aim to investigate the conversational outcomes of PWA.

**Clinical Implications**

Conversation therapy has been discussed in the literature as a participation treatment for PWA (Simmons-Mackie, 2000; Simmons-Mackie, 2008) without any evidence to support a treatment effect. Some of the group therapy literature for PWA discusses using conversation therapy as a method of treatment (Elman & Bernstein-Ellis, 1999). Even with this evidence we do not know which specific variables contribute to conversational success. Because of the countless variables at play during group therapy, it is difficult to isolate the active variables. One reason this study was undertaken was because we do not even know if there is a treatment effect for conversation therapy in individual therapy. When conversation therapy is discussed in the literature there is no manualized method for administering the treatment (Simmons-Mackie, 2000, 2008). The current study provided evidence for a treatment effect and attempted to establish a standard way of conducting conversation therapy. All participants were administered the CAPPA before therapy, following Ttx, and following Ctx. A 10-minute conversation sample between the PWA and their primary conversation partner was recorded and analyzed. The communication breakdowns evident in these conversations were used to guide intervention. This
is consistent with previous literature where the CAPPA was used to guide intervention (Booth & Perkins, 1999).

A questionnaire was given before therapy to determine each person’s hobbies and interests in conversational topics. These topics were personally relevant to each participant and goals were individualized; yet all participants were trained using the principles of conversation therapy. These included using a direct method of training strategies to enhance message exchange (e.g. gesturing, writing or drawing, initiating topics, holding turns, using continuers such as head nods or uhmm, transitioning from one topic to another, and a variety of speech acts. No matter what the participant’s individual goals were, all conversational probes were analyzed in the same way as previously described to determine an effect. Feedback on performance was given to the participants. They were mailed a copy of their treatment report at the end of their participation in the study. The report included test performances, goals/objectives, and documentation on their progress during the treatment study.

Even with a minimum treatment time of 10 sessions, an effect was found for Ctx for the youngest participant with moderate aphasia. Visual trends in the data demonstrate clear consistent results that the most gains in conversational success were achieved during or following Ctx for three out the four participants. These results are promising for using conversation therapy in clinical practice. This method of conversation therapy could provide clinicians with a more standardized method of administering treatment. If we can train specific conversational skills in therapy to improve conversational success this will extend the current literature by providing more evidence at the participation domain. If these results are upheld with more participants and at a higher intensity, we may only need to train conversation therapy
for people with mild-moderate aphasia to achieve conversational gains. However, this is not recommended for clinical practice yet. More systematic evidence of a treatment effect needs to be demonstrated. Furthermore, the measurement of conversational outcomes needs to be adapted for clinical use. In its current form, it is too time consuming and thus impractical.

**Limitations**

There were numerous limitations in the current study. The most significant limitation was the small number of participants. Although a small number of participants is appropriate in Phase I single-subject research designs, it does jeopardize the generalizability of the findings. The participant group was not a homogenous group in age, time post-onset, or amount of previous therapy. This is a common problem in aphasia treatment research due to participant recruitment challenges. Another potential limitation was the number of different clinicians administering therapy. The three clinicians had different personalities which may have affected they way treatment was administered. While this was originally thought to be a limitation, it may be beneficial and more alike to the real world to use a variety of clinicians to demonstrate a treatment effect can be achieved. Another limitation was the intensity of the study. Although the small number of sessions for each treatment type was deliberately chosen, a higher intensity may demonstrate more evident treatment effects.

The probe measures were taken at the beginning of the first session each week before therapy started. This was done to measure treatment retention/generalization. As a first step, probe measurements should have been taken at the end of therapy. Therefore, therapy would prime the person for applying the strategies used in therapy and maybe a treatment effect would have been more evident. This would measure treatment acquisition.
Another limitation is that the conversation topics changed over the course of time. For example in P01 the conversation topics at the beginning of therapy tended to be about what he used to do, his work, how he met his wife, and being in the military, as opposed to the conversations at the end of therapy where the conversation samples tended to be about the football game he watched on television the previous night. This elicits a different type of discourse and the amount of information varied. It seems a natural course of getting to know somebody through conversations is to discuss personal things first and then move on to topics of current events and such. I would predict that conversational discourse relating to personal events is more rehearsed than other types of conversational topics.

**Future Research**

There are numerous future directions for this area of research. First, if this study were replicated, the intensity of therapy could be extended to further determine the dosage needed to demonstrate a stronger treatment effect. As mentioned in the limitations section, the time when probes are administered could be changed to the end of a therapy session to reflect treatment acquisition. To measure the maintenance of a treatment effect, follow-up probes could be conducted at one month, three months, and six months after the completion of therapy. Different types of conversational prompts should be balanced across treatment types. Further investigation of the conversational variables being measured is warranted. In addition, different outcome measures could be used to attempt to capture some of the changes that were reported by the participants following Ctx.

Previous literature has reported success training the conversation partners of PWA (Boles, 1998; Booth & Perkins, 1999; Cunningham & Ward, 2003; Fox, Armstrong & Boles, 2009;
Kagan et al., 2001). A logical next step would be to train the primary conversation partner of the PWA after they complete individual therapy. This would allow the conversation partner to learn strategies to enhance conversational success and also allow the PWA to practice the strategies learned in therapy with their conversation partner while the clinician facilitates.

It is evident from the current data that P04 benefited the most from conversation therapy. She presented with moderate aphasia, the most severe of the participants, was the youngest, and was not very far post-onset. A further study should be done with people who have a similar profile to determine if this is the optimal type of person who benefits from this type of therapy. In addition, people with severe aphasia should be studied to determine the efficacy of this type of treatment with that population.

An additional study could include adding a semantic scale by contributing things that push meaning into the conversation. Training could be done at the higher level of interpretation and have the clinician model the information. Then have the PWA practice after the model. The clinician could use cloze procedure to increase complex syntax.

Another study could include an alternating treatment design. Pre-test the participants by having them discuss a topic. Then conduct the intervention and teach the participant how to improve conversational abilities. Then have the person discuss the topic again at the end without modeling or cueing for a post-test. Over time it would be expected that conversational skills would improve. Dell, Chang, and Griffin’s (1999) connectionist model indicates that priming and interacting should create some connections and therefore produce more output. Over time the strength of the connections should be stronger and therefore quicker.
Since the current paradigm is not suitable for clinical use, a future study would be to adapt or create a reliable measure that could quickly assess conversational outcomes. For participation level treatments to be administered in everyday therapy, we need reliable ways to measure and report the outcomes to our clients and third party payers.

A different study could include using Constraint Induced Language Therapy (CILT). CILT has some of the strongest evidence in this field (Cherney, Patterson, Raymer, Frymark, & Schooling, 2008; M Meinzer, Djundja, Barthel, Elbert, & Rockstroh, 2005; Marcus Meinzer, Elbert, Djundja, Taub, & Rockstroh, 2007; Pulvermuller, et al., 2001). A potential study would be to compare constraint induced conversation therapy and constraint induced traditional stimulation therapy on conversational outcomes.

**Conclusion**

In conclusion, this study’s results provide preliminary evidence that traditional stimulation therapies do produce some gains in conversational outcomes for some PWA when administered first. This study is the first to provide an indication that training PWA conversational skills in individual therapy can further improve conversational abilities. Conversation therapy has been described in the literature with no reports yet of a treatment effect. This study provides a model for conversational treatment that demonstrated a treatment effect for some participants. In three out of the four participants, the highest level of conversational success was demonstrated during or following conversation therapy. Moreover, this is the first study to investigate and demonstrate evidence of an order effect for traditional versus conversational treatment. If these results hold true with further research, traditional stimulation therapy may not be the first treatment of choice. It may be possible to administer
conversation therapy only for people with mild-moderate aphasia to enhance conversational success. Conversation is the essence of human communication. Training PWA explicitly to have successful conversations may in turn help people participate more fully in their life roles and ultimately enhance their quality of life.

Although many questions remain to be answered, the results of this study hold promise for further research into the efficacy of conversation therapy and measuring conversational outcomes for people with mild-moderate aphasia.
REFERENCES


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*Neuropsychologia, 9*, 97-113.


APPENDIX A. EDINBURGH HANDEDNESS INVENTORY

Please indicate your preferences in the use of hands in the following activities by putting a check in the appropriate column. Where the preference is so strong that you would never try to use the other hand, unless absolutely forced to, put 2 checks. If in any case you are really indifferent, put a check in both columns.

Some of the activities listed below require the use of both hands. In these cases, the part of the task, or object, for which hand preference is wanted is indicated in parentheses.

Please try and answer all of the questions, and only leave a blank if you have no experience at all with the object or task.

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  Writing</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>2.  Drawing</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>3.  Throwing</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>4.  Scissors</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>5.  Toothbrush</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>6.  Knife (without fork)</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>7.  Spoon</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>8.  Broom (upper hand)</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>9.  Striking Match (match)</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>10. Opening box (lid)</td>
<td>☐ ☐</td>
<td>☐ ☐</td>
</tr>
<tr>
<td>TOTAL (count checks in both columns)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difference</th>
<th>Cumulative TOTAL</th>
<th>Result</th>
</tr>
</thead>
</table>

Scoring:

Add up the number of checks in the “Left” and “Right” columns and enter in the “TOTAL” row for each column. Add the left total and the right total and enter in the “Cumulative TOTAL” cell. Subtract the left total from the right total and enter in the “Difference” cell. Divide the
“Difference” cell by the “Cumulative TOTAL” cell (round to 2 digits if necessary) and multiply by 100; enter the result in the “Result” cell.

Interpretation (based on Result):

- below -40 = left-handed
- between -40 and +40 = ambidextrous
- above +40 = right-handed
Card is held in good light 14 inches from eye. Record vision for each eye separately with and without glasses. Presbyopic patients should read through bifocal segment. Check myopes with glasses only.
APPENDIX C. BDAE AUDITORY COMPREHENSION

C. Complex Ideational Material (Short Form items in boldface are 1, 2, 5, 6, 9, and 10.)
There are 10 pairs of questions, each pair consisting of a yes-item and a no-item. Both
the a and the b questions must be correct to gain 1 point of credit for each numbered
pair. Note that odd and even numbered items are intermingled, to avoid having a
predictable alternation of yes and no responses. Questions 5 through 10 are based on
short paragraphs, to be read to the patient.

1a. Will a cork sink in water?
   2a. Can you use a hammer to pound nails?

1b. Will a stone sink in water?
   2b. Is a hammer good for cutting wood?

3a. Do two pounds of flour weigh more than one?
   4a. Will water go through a good pair of rubber boots?

3b. Is one pound of flour heavier than two?
   4b. Will a good pair of rubber boots keep water out?

"I AM GOING TO READ YOU A SHORT STORY AND THEN I WILL ASK YOU SOME
QUESTIONS ABOUT IT. ARE YOU READY?" (Read at a normal rate).

Mr. Jones had to go to New York. He decided to take a train. His wife drove him to the
station, but on the way they had a flat tire. However, they arrived at the station just
in time for him to catch the train.

5a. Did Mr. Jones miss his train?
   6a. Was Mr. Jones going to New York?

5b. Did he get to the station on time?
   6b. Was he on his way home from New York?

"I AM GOING TO READ YOU ANOTHER PARAGRAPH. ARE YOU READY?"

A soldier tried to cash a check in a bank near his camp. The teller, firm but sympathetic,
said, "You will have to have identification from some of your friends from the camp."
The discouraged soldier answered, "But I don't have any friends in camp—I'm the
bugler."

7a. Was the soldier's check cashed at once?
   8a. Did the soldier have a friend with him?
## APPENDIX B
### SCORING SYSTEM

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Accurate, immediate (&lt;5 seconds) and acceptable substitutions</td>
<td>e.g., minor sound distortions acceptable such as voicing/devoicing</td>
</tr>
<tr>
<td>8</td>
<td>Accurate, delayed (&gt;5 seconds)</td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td>Uninflected or incorrectly inflected</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Self-corrected</td>
<td></td>
</tr>
<tr>
<td>6A</td>
<td>Phonemic paraphasia (single phoneme substitution)</td>
<td></td>
</tr>
<tr>
<td>6B</td>
<td>Phonemic paraphasia (recognisable word with more than one sound substitution)</td>
<td>50% or more of sounds must be correct</td>
</tr>
<tr>
<td>5.5</td>
<td>Partial retrieval (noun form, word embedded in more complex form)</td>
<td>e.g., washing → washer</td>
</tr>
<tr>
<td>5</td>
<td>Semantic paraphasia (semantically related word)</td>
<td>e.g., washing → drying</td>
</tr>
<tr>
<td>4.5</td>
<td>Semantic paraphasia containing phonemic paraphasia</td>
<td>e.g., vrying for washing</td>
</tr>
<tr>
<td>4</td>
<td>Appropriate gestural response or written response</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Circumlocution / Related word</td>
<td></td>
</tr>
<tr>
<td>2.5A</td>
<td>Tangential speech</td>
<td></td>
</tr>
<tr>
<td>2.5B</td>
<td>Unrelated word</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Neologism or unintelligible word</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Preservation</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>No response or &quot;I don’t know&quot;</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E. CONVERSATIONAL INTERACTION CODING FORM

Reliability of the Conversational Interaction Coding Form when Applied to Natural Conversation
Ashley Pozzolo, M.A., R.SLP, CF, Sturgeon School Division, Morinville, AB
Jane Pimentel, Ph.D., Eastern Washington University, Spokane, WA

Please tell us your clinical successes and difficulties in using the Conversational Interaction Coding Form to measure treatment outcomes! Thank you!
Email: Jane Pimentel jpitmentel@mail.ewu.edu or Ashley Pozzolo apozzolo@sturgeon.ab.ca

| Communicator: __________________________ | Number in group: ______ | Date: __________ |
| Rater: ______________________________ | Context: __________________ |

**Directions:** Assess each participant in the group individually on informativeness and participation in conversational interactions based on conversation turns. Indicate the number of Correct Information Units (CIUs) elicited in each turn in the space provided. Circle the type of turn-taking interchange, and circle the modality used to convey the message.

<table>
<thead>
<tr>
<th>Turn-Taking Interchanges:</th>
<th>Initiation</th>
<th>Response</th>
<th>Repair/revision</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality Used:</td>
<td>Verbalization</td>
<td>Vocalization</td>
<td>Writing/drawing</td>
<td>Gesture</td>
</tr>
</tbody>
</table>

1. ___ CIUs
2. ___ CIUs
3. ___ CIUs
4. ___ CIUs
5. ___ CIUs
6. ___ CIUs
7. ___ CIUs
8. ___ CIUs
9. ___ CIUs
10. ___ CIUs

**Summary:**
- Number of Correct Information Units/total turns = ________%
- Number of turn types: Initiation ______ Response ______ Repair/revision ______ Feedback ______
- Number of modality occurrences: Verbalization ______ Vocalization ______ Writing/drawing ______ Gesture ______
Rules for Counting Correct Information Units (CIUs)
(Adapted from Nicholas & Brookshire, 1993; format taken from Shadden, 1998)

**Illegal words in italics were changes made based on the research findings**

Correct information units are words that are intelligible in context, accurate in relation to the topic, and relevant to and informative about the content of the topic or socially relevant to the interaction. “Each correct information unit consists of a single word and only words that have been included in the word count can be considered for inclusion in the correct information unit count” (Nicholas & Brookshire, 1993, p. 348).

Not counted:

a) Words that are inaccurate in portraying the topic
b) Attempts to correct words or sound errors, except for final version (if it meets CIU criteria)
c) Revisions, dead ends, and other incomplete items
d) Repetitions of information that do not add significantly to the communication
e) First examples of pronouns when the referent is ambiguous
f) Nonspecific, empty terms without clear referent
g) Conjunctive words and phrases if used to continue flow of discourse rather than to provide specific meaningful connections
h) Qualifying words or phrases that suggest ambiguity when the topic(s) should be clear
i) Word and phrase fillers (you know, well, okay, oh), interjections (oh, wow, gosh, hmm, aha) and tag questions that serve no informative function
j) The conjunction and
k) Comments about the task itself
l) Comments about the client’s performance on the task and/or personal and inappropriate statements

Counted:

m) All intelligible, accurate, relevant, and informative words to the content of the topic of discussion
n) Words do not have to be used in a grammatically correct manner as long as they do not violate the rules for not counting certain words (e.g., if the words lead to misunderstanding or uncertainty about the meaning of the words)
o) The final attempt in a series of attempts to correct sound errors
p) Informal terms (nope, yep, uh-huh) when they convey information about the content of the topic and are socially relevant to the interaction.
q) Contractions are counted as two CIUs, e.g., ‘won’t’
r) Each word in hyphenated words and proper nouns, e.g., father-in-law = 3 CIUs
s) Iconic gestures, writing, or communicative drawings are coded as one CIU if the gesture/writing/drawing adds new information to the verbal production and are coded as zero if it is a repetition of verbal information or repetition of a gesture/drawing/writing (NOTE: not an original Nicholas and Brookshire rule)
Operational Definitions

Turn-taking interchange: “(a) a turn is a unit of communicative behavior, directed from one conversational participant to another, that attempts to convey a message; (b) the end of a turn is signaled by changes in vocal intonation (e.g., rising or falling), or by a pause not associated with word/linguistic retrieval; (c) separate turns exist if the type of communication act (e.g., comment, question, answer, etc.) shifts” (Garrett & Huth, 2002, p. 529). Each turn is coded in one of four ways:

1. Initiation – beginning an interaction with another person(s) by presenting a new idea through a comment, request, or question
2. Response – responding to a comment by expanding the idea (i.e., providing more than feedback) or replying/answering a question following an interlocutor’s turn
3. Repair/revision – repairing/revising a communicative attempt when a breakdown occurs, and/or the ability to ask for a repair when misunderstanding or ambiguity has occurred (Prutting & Kirchner, 1987)
4. Feedback - giving verbal feedback to the listener such as ‘yes,’ ‘no,’ ‘yeah,’ or ‘really,’ or nonverbal feedback such as head nods or shakes to show positive or negative reactions to a statement and/or to keep the flow of the conversation (modified from Prutting & Kirchner, 1987)

Modality used: includes verbalizations, vocalizations, writing/drawing, or gestures.

1. Verbalizations – expressing feelings, thoughts, or ideas in a meaningful way to a listener
2. Vocalizations – producing voice without meaning/understanding to a listener
3. Writing/drawing – must be communicative. That is, it must support, complement, or replace verbal behavior (Prutting & Kirchner, 1987).
4. Gestures – must be communicative. That is, they must support, complement, or replace verbal behavior (Prutting & Kirchner, 1987) and do not include undifferentiated gestures such as using one’s hands during conversation. Gestures are always coded when paired with writing/drawing if the gesture is required for the interaction to occur.

These categories are not mutually exclusive. If the patient with aphasia displayed multiple modality communication, credit should be given for all modalities displayed by the patient.
APPENDIX G. INDIVIDUAL GRAPHS OF CONVERSATIONAL MEASURES DURING TTX

P01 Repair/Feedback

Proportion of Utterances

P01 Initiation, Response, Continuation

Proportion of Utterances
P03 Repair/Feedback

Proportion of Utterances

BL 1, BL 2, BL 3, Tx 1, Tx 2, Tx 3, Tx 4, P Tx 1, P Tx 2, P Tx 3

P03 Initiation, Response, Continuation

Proportion of Utterances

BL 1, BL 2, BL 3, Tx 1, Tx 2, Tx 3, Tx 4, P Tx 1, P Tx 2, P Tx 3
APPENDIX H. INDIVIDUAL GRAPHS OF CONVERSATIONAL MEASURES DURING CTX

P01 Repair/Revision

P01 Initiation, Response, Continuation
P02 Initiation, Response, Continuation

Proportion of Utterances

BL1  BL2  BL3  CTx 1  CTx 2  CTx 3  CTx 4  PCTx 1  PCTx 2  PCTx 3

P02 Percent Correct Information Units

BL1  BL2  BL3  CTx 1  CTx 2  CTx 3  CTx 4  PCTx 1  PCTx 2  PCTx 3
P04 Initiation, Response, Continuation

P04 Percent Correct Information Units
APPENDIX I. MEAN GRAPHS FOR P01

P01 mean chart ICR (Baseline, Traditional, Post-Traditional, Conversation, Post-Conversation)
P01 mean chart R/F (Baseline, Traditional, Post-Traditional, Conversation, Post-Conversation)

P01 mean chart CIU (Baseline, Traditional, Post-Traditional, Conversation, Post-Conversation)
APPENDIX J. MEAN GRAPHS FOR P02

P02 mean chart ICR (Baseline, Conversation, Post-Conversation, Traditional, Post-Traditional)

P02 mean chart R/F (Baseline, Conversation, Post-Conversation, Traditional, Post-Traditional)
P02 mean chart CIU (Baseline, Conversation, Post-Conversation, Traditional, Post-Traditional)
APPENDIX K. MEAN GRAPHS FOR P03

P03 mean chart ICR (Baseline, Traditional, Post-Traditional, Conversation, Post-Conversation)

P03 mean chart R/F (Baseline, Traditional, Post-Traditional, Conversation, Post-Conversation)
P03 mean chart CIU (Baseline, Traditional, Post-Traditional, Conversation, Post-Conversation)
Appendix L. MEAN GRAPHS FOR P04

P04 mean chart ICR (Baseline, Conversation, Post-Conversation, Traditional, Post-Traditional)

P04 mean chart R/F (Baseline, Conversation, Post-Conversation, Traditional, Post-Traditional)
P04 mean chart R/F (Baseline, Conversation, Post-Conversation, Traditional, Post-Traditional)
APPENDIX M. INDIVIDUAL SCORES FOR PARTICIPANTS ON THE WAB

P01

<table>
<thead>
<tr>
<th>WAB (Kertesz, 2007)</th>
<th>Pre-</th>
<th>Post-Conversation</th>
<th>Post-Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous Speech</td>
<td>18</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Auditory Verbal Comp</td>
<td>9.35</td>
<td>9.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Repetition</td>
<td>9.6</td>
<td>10</td>
<td>9.8</td>
</tr>
<tr>
<td>Naming/Word</td>
<td>8.8</td>
<td>8.6</td>
<td>8.8</td>
</tr>
<tr>
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- Pre Therapy
- Post Traditional
- Post Conversation

- Agree
- Conflict
- Absent

P01 Overall agreement between CP report & conversation analysis

- Pre Therapy
- Post Traditional
- Post Conversation

- Agree
- Conflict
- Absent
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- Post Traditional
- Post Conversation

Agreement levels:
- Agree
- Conflict
- Absent

P03 Overall agreement between CP report & conversation analysis

- Pre Therapy
- Post Traditional
- Post Conversation

Agreement levels:
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- Conflict
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<tr>
<td>Absent</td>
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P04 Overall agreement between PWA report & conversation analysis

- Pre Therapy
- Post Traditional
- Post Conversation

- Agree
- Conflict
- Absent

P04 Overall agreement between CP report & conversation analysis

- Pre Therapy
- Post Traditional
- Post Conversation

- Agree
- Conflict
- Absent
P04 PWA

P04 Conversation Partner
VITA

Meghan Collins received her Bachelor of Arts degree in psychology from Hendrix College in Conway, Arkansas, in May 2004. She received her Master of Arts in speech-language pathology from Louisiana State University in December 2007. She chose this field because of her love of communication and connecting with other people. She holds her Certificate of Clinical Competency from the American Speech Language and Hearing Association. She plans to continue working in clinical practice and clinical research to help improve the efficacy of conversational treatments for people with aphasia.