Patient Characteristics and Treatment Components that Mediate Improvements in Connected Speech in Persons with Chronic Post-Stroke Aphasia: A Delphi study involving a Communication Disorders Expert Panel

by

Kimberly L. Frey

B.A., The University of Tulsa, 1993

M.S., The University of Nebraska-Lincoln, 1995

A thesis submitted to the

Faculty of the Graduate School of the

University of Colorado in partial fulfullment

Of the requirement for the degree of

Dual Doctor of Philosophy

Departments of Speech, Language, & Hearing Sciences

and Institute of Cognitive Science

2013

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

This dissertation entitled:

Patient Characteristics and Treatment Components that Mediate Improvements in Connected Speech in Persons with Chronic Post-Stroke Aphasia: A Delphi study involving a Communication Disorders Expert Panel

Written by Kimberly Lynne Frey

has been approved for the Department of Speech, Language, & Hearing Sciences and Cognitive Science

_____

(Gail Ramsberger, Chair)

_____

(David B. Arciniegas)

_____

(Albert Kim)

_____

(Neeraja Sadagopan)

_____

(Brenda Schick)

Date: 05/30/13

The final copy of this dissertation has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned disciplines.

HRC protocol: # 12-0587

Abstract

Frey, Kimberly Lynne (PhD., Speech, Language & Hearing Sciences; Neuroscience)

Patient Characteristics and Treatment Components that Mediate Improvements in Connected Speech in Persons with Chronic Post-Stroke Aphasia: A Delphi study involving a Communication Disorders Expert Panel

Dissertation directed by Associate Professor Gail Ramsberger

Purpose: To achieve agreement amongst a group of aphasia experts regarding the most important patient characteristics and treatment components that mediate improvements in connected speech in persons with chronic post-stroke aphasia.

Method: A three-round Delphi study obtained the views of experts regarding patient characteristics and treatment components (e.g., focus, materials, task, duration/intensity, other) that positively, neutrally, or negatively influence connected speech. A structured eight-stage process included two data acquisition methods. First, a systematic literature review extracted patient characteristics and treatment components in studies for which connected speech was an outcome variable of interest. Next, over three-rounds, experts identified and rated patient characteristics and treatment components according to their relative influence on connected speech. Means, standard deviations, percentiles, and Spearman rank correlation coefficients were used to investigate the importance of items, agreement amongst experts, and stability of responses across rounds.

Results: Fifty-two experts identified in the literature review were contacted to participate in the study, seven of whom completed all three Delphi rounds. Categorization of the narrative responses to first round questions resulted in 175 specific, five-point Likert-scale questions

After expert ratings of Round two and three questions, 53 final items achieved greatest certainty to positively or negatively influence connected speech. Of these 53, 38 achieved high expert consensus, 11 moderate consensus, and 4 low consensus. Twenty-three of the ratings had strong stability across rounds, 38% had moderate, and 26% had weak.

Discussion: Comparison of the literature and expert responses in the Delphi study revealed contrasting thoughts on variables that influence connected speech. Studies identified in the literature review emphasized treatment of microlinguistic elements of language. In contrast, experts' responding to the Delphi questionnaire indicated that treatment should be directed toward macrolinguistic elements of language. Through this Delphi study, a panel of international aphasia rehabilitation experts identified and agreed upon key elements of aphasia therapy aimed at improving connected speech. When the tasks, materials, and types of feedback are considered, and treatment is constructed, these key elements can be integrated and manipulated and thus be used as mechanisms of, not just variables in, change.

Dedication

This dissertation is dedicated to my parents, Jim and Linda Jorgensen, and my husband and daughters, Dave, Alex, and Masen. Your unconditional and steadfast support has been the vessel that kept me afloat through the calm and rocky waters of this seven-year journey. To my parents, thank you for teaching me to approach life with an open mind and an open heart. The roots you planted made this PhD possible. To Dave, thank you for all your dedication to our family, your patience, and your stalwart support of the time, money, and energy needed to accomplish this endeavor. To Alex and Masen, thank you for your understanding, love, and appreciation for how much work and dedication a PhD requires. I'm ready to rejoin life because "I *do not* have to work on my dissertation" any longer.

Acknowledgements

One of the most valuable lessons I've learned throughout this process is that when writing, especially when having trouble putting things into words, just say want you want to say. A difficult task, but I'll try to demonstrate my learning here. I want to thank three members of my doctoral committee, Drs Brenda Schick, Neeraja Sadagopan, and Al Kim for your consistent support during my doctoral program. Each of you brought a valuable perspective to not only this dissertation, but also, through coursework or advising, my doctoral studies. Thank you to the co-chair of my committee, Dr. Gail Ramsberger, for your patience, insight and expertise over the past seven years. This entire process got seen through to completion because of you. And with tremendous gratitude, I thank the other co-chair of my committee, David Arciniegas, M.D. Your tireless and unwavering investment in my growth and PhD have influenced my life more than I can put into words. Thank you to the William Orr Dingwall Foundation for providing the Neurolinguistic Fellowship and financial support that allowed me to dedicate a large amount of time to completion of my dissertation. To my parents, Jim and Linda Jorgensen, thank you for modeling and instilling in me the tools for how to live your life. You set the bar at practicing what you preach - life's not a destination, it's a journey. Finally, I'm not the only person who has been on this journey for the past seven years. I have been blessed to have the love and support of the most amazing husband and daughters. Dave, Alex, and Masen, thank you for your fortitude, as each aspect of this PhD process took a toll on you. I thank you with the deepest gratitude for your willingness to be with me on this journey.

Table of Contents

List of Figures

Figure

List of Tables

Table

List of Appendices

Appendix

Generalization and Connected Speech

In medical terms, stroke-related aphasia is caused by damage to the part of the brain that controls language processing. In "so what" terms, aphasia can rob a person of the ability to speak or understand language and, as a result, gravely impair that person's ability to communicate the most basic of needs. In the end, the struggle to talk or understand leaves many stroke survivors with a lifetime of communication difficulties that can devastate relationships with family, friends, and the community (Boone & Zraik, 1991; Croteau & LeDorze, 2006; Murphy, 2006). To this point, the speech-language discipline is attempting to determine how language gains achieved in the office with the speech-language pathologist can translate, or generalize, to language use in everyday communication (Chapey, et al., 2008).

Generalization

The premise of generalization is relatively consistent, referring to the occurrence of a trained behavior in untrained conditions e.g., trained word to untrained word, trained sentence structure to untrained sentence structure, or trained behavior to another environment, person, or behavior. While this underlying premise of generalization is generally understood, and there exist frequent reference to stimulus and response generalization, inconsistencies remain with regard to the labeling, conceptualization, and description of the processes related to generalization. This variability has clinical relevance in that it may lead to the incorrect assumption that all terms refer to the same process. McReynolds (1989) notes with caution that other terms are often used synonymously including:

> Transfer, carry-over, induction, rules, concept formation, and spread of effect. Although the terms have specific meaning for some individuals in the context of their theoretical formulation, others use them interchangeably. Those who accept all the terms

> interchangeably suggest that all of the terms present a similar concept, that what is occurring in training can be observed in nontraining conditions as well when an individual is treated for a communication disorder. (p. 2)

In the clinical setting, treatment response is often not thoroughly characterized, an approach that may be leading to imprecise at best and incorrect at worst beliefs about treatment construction and effect. Often, a person's improvement on a trained skill is given credit as if there was improvement on a separate skill, thus suggesting that the same cognitive processes underlie both the skills and the improvements.

Non-specific terminology results in some related problems. First, nonspecific terminology promotes a clinical culture of assumed universal treatment response. Clinicians adequately assess and specifically define the impairment (e.g., aphasia) but generally (and incorrectly) assume that treatment results will generalize. In reality, there exists little evidence in the rehabilitation field the treatment effects translate to real-world change and little understanding of why those effects that do generalize occur as a result of some treatments but not others. In order to address these inconsistencies, clinicians should direct attention toward the variables necessary for successful treatment. Byng and Black (1995) pose that while important, a clinical focus on identification and assessment of the impairment (e.g., aphasia) deters from critical analysis of the treatment itself and identification of treatment components that may mediate generalization of improvements. They further their discussion by calling for a theory of impairment and a "theory of therapy" (p. 303).

In that regard, there exists a movement in generalization research away from treatment outcome discussion and toward treatment de-construction and re-construction that acknowledges three aspects of the learning process. In other specializations (e.g., motor learning) (Maas et al.,

2008), the terms acquisition/practice, retention, and transfer/generalization are used with distinction to describe behaviors observed during the learning process. They are not used uniformly to reflect learning or to hypothesize about what has occurred to obtain each behavior or what will materialize in other behaviors or settings. Instead, the three individual terms speak specifically to different processes that may be relevant to an observed behavior.

Connected speech defined

Spoken language comes in many forms, but when specifically referring to connected speech, researchers often include combinations of two-or more words, short phrases, sentences, and a variety of discourse types. Kirmess and Lind (2011) used the term connected speech synonymously with the term spoken language - "…spoken language production refers to utterances beyond the single word or single sentence level within a certain context of conversation. The term connected speech production is used synonymously. The term spontaneous speech is frequently used in the aphasia literature" (p.1208). Yorkston and Beukelman (1980) specifically described connected speech as "running speech" (p. 28).

Beyond the connected speech level of at least two or more combined words, the term discourse is often used to describe a variety of connected speech forms. Bandur & Shewan (2008) presents four categories of discourse (conversational, expository, procedural, and narrative), and further described them. Conversation is similar to other forms of discourse however also involves reciprocity and repair abilities. Li, Volpe, Ritterman, and Williams (1996) characterizes the three other discourse categories. Expository discourse relates to a specific topic or stimulus (i.e., picture description). Procedural discourse involves verbalization of a process or chronological steps related to a topic. Finally, narrative discourse is elicited through retelling a story or providing information. Connected speech can be analyzed at the

linguistic microstructural level (i.e., quantitative lexical and grammatical units) or at the narrative macrostructural level (i.e., quality or informativeness) (Boyle, 2011; Prins & Bastiaanse, 2004).

Implications

Discussions of generalization in aphasia, especially generalization from one context to another, have been limited, but as Boyle (2011) notes, studies are beginning to investigate the efficacy of treatments designed to mediate improvements in connected speech. The emphasis on evidence-based practice in the field of speech-language pathology has generated a necessary focus on treatment outcomes and real-world efficacy. However, from a clinicians perspective, knowing that a treatment works (treatment effect) is different than knowing how to make it work (treatment construction). Currently, the focus on generalization outcomes, rather than on the mechanisms that facilitate generalization, permeates much of the current research related to generalization in aphasia (Byng & Black, 1995; Nadeau, Gonzalez Rothi, & Rosenbeck, 2008; Thompson, 1989b). Additionally, as the literature currently stands, even for those methods that do report translation of treatment-related improvements to connected speech, there exist few descriptions of the treatment elements that are hypothesized to obtain such results – a fact that leaves clinicians in the dark on which patients are appropriate for and how to construct treatment targeting connected speech.

The case is also made that one cannot assume that generalization occurs. Aphasia researchers are now voicing that stimulus-bound improvements and *assumption* of associated translation to untrained stimuli or connected speech is not enough – evidence for treatment-related improvements in real-world language abilities is *necessary* to establish aphasia treatment efficacy. Stokes and Baer (1977) purport that clinicians often take a "train and hope" (p. 351)

approach, meaning they attempt to measure generalization of communicative improvements but they seldom do anything to actively try and achieve generalized responding. Generalization requires planning. However at this point, while evidence exists to support the notion that behaviors acquired in treatment sessions can translate into improved real-world spoken language, there are few guidelines to which clinicians can refer when constructing treatments aimed at improving connected speech.

Current study

The current study arose from the need to better understand the mechanisms that produce meaningful change in the connected speech of persons with chronic post-stroke aphasia. Given the focus on treatment outcomes in the connected speech literature, there exists a small pool from which an investigator can pull data to more critically investigate treatment components that influence connected speech. Consequently, the central purpose for this dissertation is to obtain an expert consensus about patient characteristics and treatment elements that mediate improvement in connected speech in persons with chronic post-stroke aphasia.

The shift away from "if" to a focus on "how" treatment-related improvements generalize will allow the field to 1) more critically identify and consider patient characteristics and treatment components that mediate improvements in connected speech; 2) operationalize treatments that mediate improvements in connected speech and 3) replicate treatments that affect change on connected speech.

BACKGROUND AND SIGNIFICANCE

Generalization

Importance of Generalization

Generalization of the behaviors targeted in structured treatment and use in real-world situations is a universal goal in aphasia rehabilitation (Carragher, Conroy, Sage, & Wilkinson, 2012). Rephrasing the words of Wepman (1972), Hallowell and Chapey (2008) propose that the premise on which aphasia therapy rests is that:

> Language is vital to one's human essence and that treatment can affect a change in a person's communicative performance…..Through intervention, aphasiologists attempt to heighten each patient's potential to function maximally within his or her environment, to facilitate meaningful relationships, and to restore self-esteem, dignity, and independence. (p. 15)

The benefits of language recovery extend beyond improved standardized test scores, object naming, writing one's name, matching a written word to a picture, etc. Language makes us human. Amongst a variety of characteristics, asserts Chomsky (1972), language differentiates us from other animals and is thus the basis for "human essence" (in Hallowell and Chapey 2008, p. 14)**.** By providing a means by which to express our wants, needs, and interests, this shared set of signs and symbols helps us socialize and share our personalities. In many respects, language helps to nurture and maintain our true identity. It thus stands to reason that unless clinicians are omniscient and through therapy tasks can target the "essence" of their patient or foresee the scope of their daily language needs, generalization of treatment-related gains to real-world contexts is necessary.

Generalization Definitions

The premise of generalization has been contemplated by many disciplines. Perhaps the most frequently referenced clinical definition is one proposed by Stokes and Baer (1977). Generalization is in their definition "the occurrence of relevant behaviors under different, nontraining conditions (i.e., across subjects, settings, people, behaviors, and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions" (p. 350). That being said, while not many researchers would argue with the spirit of that definition, the transfer of skills from the training context/environment to a novel context/environment has received several different labels. In general, when the term generalization is used in the aphasia literature, it refers to what Thompson (1989b) describes as the application of acquired skills "to a variety of untrained language responses and environments" (p. 196). In some references, researchers specifically state the stimulus or context to which generalization is being measured (e.g., "across sentence types" or "generalization to measures of informativeness of connected speech"). Often however, two terms taken from the scientific literature are likely to be used. "Response generalization" occurs when skills generalize from one linguistic stimulus to another linguistic stimulus. (e.g., trained word to an untrained word of same or different category – furniture name to furniture name or to animal name) (Thompson, 1989a). "Stimulus generalization" occurs when improved language abilities generalize from the training environment to a novel environment (e.g., trained word to a greater degree of informational content in conversation) (Allaire, 2005; Thompson, 1989b; Thompson & McReynolds, 1986). Although there is debate regarding the application of these two laboratory-specific terms to generalization in the clinical setting (Kearns, 1989), these terms are frequently used.

Study of treatment-related generalization in aphasia rehabilitation has evolved over the past fifteen or so years, beginning with a focus on grammar, then a shift then to semantics, and finally more recently directing efforts toward training of specific words or scripts and improvement in connected speech.

Generalization in Aphasia Rehabilitation

Although limited, when generalization of treatment-related improvements is studied in the aphasia rehabilitation literature, the focus tends to be on treatment of words and word forms (Boyle and Coelho, 1995; Jacobs and Thompson, 2000) or sentence structure and grammar (Thompson and McReynolds, 1986; Davis and Tan, 1987; Doyle, Goldstein, and Bourgeois, 1987; Doyle, Goldstein, Bourgeois, and Nakles, 1989). More recent treatments have attempted to increase the length of utterances in connected speech and in novel contexts (Wambaugh and Martinez, 2000; Munoz and Karow, 2007; Conroy, Sage, and Ralph, 2009; Peach and Reuter, 2010; Kirmess and Lind, 2011). While these studies attempt to discern if treatment-related effects acquired in the office with the speech-language pathologist can generalize or transfer to the word, sentence, or connected speech level, their efforts have been directed toward outcomes and "if" generalization occurs, not processes and "why" generalization occurs.

Additionally, an important distinction must be made between *acquisition* and *generalization/transfer*. From a motor speech perspective, Maas et al. (2008) share that correctly applied, the term *acquisition* is used interchangeably with *practice* and reflects *temporary performance* of a behavior after practice (italics added). The capability of a person to *acquire* a new skill through practice is often the focus of therapeutic sessions (italics added). There is a tendency then to refer to that *acquisition* as *learning* (italics added). *Learning* however reflects a more *permanent change* in a behavior – changes that are measured by generalization/transfer

(italics added). The distinction is important because the term *learn* (e.g., "The person with aphasia (PWA) will learn the target words") is often used very generally in discussions of formal treatment-related changes and real-life changes. In order to think critically about transfer of skills from one context to another, we cannot assume that office-based *practice/acquisition* leads to *generalization*. As stated by Maas et al. (2008) "Performance during practice is a poor predictor for retention and transfer" (p. 278).

Variables that Influence Generalization in Aphasia Rehabilitation

Variables that influence generalization of treatment-related effects can differ from mechanisms that influence improvements on untrained behaviors. Variables such as patient characteristics, aphasia severity, aphasia type, associated neuropsychiatric conditions, and the home or living environment are factors that cannot necessarily be manipulated by the clinician, but that can definitely influence improvements in language and generalization of those improvements. These variables must be taken into consideration when considering a person's appropriateness for therapy, desired goals, and possible treatment response.

Mechanisms that Facilitate Generalization in Aphasia Rehabilitation

While an understanding of the variables to be considered in treatment and treatment outcomes is important, some researchers promote an understanding of not just the variables in rehabilitation, but also an understanding of the mechanisms that facilitate generalization. Kearns (1989) asserts that planning for generalization means "…an attempt should be made to gather information about behaviors, situations or settings, significant others, and environmental factors that can effect generalized responding" (p. 27). Acquisition of this data then arms the clinician with the necessary tools or mechanisms that can facilitate generalization of a behavior to another context.

Thompson (1989a) presented four considerations for promoting generalization. The first, training sufficient exemplars, suggests that there is a training threshold that needs to be reached before generalization can occur. Sufficient training must occur for the response exemplars (i.e., number of exemplars from response class) and for the stimulus exemplars (i.e., across persons or settings). The second consideration for promoting generalization is programming common stimuli. This ensures that stimuli shared by the training and generalization context are included in either setting. In other words, stimuli important in the generalization context are included in training (e.g., family names) and stimuli important in training are included in the generalization context (e.g., trained words to restaurant). The third consideration is sequential modification. With this approach, generalization is assessed across a variety of contexts, people and settings. Training then occurs in the contexts in which there is not yet generalization. Finally is loose training. Loose training ensures that training contexts contain characteristics of the generalization environment and that during treatment, responses to those characteristics can be variable.

Doyle et al. (1989) investigated a training program to increase the number of requests for information made by persons with Broca's aphasia. They evaluated stimulus generalization in a natural conversation context with familiar and unfamiliar communication partners and attributed generalization to several treatment features including: "(a) using multiple trainers, (b) employing functional rather than structural response criteria, (c) reinforcing various topographies of the target behavior, (d) encouraging subject-initiated requests, and (e) using natural reinforcers" (p. 168).

Nadeau, Gonzalez Rothi, and Rosenbeck (2008) described generalization as "the process by which the effects of therapy extend to material or circumstances not explicitly taught during

speech-language therapy sessions" (p. 710). They propose seven mechanisms that might mediate generalization. First, the authors propose that the "to be acquired" knowledge must be intrinsic. This means that the conceptual or underlying knowledge about what is trained (semantic features, phonological sequences, phonetic sounds, syntactic techniques) can be applied universally across communication contexts that share these features or that provide opportunities for use of the trained knowledge. Second is cross-functionality, meaning that knowledge gained in therapy can cross modalities e.g., trained semantics will benefit verbal and written expression. Third is that the features in therapy are extrinsic, meaning that patients who are motivated, will be able to apply techniques/knowledge outside of therapy. Fourth is that a mechanistic approach will ensure development of non-linguistic neural functions that support language e.g, working memory, generative abilities, and language use rather than non-use (i.e., choosing to gesture or avoid speaking). Fifth is that treatment mechanisms are substrate-mediated. In other words, treatment affords development of a critical mass of language skill that support continued use of language outside of the treatment session, in many different contexts. Sixth is that the knowledge being trained is contextual. This ensures that the training context resembles the generalization context e.g., room characteristic, clinician interaction style, patient mood, language/communication strategies used, etc). Last, is that the treatment is socially mediated. This means that the family adopts and supports the PWA's role as a communicator. In doing so, the family sets expectations for, places pressure on, and encourages the PWA to use language at home.

Response generalization in aphasia

Aphasia research has for the most part focused on response generalization with a focus on acquisition of single words (typically naming objects or actions) and generalization of that

naming skill to untrained words (Nickels, 2002; Thompson, 1989b). In her systematic literature review, Thompson (1989b) identified 35 studies focused specifically on aphasia and generalization. Overall, study results following naming therapy generally find acquisition of trained words i.e., participants improve ability to name words that have been trained (see Nickels 2002 for thorough review), however generalization performance on untrained words is not as strong as on trained words (Nickels and Best, 1996).

Naming treatments that investigate acquisition of trained words and response generalization (i.e. trained word to untrained word) are grossly divided into two types; those that attempt to address the semantic aspect of words (Wambaugh and Martinez, 2000; Peach and Reuter, 2010) and those that target the phonologic components of words (Howard, Patterson, Franklin, Orchard-Lisle, & Morton, 1985). While findings for acquisition of trained words are fairly strong, successful generalization of naming ability from trained to untrained words is inconsistent, as are the findings for which of many approaches has an advantage including phonologic (Howard et al., 1985; Vitali et al., 2010), semantic (Thompson and Kearns, 1981; Wambaugh and Ferguson, 2007), combined semantic and phonologic (Howard et al., 1985), combined semantic and lexical (Best, Howard, Bruce, and Gatehouse, 1997)**,** phonological and orthographic (Greenwood, Grassly, Hickin, and Best, 2010), or multi-modal (Ramsberger and Marie, 2007) (see Nickels, 2002 for review).

While acknowledging the variability of outcomes for treatments targeting semantics, or phonology, Howard et al. (1985) suggested that semantic as opposed to phonologic treatments generally incur and maintain positive results because:

> "the semantic representation accessed in the course of the technique is 'primed'. As a result, the full verbal semantic representation is more easily accessible when the patient

> subsequently needs to retrieve it in picture naming. Phonological techniques, whose effects are much shorter lasting, probably act at the level at which the phonological word form is stored – the phonological output lexicon." (p. 820)

Howard continues to say however that more recent results suggest that "both semantic and phonological approaches can aid word finding" (p. 392).

Ultimately, the majority of studies aimed to affect change on trained and untrained words have inconclusive findings and the field cannot say with confidence whether or not, or by what mechanisms, treatment focused on one word will result in improved ability to produce another.

Stimulus generalization in aphasia

As found by Thompson (1989a), few studies have focused on, and even fewer have obtained success with, stimulus generalization. The ability to produce trained words does not always translate to improved connected speech (Boyle, 2004; Boyle & Coelho, 1995; Conroy, et al., 2009). With that said, similar to the response generalization literature, when studies do investigate stimulus generalization, the focus of treatment efforts has been on linguistic knowledge (i.e., syntax or semantics) and/or cueing methods.

Kearns and Salmon (1984) investigated response and stimulus generalization with a treatment focused on syntax. They found response generalization for production of one sentence type to production of another same sentence type. However, the syntax treatment did not result in stimulus generalization, i.e., use of that sentence type, to conversation. Boyle and Coelho (1995) investigated generalization following Semantic Feature Analysis (SFA), and more specifically, if treatment-related improvements in picture naming would transfer from trained pictures to control pictures and into connected speech. Their patient demonstrated improvement on control-picture naming during the treatment and maintained those improvements one and two

months after treatment cessation. The improvements in confrontation naming did not generalize to connected speech (e.g., story-telling of pictures and picture sequences assessed via spontaneous and semi-spontaneous narratives and analyzed via mean words per minute, mean correct information units per minute, and the percentage of all words that were content information units).

Best, Greenwood, Grassly, & Hickin (2008) compared the influence of progressive phonologic and orthographic cues on naming and use in connected speech. Participants demonstrated improvements on naming of trained pictures but the improvements did not translate to improved production of those words in connected speech. Cameron, Wambaugh, Wright, & Nessler (2006) took a slightly different approach and used a combined semantic/phonologic cueing hierarchy to train specific information units from picture supported story retells. Following treatment, patients produced trained information units in post-treatment story-retells but those gains did not generalize to production of *untrained information units* (italics added) in supported story re-tell. Additionally, improvements in ability to produce trained information units did not translate to increased *informativeness* (italics added) on a post-treatment discourse level measure of connected speech.

Overall, efforts to improve naming in aphasia therapy have taken fairly consistent approaches, e.g., strengthen syntactic processes, semantic networks, and/or phonological representations, and orthographic and/or phonological cueing. These methods have produced substantial improvements in confrontation naming abilities, with limited generalization to connected speech. At this point, the field does not have a clear picture regarding the therapeutic mechanisms that can extend treatment gains beyond confrontation naming into connected

speech. As the majority of our spoken language is expressed at the connected speech level, efforts continue to gain clarity into if or how treatment-related change can occur.

Connected Speech

Importance of connected speech

For many reasons, language gains achieved in the office must translate to real-life communication (Armstrong and Ferguson, 2010; Kirmess and Lind, 2011; Seron, Deloche, Bastard, Chassin, Hermand, 1979). Whether improved language processing means that trained words are used in a novel context, or that connected speech is more informative and efficient, therapy addressing language skills has the opportunity to change the lives of our patients with aphasia. For any individual, communicative success can be defined in many ways and can influence many aspects of one's life.

Daily communication is heavily dependent on verbal expression (Davidson, Worrall, & Hickson, 2003; Shewan, 1988) and often involves connected speech or spontaneous language (Shewan, 1988). As opposed to single words, connected speech provides greater opportunity to meet the communication demands of society and fulfill personal communication needs. We use language in different contexts (e.g., with friends, at a restaurant, at the football game) and for different reasons (e.g., offer thoughts or feelings, tell a story, request information, etc.) (Armstrong & Ferguson, 2010). The ability to express oneself in connected speech facilitates the speed and completeness by which one can provide descriptions, exchange information, re-tell events, and have conversation. For a PWA attempting to participate in daily conversation or for a communication partner, more efficient and effective exchanges allows everyone to engage in more natural, less effortful communication. This in turn, helps persons with aphasia maintain their place in the conversation, likely resulting in longer and more frequent opportunities to

express themselves using language skills. Use of efficient and effective connected speech allows for more successful daily communication and potentially increases the likelihood that communication partners will continue to foster communication opportunities. Additionally, increased success with verbal expression in meaningful contexts has the strong potential to increase the PWA's self-confidence and be the catalyst for more frequent communicative attempts.

In addition to communication, our language abilities support our participation in life and relatedly, the emotions tied to our language success. As published by Frey, Newman, Arciniegas, Anderson, and Ramsberger (2011), language skill interacts with other non-linguistic elements of our being such as mood and motivation. Improvement in language abilities is shown to correlate with positive mood and ignite more communicative attempts (Cherney, Halper, & Kaye, 2011). Best et al. (2008) investigated the use of the Communication Disability Profile (Swinburn and Byng, 2006) for a patient's self-rating of participation in activities requiring communication following an impairment-based (i.e., naming) treatment. After the naming treatment, four of the seven patient's ratings of the emotional toll of their aphasia showed a positive correlation with improvements in naming. All seven patients reported improved ease of participation within their social situations. Similarly, following a computer-based script training treatment, Cherney et al. (2011) completed post-treatment interviews with the person with aphasia and his/her significant other. Of the persons with aphasia who commented on feelings associated with their current communication skills, 87% reported an improvement in feelings including decreased anxiety, fear, and nervousness. Additionally, they expressed greater motivation to fix communication breakdowns, and were happier and more confident about their communication skills.

While the influence of impairment-based aphasia therapy (i.e., naming therapy) on real-life communication is not understood completely (Best, et al., 2008; Boyle and Coelho, 1995; Cameron, et al., 2006; Conroy, et al., 2009), the case can be made that structured treatment-based language gains do extend beyond the office and mediate non-linguistic aspects of life. Hallowell and Chapey (2008) go so far as to suggest that impact of language impairment is not limited to communication ability:

> Insofar as persons with aphasia are impaired in their ability to use language, they are impaired in their human essence. Part of the personality often appears lost, and the ability to maintain interpersonal relationships, to convey wants and needs, and to be a mature self-reliant, self-actualized person is impaired. (p. 14)

Not only is generalization of treatment-related improvements from the office to everyday conversation important to demonstrate aphasia therapy efficacy, but the true value of the speech-language discipline also rests on our ability to demonstrate real-life, treatment-related outcomes. As reported by Kagan et al. (2008):

> Stakeholders such as clinicians, consumers, funders, and policy makers want evidence of a range of meaningful life outcomes associated with treatment. However, in spite of a call for more accountability in the realm of functional outcomes and life participation (Simmons-Mackie, Threats, & Kagan, 2005), many aphasia clinicians continue to measure relatively narrow, behaviourally defined, discrete performances such as ability to name 10 common objects, follow one-step commands, or point to pictured items. (p. 259-260)

Jacobs and Thompson (2000) support this statement by saying “As pointed out by Thompson et al. (1997), given the current health care climate, which substantially restricts provision of

treatment for individuals with aphasia, it is essential that clinicians provide treatment that will result in generalization" (p. 18). Clinically, this means that improved "discrete performance" (i.e., naming objects, point to pictures) is irrelevant if demonstrated only in the context of the treatment session, without affecting more effective and efficient daily communication.

Evidence of generalization to connected speech in aphasia

While, as noted above, the evidence for successful generalization of treatment-related effects to connected speech is somewhat bleak, this goal is not without hope. Several studies have demonstrated that gains from treatment sessions can translate into improved connected speech. Antonucci (2009) integrated a Semantic Feature Analysis (SFA) (Ylvisaker & Szekeres, 1985) approach into a barrier-task in a group setting. Participants took turns communicating information about complex pictures, fairy tales, and movies to a partner. Post-treatment assessments revealed improvements in specific linguistic and narrative elements of connected speech. In another barrier-task, Kirmess and Lind (2011) used constraint-induced language therapy to determine if a focus on word production would translate into improved connected speech. Following treatment, patients increased the informativeness of and noun use in their connected speech. Greenwood et al. (2010) attempted to improve the connected speech of one patient during two treatment stages. First, the researchers provided phonemic and orthographic cues during a picture naming treatment task. In the second stage, the therapeutic focus shifted from single picture naming to use of those words in personally relevant conversations. After treatment, the participant demonstrated improved word production for trained and untrained pictures and generalization of those words into conversation. Additionally, self-ratings of day-to-day communication activities increased, reflecting improved confidence and community participation.

Rationale and Purpose for study

Caramazza (1989) asserts that:

> The hypothesized functional lesion represents a hypothesis about the nature of the transformation the cognitive system has undergone as a function of brain damage. It does not inform us about the steps that could be most efficacious for overcoming the sustained damage. (p. 393)

The demand to demonstrate treatment efficacy has promoted the growth of evidence-based practice in speech-language pathology. To that end, the drive to answer the question "does aphasia therapy work?" has promoted a focus on treatment-related responses, i.e., the dependent variable, and effect sizes of such treatments. While the establishment of treatment efficacy is undoubtedly necessary, the focus on outcomes has diverted attention away from critical analysis of the treatment properties themselves. In Thompson's review (1989b), only six of 35 (17%) studies focused on identification of variables that could promote generalization. In order to arm clinicians with the information necessary to design treatments for connected speech, investigators must explore not just "whether" treatment-related improvements generalize from the office to real-world connected speech (i.e., treatment effect), but also "how to make" these improvements generalize (i.e., treatment construction) (Sullivan and Brookshire, 1989).

Additionally, while the neurogenic communication disorder field is recognizing the need to demonstrate translation of our treatment gains from the office to the community, there is a tendency to assume that generalization occurs. Clinicians often take what Stokes and Baer (1977) call a "train and hope" approach (p. 350). This implies that investigators frequently treat and measure for behavior change, with the assumption of, not planning for, generalization. As such, therapists need to program for (i.e., plan for), not merely assume, office to real-life

generalization. This frame of mind differs from that of traditional treatment planning. As posited by Kearns (1989) "When intervention is conceptualized from a generalization planning perspective, it involves a number of unique considerations" (p. 15). A generalization planning approach considers clinical factors and incorporates treatment mechanisms that facilitate generalization.

In a review of three studies for agrammatism, Byng and Black (1995) articulated the need for deconstruction of treatment components by stating:

> Analysis of the impairment is a necessary but not sufficient precondition for therapy. Adequate remediation programmes require the development of an independent theory of therapy that provides a detailed specification of the different components of the therapeutic process. Therapy can be shown to have as many interacting components as the impairment itself. (p. 303)

Across the three studies, Byng and Black identified and compared several key treatment components: 1) the focus of therapy, 2) the materials, 3) the task requirements, and 4) the feedback and interactions between the therapist and the patient. Duration and intensity of treatment were also thought to be influential therapeutic components, however they were not systematically investigated in Byng and Black's publication.

The central purpose for this dissertation is to identify patient characteristics and treatment elements that mediate generalization of improvements in connected speech in persons with chronic post-stroke aphasia.

Rationale for Research Design and Methodology

Systematic investigation of factors or variables that mediate connected speech is in its infancy. Consequently, there exists a small body of literature that can inform the methodology

used to study the variables that influence improvements in connected speech. One method to address this question would have been a traditional investigator designed survey sent to a speech-pathology special interest group list-serve. While several traditional survey methods exist (e.g., mass survey, focus groups, interviews (Huston & Rowan, 1998), a few factors limit the feasibility of some approaches.

A traditional mass survey has the ability to accumulate a large amount of data from the general population, i.e., an emphasis on statistical power. However, the data may not all be from experts on the topic, making difficult the ability to extract significant response patterns, i.e., agreement on issues. Additionally, as discussion focused specifically on treatment construction and connected speech is fairly recent, acquiring insight from a general pool of clinicians may not reliably capture the most important variables related to this topic. Focus groups, another commonly-used data acquisition method allow for researchers to direct and focus the discussion however, in the group, the ideas of one stronger personality may subdue the ideas of a less vocal participant. One-on-one interviews can be easily managed however, they can also be time consuming and not conducive to the logistics of geographic dispersion. If a person in a specific discipline is compelled to respond to a research survey, there is a strong likelihood that they have a busy schedule. Study participation time requirements must take this into account. Additionally, discipline specific research participants and survey responders are often nationally and internationally dispersed, a logistic that can make efficient communication a necessity.

Another relative shortcoming of traditional surveys is the fact that they are administered one time. Given the infancy of interest in affecting change on connected speech, there is likely to be a wide range of thoughts on the topic. A “one and done” survey administration might capture a large number of opinions, but risk achieving little agreement among responders.

Finally, investigation of treatment construction, response generalization, and connected speech is gaining momentum, however an undeniably limited amount of research is available to inform further insight into this topic. Traditional survey methods often rely upon large, or at least substantial bodies of literature to inform survey construction. When the current state of the science regarding a topic is limited, as is the case with the topic-at-hand, there is little data available from which to build a traditional survey.

As a traditional survey technique would not effectively meet the needs of this specific study, the Delphi technique (Linstone & Turoff, 1975; Murray, 1968), a mixed qualitative and quantitative approach, was selected for this study. The Delphi method is a consensus-building process in which, over a series of rounds, chosen "experts" rate the importance of issues related to the topic-at-hand. As opposed to a strictly quantitative analysis in which one attempts to prove or disprove a hypothesis, the Delphi technique, using qualitative and quantitative methods, employs the insight of subject matter experts to better understand complex and not-yet-well defined issues. Quantitative statistical summaries (e.g., means of Likert-scale responses and/or percentage of expert agreement on issues) begin following the first round of questions.

The Delphi technique is an outgrowth of a 1950s Rand Corporation Air-Force study in which a group of experts were given a series of questionnaires and asked to opine on the number of specific bombs needed to decrease use of other ammunition by a defined amount (Dalkey and Helmer, 1963; Linstone and Turoff, 2002). According to Dalkey and Helmer (1963), the objective of the Rand study was to "obtain the most reliable consensus of opinion of a group of experts … by a series of intensive questionnaires interspersed with controlled opinion feedback" (p. 458). This approach was used in place of the alternative approach, which, at that time would have meant completion of a time- and dollar consuming data collection study (Linstone and

Turoff, 2002). Such an endeavor would have also required complicated programming on computers that were not advanced enough to tackle such feats (Linstone and Turoff, 2002).

Use of the Delphi method is becoming more common. PubMed and Chinook (University of Colorado Library catalog system) searches using the search term "Delphi study" revealed 3400 and 3510 journal publications respectively that referred to this method. This consensus-building approach has been used in many fields including education (Judd, 1972), marketing (Armstrong & Brodie, 1999), dentistry (Cramer, Klasser, Epstein, and Sheps, 2008), medicine (Marshall, Bayley, McCullagh, Velikonja, and Berrigan, 2012) and speech-pathology (Berquez, Cook, Millard, and Jarvis, 2011). Linstone and Turoff (2002) propose that the Delphi method is well-suited for studies in which there is a need for "…a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem" (p. 3). In education, the purpose of the Delphi study may be to explore a specific teaching method or principle. In science, technology, and public policy, the Delphi method is used to forecast future trends in areas such as population growth, technology, and war prevention (Gordon and Helmer, 1964). In healthcare, Delphi-based studies have pursued expert insight into issues such as clinical practice guidelines for mild traumatic brain injury (Marshall, et al., 2012), hospital management of acute stroke (Holloway, Vickrey, Benesch, Hinchey, and Bieber, 2001), and diagnosis of delirium (Huang, et al., 2012).

Anonymity and individuality are considered salient pieces of the Delphi process, however the polled experts do not work in a vacuum. Linstone and Turoff offer that throughout the process, participants are informed of proceedings in several ways including "some feedback of individual contributions of information and knowledge; some assessment of the group judgment

or view; some opportunity for individuals to revise views; and some degree of anonymity for the individual responses" (p. 3).

Delphi Method

Delphi Method Compared to a General Survey Approach

When one considers the methodology and premise behind the Delphi technique and a traditional survey approach, the differences between these two methods become more apparent. The Delphi technique is well suited for issues for which there is a lack of prior relevant information to support question design. While a traditional survey begins with investigator driven questions to which the general population responds, the Delphi method poses a topic for study and the insight of experts shapes the progress of the questions / study. The Delphi questions are only minimally, and only initially, influenced by the investigator. Study progression, including the content of the questions, is shaped by the expert responses.

The Delphi method also differs from a traditional survey approach in the manner by which it identifies study participants/respondents. The focus of this study was a somewhat broad question for which there is little to no accumulated data. Rather than use a heterogeneous sample to acquire a large, and potentially misguided, data set, the decision was made to focus efforts on recognized aphasia researchers – persons who, by virtue of peer-reviewed publications pertaining to treatment of aphasia, are likely to have theoretically, empirically, and clinically sound thoughts regarding clinical practice.

Another difference between a general survey method and the Delphi approach is that the intent of the first round of a Delphi study is to obtain from each expert, an individual view of the issue at hand. In other words, each expert is afforded the opportunity to provide individual and anonymous response to the Delphi session questions. Additionally, it is at this stage that the

panel members, or more specifically their responses, are viewed as "individuals". After this first round, the study progresses such that responses are not considered individually, but that each response contributes to subsequent construction of the expert "group" views on the research subject. Stronger group views (i.e., those with less response variability between rounds) reflect movement toward expert consensus. The mean of ratings, rankings, and percentages also determine the importance of statements relative other statements within that round. In this manner, states Nworie (2011), a Delphi study "is based on the premise that the collective opinions of expert panelists are of richer quality than the limited view of an individual" (p. 25).

Delphi Rounds

Execution of the Delphi technique logistically involves at least two rounds, each comprised of a few stages (Figure 1), with each round typically taking a few weeks to complete (Duffield, 1993).

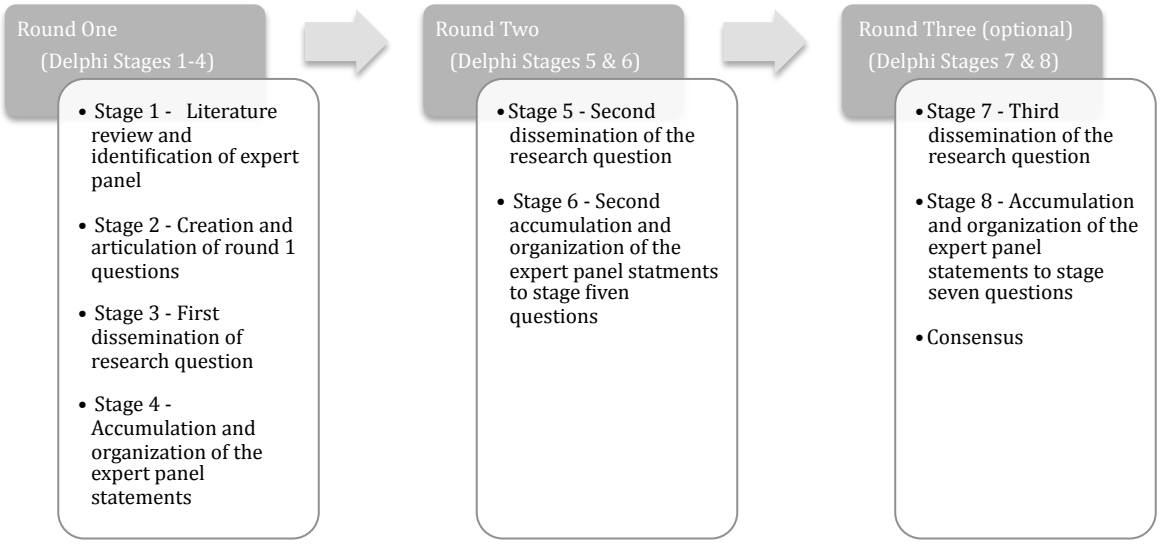

Figure 1: Delphi Rounds

Round One: Delphi Stage 1: Literature review and identification of expert panel members. In this first stage of round one, a literature review can be completed. This literature review helps guide selection of the expert panel and inform definition of the first research question(s). Round one often includes a literature review that serves several purposes. Reading studies related to the topic of interest helps to identify knowledgeable contributors for the expert panel. Additionally, knowledge gleaned from the literature review helps the investigator identify the relevant issues that will inform definition of the round one question(s). This literature review is often provided to the expert panel to inform them of the research question.

There are no set standards by which individuals are identified for a Delphi expert panel, however their selection is not a random process. It has been suggested that the experts need to possess knowledge and experience with the topic of interest, have the time and resources through which to share that knowledge, and their level of experience should be *a priori* defined e.g., credentials, degree, specializations, publications, position in company, etc. (Baker, Lovell, and Harris, 2006). Experts on a Delphi panel do not necessarily have to be members of the primary target discipline, nor does every "expert" in the field need to be included.

There are also no strict recommendations for the number of experts needed to complete a Delphi study. While more familiar, commonly researched topics inherently generate a larger pool from which experts can be pulled, Delphi study sample sizes vary greatly. For their study on stammering, Berquez et al. (2011) had 154 participants - a group comprised of 25 children age 7-11 who stammer, 27 young persons age 12-18 who stammer, 67 parents of children/young persons who stammer, and 35 persons who work in education. In their study investigating early supported discharge programs in persons with stroke, Fisher et al. (2011) created a consensus

document using the insight of ten experts who had previously participated in a Cochrane Systematic Review. Morrison and Barratt (2010) used a seven-person panel comprised of psychologists, therapists, psychiatrists, and mental health professionals to obtain consensus on the key components of cognitive behavior therapy. In order to support clinician's identification of delirium at bedside, Huang et al. (2012) used a modified Delphi process (i.e., via meetings) with a panel of seven interdisciplinary clinical experts to achieve consensus on indicators for delirium.

Ludwid and Geller (1997) reported that the average sample size of Delphi studies was 15-20 and that a larger sample size equates not necessarily with more information and better insight into the issue, but actually the potential for too much information and greater difficulty summarizing the generated ideas. Brown, Cochran, and Dalkey (1969) suggested that a seven-member panel is the smallest accepted sample size.

Round One: Delphi Stage 2: Creation and articulation of the round one question(s). After selection of the expert panel, the first round of questions are created that speak directly to, but broadly cover, the related issue. Questions can target specific issues within the field, policies or standards, or other issues identified from the literature review.

Design of these first questions can take several approaches. A Delphi study can begin with either open-ended questions or with a structured questionnaire. Nworie (2011) states that:

> The approach used may be determined by the issues involved. Starting a Delphi study with a blank page that contains a question for the panelists enables them to generate relevant ideas from their wealth of knowledge. Developing a round-one questionnaire to have open-ended questions is consistent with the requirement in most Delphi method literature. (p. 26)

The Delphi approach, which allows for both qualitative and quantitative methodology, is well suited to investigate topics that have little history of discussion (Martino, 1972). For example, the combination of a questionnaire and a rating scale within a Delphi study can obtain useful insight. First, a literature review is often completed to inform construction of the first questions or to inform the experts on the current state of the literature regarding the topic-at-hand. This first round of questions can develop from the literature review and take a quantitative approach using multiple choice, rating, ranking, or agree/disagree response options. In a different approach, the first round can be more qualitative, presenting a few, clearly articulated, but somewhat open-ended questions to obtain the insight of experts (Hasson, Keeney, and McKenna, 2000; Keeney, Hasson, McKenna, 2006). The questions may have been constructed by the investigator to focus the questions and responses to a specific topic while allowing for a looser text-like or narrative response. With this approach, the literature review can be provided to experts to give them insight into the focus of the study. By providing experts with some background knowledge on each of the questions, the respondents will feel comfortable with their initial exposure to the Delphi study and their responses will be directed toward the key elements of the research question. This type of approach is directive in that experts opine on the given issue but this format also allows individuals to expatiate upon personal thoughts and opinions related to the topic.

Round One: Delphi Stage 3: First dissemination of the research question. Once a clearly defined question is formulated, the Delphi session can begin. First, a letter of invitation that explains the intent of the Delphi session and that provides some background for the research question is sent to the list of experts. The initial question(s) is/are disseminated to experts in several ways, e.g., mail, email, fax, etc. If the expert agrees to be a member of the expert panel,

the first question (s) is/are sent. Experts can also express their willingness and consent to participate by completing a survey embedded in the letter of invitation. Typically, the session administrator requests that responses be submitted within a specified time frame (e.g., one week). An expert may decline to participate by either responding to the invitation or by not responding to repeated invitations. In either of these situations, once the investigator determines that a reasonable number of contacts have been completed, no further communication occurs.

The intent of this stage is to obtain a comprehensive and objective view of the issue at hand. As such, each expert is afforded the opportunity to provide individual and anonymous response to the Delphi session questions. It is at this stage that the panel members, or more specifically their responses, are viewed as "individuals" – each response contributes to subsequent construction of the expert "group" views on the research subject

Round One: Delphi Stage 4: Accumulation and organization of the expert panel statements. Once all the responses are received, the primary investigator removes any duplicate or unclear responses. The responses are then categorized, either by written responses or by rankings/ratings, and a new questionnaire is created for and disseminated to the experts. This new questionnaire also serves to inform the experts of the responses provided by their expert colleagues serving on the panel. During the categorization of the written narratives, the investigator attempts to adhere as closely to the expert's original wording as possible, due to the unwanted potential for movement of categories further from the original intended statement (Keeney et al., 2006).

Round Two: Delphi Stage 5: Second dissemination of the research question. At this stage, the experts are sent the second questionnaire, and are informed that the questions were constructed from responses collected from their expert colleagues and thus provide insight into

the views of their national and international colleagues. The goal of this stage is to obtain an overall sense for the group's thoughts on the issues by asking experts to agree or disagree with statements or rate them in order of their importance.

Round Two: Delphi Stage 6: Second accumulation and organization of the expert panel statements to stage five questions. At this stage the investigator accumulates and reviews the expert responses and determines whether or not to end the rounds or complete another round. Results from round two Likert-scale questions provide two pieces of information; item-specific level of importance and item-specific level of agreement. The mean rating offers insight into the level of importance of the individual item. The variability, often determined for each item by standard deviation, gives an idea of consensus or the degree to which the experts agree on the level of importance. Additionally, consensus or agreement can be defined by percentage agreement among experts for each question, i.e., the number of experts rating 4 or 5, converted to a percentile, indicates agreement that this variable is important. Although there is no standard cut-off for agreement, 70% - 75% or greater agreement is often used to reflect consensus (Fisher, et al., 2011; Hasson, Keeney, and McKenna, 2000; Holloway, et al., 2001; Loughlin and Moore, 1979; McKenna, Bradley, and Keeney, 2000; McKenna, 1994).

Once expert responses to round one are accumulated and organized, the second round focuses on the expert group as a whole to ascertain their views on the issue. Here, the facilitator identifies where there is agreement or disagreement amongst the panel members regarding the importance of, and consensus on, the topic under discussion. If there is significant disagreement amongst panel members, then a third round may be used to more thoroughly explore the nature

of that disagreement. A third round may also be used to determine response stability across rounds.

Round Three: Delphi Stage 7: Third dissemination of the research question. The decision whether or not to complete a third round is usually made based on degree of consensus reached, the degree of variability among the expert panel, and whether or not one wants to risk attrition by asking experts to participate in another round. The goal of a third round is to obtain an overall sense for the group's thoughts on the issues (i.e., agree or disagree) and consistency of responses relative to round two.

Round three questionnaire construction can be based on several approaches. Sometimes, in order to decrease the number of times experts must respond, those items reaching consensus are accepted and not carried over into the third round. Only the items that received middle-ground means are re-rated by the experts in the third round. Another approach, one that attempts to determine stability of responses, carries forward only those items that have reached a specified level of consensus. The format of the questions may change i.e., asking Likert-scale ordinal questions in one round and asking for dichotomous agree/disagree in the final round. Or, if a high level of consensus is achieved in one round, the subsequent round may maintain the same question format in order to investigate stability of consensus. Across all the approaches, after the first rating round, it is common to give each expert insight into the opinions of their expert panel colleagues by providing the mean responses to each question from the previous round. In this manner, the experts are given the opportunity to review the mean group responses, revise their answers relative to what they saw in the group responses, and re-rate the questions.

Round Three: Delphi Stage 8: Accumulation and organization of the expert panel statements to stage seven questions. At this stage the investigator accumulates and reviews the expert responses and using the same criteria as in round two, determines whether or not to end the rounds or complete another round.

The number of rounds to be completed in a Delphi study can vary, however in order to complete the most important stages - accumulation of expert responses and opportunity for revisions – at least two rounds must be completed. A Delphi study may have as many rounds as needed in order to achieve consensus but the typical number of rounds is between two and four (Keeney, et al., 2006). Some authors noted that after three rounds the consensus of ideas increased, the variability in rankings and in comments decreased, and trends began to emerge (Holey, Feeley, Dixon, and Whittaker, 2007). On the other hand, in order to deter attrition, and minimize the risk of redundancy both in the eyes of the experts and in the generation of ideas, the number of rounds may be limited.

Regardless of the number of rounds, an integral piece to the Delphi process is that across rounds, the experts are given the opportunity to see the responses of other experts. This aspect of the Delphi aims to facilitate consensus. Exposure to the insight of other experts may be the impetus to revise individual response to issues. Additionally, the Delphi's requisite multiple rounds afford the opportunity to change views on a given question or demonstrate confidence in a view by maintaining responses across rounds.

Consensus in a Delphi Study

Over several rounds during which experts rate the importance of issues related to a given topic, the Delphi method attempts to achieve consensus (i.e., agreement) regarding the importance of those issues. Not only is it important to a priori specifically define how the experts are selected, but it is equally as critical to also state how consensus will be determined. While 100% agreement would be ideal, due to attrition and opinion diversity, that number may be unrealistic. Additionally, depending on the significance of the research topic, that number may also be unnecessary. For example, an issue that may risk fatality e.g., the issue of when to discontinue CPR, may necessitate a 100% agreement but a question regarding the type of food to serve athletes before competition may not require unanimity (Keeney, et al., 2006). Although there exists no universal percentage by which to establish consensus (Keeney, et al., 2006), agreement of anywhere between 50 and 80% of the expert panel has been used (Loughlin and Moore, 1979; Sharkey and Sharples, 2001; Smart, Curley, Blake, Staines, and Doody, 2010), with 70-75% agreement being a recommendation (Keeney et al., 2006; Vernon, 2009). An acceptable consensus is typically achieved by identification of responses with the highest percentages or ratings and the smallest standard deviations (Berquez et al., 2011; Jones and Hunter, 1995)

One means by which to more specifically identify consensus is to calculate the statistics of Likert scale ratings (e.g., 1 = “not at all important and 5 = “extremely important”) and identify those statements that were most important and had the highest unanimity (Berquez et al., 2011; Duffield, 1993). Holey et al. (2007) demonstrated that a trend towards agreement of expert opinions can be assessed through a combination of descriptive statistics. Using the mean, median, range, and standard deviation for Likert-scale questions, one can identify statements that

were rated by experts as most important by keeping only those statements with a mean of four or greater (corresponding to "very important" or "extremely important" on the provided Likert scale). Any statements with a mean score of three or less are eliminated. Additionally, in order to investigate the level of agreement between experts, standard deviations can be computed for each item. Those items with greater than plus or minus one standard deviation are removed, thus ensuring strong consensus between experts (Berquez et al., 2011). Final insight into group convergence (inter-rater reliability) can be obtained by comparing standard deviations and ranges (Holey et al., 2007). The stability of an individual's opinions across rounds (intra-rater reliability) is reflected in Rho values close to 1.

Delphi Validity

Consensus and stability of expert opinions are the primary goals of a Delphi study and this approach lends itself well to investigations in the healthcare field. While the subjectivity of the Delphi method has been questioned, steps have been proposed to ensure the validity and reliability of this research technique. Holey et al. (2007) found that by including simple descriptive statistics in the Delphi methodology (e.g., agreement percentages, importance rankings, and a statistical value that reflected stability) researchers could "reduce subjectivity and ensure maximum validity of results in Delphi methodology" (p. 9).

The validity of the Delphi technique overall can be bolstered by acknowledging several aspects of the process. First, the anonymity of the process deters the influence of strong personalities or "group-think" (Clayton, 1997) and allows for independently constructed ideas. The validity is strengthened when experts are given the opportunity to evaluate their individual answers and opinions against that of the other experts. Second, while the accumulation of "opinions" (vs data or evidence) can put the validity of the Delphi process into question, the fact

that the information source is a group of *a priori* defined experts increases the confidence that their collective expertise validly reflects the status of the issue at hand (Baker et al. 2006). The greater the expert consensus, the stronger the content validity of the Delphi study. Validity is also enhanced via the group process, with the assumption being that two heads are better than one, i.e., many opinions are likely to better reflect thought trends than that of an individual opinion (Hasson et al. 2000). Finally, use of several rounds offers the opportunity to explore response consistency and stability and thus ensure that expert's responses truly reflect their opinions (Hasson et al. 2000).

Summary and Research Question

The ability to say a word following repeated practice increases the liklihood that the word can be said again in the same single-word context. However, there exists little evidence that the ability to say a single word will translate to use of that word in daily communication contexts. The effects of treatment must extend beyond the clinical setting and into novel real-world use. Encouragingly, albeit with inconsistent success, the aphasia rehabilitation field has identified treatment approaches that do produce associated change in novel language use i.e., connected speech. However, the success is variable enough that the field cannot draw conclusions about when or why positive outcomes are achieved. In order to develop theories regarding not only "if" but also "how" therapies work, the aphasia rehabilitation field must systematically investigate the mechanisms of treatment that mediate real-world language improvements. The key question for the current study is:

1. What patient characteristics and treatment components mediate improvements in connected speech in persons with chronic post-stroke aphasia?

METHODOLOGY

Delphi Study Questions

The three-round Delphi study involved expert polling of the patient characteristics and treatment components; the focus of the therapy, the materials, the task requirements, the forms of feedback and interaction, and the duration and intensity of the treatment; (Byng & Black (1995). The three-round Delphi study involved expert polling of the patient characteristics and treatment components that mediate improvements in connected speech in persons with chronic post-stroke aphasia.

Round One: Delphi Stage 1: Literature Review and Identification of Expert Panel Members

Literature review. In order to obtain responses specific to the question at hand, this study utilized purposeful information gathering from experts rather than random sampling (Holloway and Wheeler, 1996; Sharkey and Sharples, 2001). In this first stage of round one, a systematic literature review was completed in order to address these aims: a) identify papers in which improvement in connected speech in persons with chronic post-stroke aphasia was stated as an outcome variable; b) identify the authors of such papers who would be knowledgeable contributors to the expert panel; and c) identify patient characteristics and/or treatment components from each paper.

The first step of the literature search addressed the first review aim – identify studies in which improvement in connected speech in persons with chronic post-stroke aphasia was stated as an outcome variable.

The current study replicated the Thompson (1988) paper by completing a systematic literature review of four electronic sources: 1) The Aphasiology Archive - Clinical Aphasiology conference proceedings, 2) PubMed, 3) PsycInfo, and 4) OVID/Medline. Abstracts for citations were initially acquired using the search terms “aphasia”, and “generalization” (also “generalisation”), and “speech”. These search terms were chosen in order to identify the broadest range of publications possible. It was assumed that any study investigating generalization of treatment-related improvements at any level of language production would use the term “generalization”, and that use of the search term “generalization” would capture any studies for which this was a specific end-goal of treatment. Two rounds of exclusions were completed. First, abstracts acquired from the literature search were reviewed and inclusion/exclusion criteria applied. Inclusion criteria were defined as: the study was identified using search terms and the paper was English. Exclusion criteria were defined as: studies not investigating generalization, studies not investigating generalization at the connected speech level, reviews and theoretical papers, observational studies, papers related to apraxia only, studies that included subjects with diagnoses other than CVA (e.g., traumatic brain injury or primary progressive aphasia), studies of children, studies investigating solely written expression, studies investigating solely language comprehension, studies investigating computer generated output. Then, the full publications from any remaining abstracts were reviewed and exclusion criteria again applied. This second round of exclusions finalized and identified the core body of literature.

Identification of expert panel members. After exclusions resulting in a core database of publications, the next step of the literature review addressed the second aim of the literature review - identify the authors of such papers who would be knowledgeable contributors to the

expert panel. It was presumed that first or second authorship on a paper reflected expert knowledge of aphasia rehabilitation techniques and generalization. Authors who composed multiple papers were included once in the final expert database. Contact information was acquired either by the information listed on the paper or by an internet search. If it was apparent that the primary author was a student, the more senior author was contacted. If contact information could not be obtained, a different author on the paper was contacted.

The final step of the literature review addressed the third aim - identify patient characteristics and/or treatment components from each paper. By nature of having published on this topic, in the previous step of this literature review, experts knowledgeable on the topic of connected speech had been identified. The aim of this final step was to provide the experts with a summary of the literature and insure that the responses of these expert panelists to the current study's goals were informed in some part by the same body of research. A summary of the literature relative to this study's Delphi questions clarified the overall goals for this study and provided the experts with a common referent for their responses. This step insured that the expert panel's responses would collectively be directed toward the current study's goals.

Round One: Delphi Stage 2: Creation and Articulation of the Round One Question(s).

The first round of questions for the present study was based on Byng and Black's (1995) proposal to define the components of treatment. Seven open-ended questions were posed to the expert panel:

1) What is the stated focus of therapy in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?
2) What materials are employed in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

3) What are the task requirements in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?
4) What forms of feedback and interaction between the therapist and patient occur in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?
5) What is the duration and intensity of treatment in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?
6) What are the patient characteristics reported in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?
7) Please list any other variables that mediate improvements in connected speech in persons with post-stroke chronic aphasia.

Round One: Delphi Stage 3: First Dissemination of the Research Question

On November 4th, 2012, a letter of invitation to participate in the present study was sent via email to the first author experts identified in the literature review. The letter was re-sent on November 8th, 2012 to experts who had not responded. A final third request was sent to this first author group on November 18th, 2012. Due to a low response rate, the decision was made to send a letter of invitation to second authors on the identified papers. On November 25th, 2012 a letter of invitation to participate was sent via email to the additional second author experts. A letter was re-sent on November 30th, 2012 to experts who had not responded. This letter included a description of the study, IRB information, and a SurveyMonkey link on which the experts were to click if they agreed to participate on the expert panel. Completion of the survey was considered proxy for written consent.

The website http://www.surveymonkey.com was used to execute many aspects of the Delphi process including:

- correspondence with the expert panel (e.g., invitation letters for participation, reminder emails to complete the Round, link to provide their anonymous responses to questions in each Round, summarized results of each round and the study). Email addresses were acquired via correspondence information provided on journal publications or via internet search.
- construction of the chosen format for responses to question (e.g, text only, ratings of statements, rankings of importance)
- data management including accumulation, storage, and analysis (e.g., total number of answers, mean, median, standard deviation, average rank, best rank, worst rank, number of times a choice was ranked first).

Additionally, a summary of the completed literature review was provided to experts to apprise them of the current status of aphasia research and treatment elements that mediate improvements in connected speech.

The first SurveyMonkey page provided a definition of the terms used throughout the study. Subsequent pages on the SurveyMonkey site presented each of the seven questions individually and asked experts to respond in free-text.

Round One: Delphi Stage 4: Accumulation and Organization of the Expert Panel Statements.

Organization of round one responses. Responses to the seven round one questions were examined to identify common themes, patterns, or groupings that could be used to organize

the expert feedback. The primary investigator summarized the responses to each question through removal of duplicate, and assimilation of similar statements.

Formulation of round two questions. Expert responses were constructed into questions for round two with an attempt made to carryover original wording from the expert statement into the round two question. These questions were designed to determine not only if other experts agreed or disagreed with the stated treatment component, but also to determine to what degree the component would influence connected speech.

Statements provided by experts to each open-ended question were constructed into specific five-point Likert-scale questions (with an addition of a "not relevant option"). Questions were worded in one of three ways to obtain expert insight into 1) the relative influence of given variable on connected speech; 2) the relative importance for consideration of given variable in improvements in connected speech; or 3) the degree to which a given variable influences a person's candidacy for treatment targeting connected speech. Relative weighting on the Likert scale increased from left to right on the scale, with one reflecting negative (i.e.,"inhibits" or "unimportant" or "poor") and five reflecting positive (i.e., "causes" or "very important" or "very good"). In order to maintain an intuitive flow to the Delphi tool, round two presented the Likert-scale questions in the same seven categories: focus of therapy, materials, treatment task, feedback/interaction, intensity/treatment schedule, patient characteristics, other considerations. In an attempt to avoid the expert's habituated responses, questions within each category were systematically randomized using a randomization website. The Chair of the dissertation committee reviewed the questionnaire twice for clarity and validity and gave final approval before the questionnaire was presented to the expert panel.

Round Two: Delphi Stage 5: Second Dissemination of the Research Question

In this stage of the current study, a letter of invitation for round two was sent via SurveyMonkey to the experts who, by nature of completing the round one questionnaire, agreed to participate on the Delphi expert panel. Three letters of invitation for round two were sent (December 19th, 2012; December 26th, 2012; January 1st, 2013). This letter included a brief reminder description of the study, IRB information, and a SurveyMonkey link on which the experts were to click if they agreed to continue their participation on the expert panel. This SurveyMonkey link took experts to the Likert-scale questionnaire. Experts were informed that as the questions were constructed from the expert's Round one responses, the content of the questions informed experts of the variables their national and international colleagues deem relevant to improve connected speech.

Round Two: Delphi Stage 6: Second Accumulation and Organization of the Expert Panel Statements to Stage Five Questions

Responses to round two questions were tallied based on the same Likert-scale described. Mean scores for each question were computed. Statements with means of 3.75 or greater were maintained so that the mean of remaining statements reflected variables important to or that caused improvements in connected speech (i.e., 4 and 5 on Likert scale). Additionally, those items with a mean of 2.25 or less were maintained to investigate those items that experts agreed were of little relevance to or inhibited improvements in connected speech. Items demonstrating lack of agreement, determined by standard deviations of greater than plus or minus, one were eliminated, thus preserving, as stated by Berquez (2011) (p. 212) in his stammering study "those that were most important and with the greatest consensus".

In an effort to determine response stability across rounds, the decision was made to complete a third round. Round three questions maintained the same wording and format as in the round two SurveyMonkey questionnaire. In order to give insight into the responses of their expert panel colleagues, the mean scores for responses from round two were provided to experts for each question.

Round Three: Delphi Stage 7: Third Dissemination of the Research Question

In this stage of the current study, a letter of invitation for round three was sent via SurveyMonkey to the experts who, by nature of completing the round two questionnaire, agreed to participate on the Delphi expert panel. Five letters of invitation for round three were sent (January 17th, 2013; January 22nd, 2013; January 26th, 2013; January 29th, 2013; February 1st, 2013). This letter included a brief reminder description of the study, IRB information, and a SurveyMonkey link on which the experts were to click if they agreed to continue their participation on the expert panel. This SurveyMonkey link took experts to the round three Likert-scale questionnaire. Expert responses to 65 of the round three questions were acquired at the same time, however responses to one additional round three question was obtained three months after the final acquisition of round three responses. Delayed acquisition of data for this question resulted from the finding that during initial earlier review of the 175 mean responses to round two questions, the mean for this one question did meet the criteria but was not carried forward into the final third round. Thus, for round three, expert responses to 65 questions were acquired at the same time, and expert responses to one additional question were acquired three months later, thus completing the final 66 questions.

Round Three: Delphi Stage 8: Accumulation and Organization of the Expert Panel

Statements to Stage Seven Questions

Essentially the same analysis approach used in round two was applied in round three. Results from Likert-scale questions were analyzed to obtain three pieces of information; item-level importance, item-level expert agreement, and, for the third round, stability of responses across rounds. In Delphi studies, the consistency or stability of responses can be determined by calculating intra-experts change or variability in question responses. In the case of ordinal data, a non-parametric statistical method is often used, e.g., Spearman Rho (r_s) rank correlation.

All responses were again tallied based on the 1-5 Likert-scale options (0 for "not relevant"). To investigate each item's level of importance, mean scores for each question were computed. Only those statements with means of greater than 3.70 and less than 2.30 were maintained so that the mean of remaining statements reflected variables important to or that caused improvements in connected speech (i.e., 4 and 5 on Likert scale) or variables less relevant to or that inhibited improvements in connected speech (i.e., 1 and 2 on Likert scale). Eliminations according to standard deviation were applied as in round two.

Consensus among experts, for each question across rounds two and three was investigated by identifying the number of experts who rated the question a 4 or 5 (indicating positive certainty) or a 1 or 2 (indicating negative certainty). These results were converted to percentages to reflect consensus. Taking an approach used by other Delphi studies focused on treatment components (Morrison and Barratt, 2010), consensus was defined in levels according to the strength (%) of agreement on those items rating a 3.70 or higher or 2.30 or lower.

1) "High consensus" items: greater than or equal to 80% consensus among the experts (i.e., six of seven responders rated the item a four or five or a one or two on the five-point Likert scale).
2) "Moderate consensus" items: between 65 and 79% consensus among the experts (i.e., five of seven responders rated the item a four or five or a one or two on the five-point Likert scale).
3) "Low consensus" items: lower than 65% consensus among the experts (i.e., four of seven responders rated the item a four or five or a one or two on the five-point Likert scale).

Stability across rounds was also investigated using Spearman Rho rank correlation (r_s) (Cramer et al., 2008; Sweigert and Schabacker, 1974). This correlation compared the mean averages from round two and three to determine if as a group, experts maintained or changed their item-level ratings from round two to round three. Rho's effect sizes are the same as other associational statistics, varying between -1.0 and +1.0 with 0 indicating no effect and +1 or -1.0 indicating maximum effect. Effect sizes for Rho are: weak association .20; moderate association .50; strong association .80. As the purpose of a Delphi study is to determine group level consensus or agreement on a given topic, intra-rater reliability, or stability of each expert's responses across rounds was not investigated. This ensured that the study considered the results from the point-of-view of a group/panel of experts, not as individuals.

As unequal sample sizes were obtained for rounds two and three (*n* of eight and seven respectively), the different samples were used to examine the three different types of information provided by the Delphi approach. First, *level of importance* for each item was analyzed by mean ratings of each item in each round, using that round's sample size. In other words the mean (i.e.,

importance) of each item was calculated using an *n* of eight for round two and an *n* of seven for round three. The second piece of information, *percentage of agreement*, used the same approach, i.e., using an *n* of eight for round two and an *n* of seven for round three. However, in order to determine the third piece of information, *stability across rounds*, the same sample size was required to compute the Spearman Rho rank correlation, a requirement not met by the round two and round three responses. As such, to determine stability of ratings across rounds, the expert who responded in round two, but not in round three, was removed from the analysis, thus making seven the sample size for both rounds. Spearman Rho rank correlation was then computed for round three based on a sample size of seven.

RESULTS

Round One: Delphi Stage 1: Literature Review and Identification of Expert Panel Members

Literature review. Three hundred twenty abstracts that investigated treatment for post-stroke related aphasia and stated generalization to connected speech as a dependent variable or outcome measure or goal were identified. Forty-four duplicate papers across databases were removed. Abstracts were reviewed and inclusion and exclusion criteria was applied, resulting in the elimination of 177 papers for these reasons:

Generalization at word level, not to connected speech: 61 papers

Not CVA diagnosis: 28 papers

Solely apraxia: 19 papers

Other (e.g., article not in English, medication trial, observational study, child): 15 papers

Focus on writing (i.e., written output or dysgraphia): 10 papers

Focus on auditory comprehension: 8 papers

Focus on reading (i.e., reading comprehension or dyslexia): 6 papers

Focus on naming: 6 papers

Evaluation or measurement tool: 3 papers

Augmentative/Alternative communication output: 2 papers

Focus on computer output: 2 papers

Focus on spelling: 1 paper

The remaining 99 papers were reviewed fully and final exclusions were completed for those papers that did not identify generalization to connected speech as a dependent variable or outcome of interest. Forty-eight papers were excluded after this process and 51 publications

were thus included in the final literature database. Information pertaining to the following features was extracted from each publicaiton: the treatment focus, the materials employed, the treatment task, the interaction between the patient and clinician, the treatment duration/intensity, and the patient characteristics.

Results of the round one, stage one literature summary that was provided to the expert panelists are presented below. Findings were tabulated and the number of studies that included a given patient characteristics or treatment component were tallied. Listed below are the findings for each question.

Summary of literature review

Question #1: What is the stated focus of therapy / desired effect of the treatment in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

- **Mapping therapy / Verb argument relations (Total number of studies: 13)** (Byng, Nickels, & Black, 1994; Jacobs & Thompson, 2000; Links, Hurkmans, & Bastiaanse, 2010; Marshall, Chiat, & Pring, 1997; Murray, Timberlake, & Eberle, 2007; Nessler, Pinkowski, & Wambaugh, 2005; Peach & Wong, 2004; Rochon, Laird, Bose, & Scofield, 2005; Shewan, 1976; Stadie, et al., 2008; Thompson, Shapiro, & Roberts, 1993; Thompson, Shapiro, Kiran, & Sobecks, 2003; van de Sandt-Koenderman, Bonta, Wielaert, & Visch-Brink, 1997)
- **Activating semantic networks (Total number of studies: 8)** (Antonucci, 2009; Boyle & Coelho, 1995; Harvey, Murray, & Eberle, 2008; Kim, 2005; Papathanasiou, Mesolora, Mihou, & Papachristou, 2006; Peach & Reuter, 2010; Rider, Wright, Marshall, and Page, 2008; Wambaugh, Nesser, & Wright, 2012)

- **Treating verbs (core meaning of verbs / semantic aspect of verbs) (Total number of studies: 7)** (Bastiaanse, Hurkmans, & Links, 2006; Conroy et al., 2009; Edmonds & Babb, 2011; Edmonds, Nadeau, & Kiran, 2009; Kim, 2005; Murray & Karcher, 2000; Webster, Morris, & Franklin, 2005)
- **Self-generated creative language use for information elaboration or exchange (Total number of studies: 5)** (Davis & Tan, 1987; Goral, Levy, & Kastl, 2007; Kirmess & Lind, 2011; Wambaugh, et al., 2012; Wambaugh & Martinez, 2000)
- **Expand / lengthen verbal output (Total number of studies: 4)** (Hough, 2010; Kirmess & Lind, 2011; van de Sandt-Koenderman et al., 1997; Wambaugh et al., 2012)
- **Morphosyntactic production / Syntax Stimulation (HELPSS) (Total number of studies: 3)** (Doyle et al., 1987; Shewan, 1976; van de Sandt-Koenderman et al., 1997)
- **Automaticity of language use in scripted, personally-relevant social situations (Total number of studies: 3)** (Cherney et al., 2011; Munoz & Karow, 2007; Munoz & Powers, 2006)
- **Word finding and naming (Total number of studies: 3)** (Cameron et al., 2006; Doesborgh, et al., 2004; McNeil et al., 1997)
- **Wh- questions (Total number of studies: 3)** (Thompson, et al., 1993; Thompson & McReynolds, 1986; Wilkinson, et al., 2011)
- **Phonologic production (Total number of studies: 1)** (Kendall, et al., 2006)
- **Precision and automaticity of speech movements under different linguistic demands (Total number of studies: 2)** (Bose, et al., 2001; Cherney, 1995)
- **Functional and positional representations/relationships (Total number of studies: 2)** (Weinrich, Boser, & McCall, 1999; Weinrich, Shelton, Cox, & McCall, 1997)

- **Self-monitoring of verbal output (Total number of studies: 1)** (Whitney & Goldstein, 1989)
- **Use of requests (Total number of studies: 1)** (Doyle et al., 1989)
- **Story grammar – micro- and macro- linguistic elements of story (Total number of studies: 1)** (Whitworth, 2010)
- **Strengthen connections between orthography and phonology (Total number of studies: 1)** (Greenwood et al., 2010)
- **Process that enable improvements in fluent speech (Total number of studies: 1)** (Siguroardottir & Blondahl Sighvatsson, 2006)

Question #2: What materials are employed in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

- **Pictures only as stimuli (Total number of studies: 16)** (Antonucci, 2009; Boyle & Coelho, 1995; Conroy et al., 2009; Davis & Tan, 1987; Doesborgh et al., 2004; Edmonds & Babb, 2011; Edmonds et al., 2009; Kim, 2005; Nessler et al., 2005; Papathanasiou et al., 2006; Rider et al., 2008; Rochon et al., 2005; Thompson & McReynolds, 1986; Wambaugh & Martinez, 2000; Whitney & Goldstein, 1989; Whitworth, 2010)
- **Written word and picture (Total number of studies: 7)** (Bastiaanse et al., 2006; Greenwood et al., 2010; Links, et al., 2010; Peach & Reuter, 2010; Shewan, 1976; Stadie et al., 2008; Thompson, et al., 2003)
- **Verbal stimuli (Total number of studies: 6)** (Hough, 2010; McNeil et al., 1997; Peach & Wong, 2004; Thompson & McReynolds, 1986; Wambaugh, Nesser, & Wright, 2012)
- **Other (objects, photos, pictures of real situations, mirror, drawings or verbal descriptions of oral placement) (Total number of studies: 5)** (Kendall et al., 2006;

Thompson et al., 1993; van de Sandt-Koenderman et al., 1997; Weinrich et al., 1999; Weinrich et al., 1997)

- **Written word (Total number of studies: 4)** (Doyle et al., 1989; Jacobs & Thompson, 2000; Thompson & McReynolds, 1986; Wilkinson, Wambaugh, & Nessler, 2011)
- **Pictures and verbal stimulus and written stimulus (Total number of studies: 3)** (Byng et al., 1994; Siguroardottir & Blondahl Sighvatsson, 2006; Webster et al., 2005)
- **Written word and verbal (Total number of studies: 2)** (Bose, et al., 2001; Cherney, 1995)
- **Drawings (Total number of studies: 2)** (Cameron et al., 2006; Doyle et al., 1987)
- **Scripts (Total number of studies: 2)** (Munoz & Karow, 2007; Munoz & Powers, 2006)
- **Barrier and verbal stimulus and written and pictures (Total number of studies: 2)** (Goral, et al., 2007; Kirmess & Lind, 2011)
- **Written word and drawing (Total number of studies: 1)** (Marshall, Chiat, & Pring, 1997)
- **Computer and written sentences (Total number of studies: 1)** (Murray & Karcher, 2000)
- **Avatar (Total number of studies: 1)** (Cherney et al., 2011)
- **Drawing, and written word, and picture (Total number of studies: 1)** (Murray, Timberlake, & Eberle, 2007)

Question #3: What are the task requirements (what the patient has to do) in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

- **Repeat therapist's production or therapist's verbal model (Total number of studies: 17)** (Antonucci, 2009; Bose et al., 2001; Cameron et al., 2006; Conroy et al., 2009; Davis & Tan, 1987; Doyle et al., 1987; Hough, 2010; Kendall et al., 2006; Munoz & Karow, 2007; Munoz & Powers, 2006; Nessler et al., 2005; Peach & Wong, 2004; Siguroardottir & Blondahl Sighvatsson, 2006; Stadie et al., 2008; Thompson & McReynolds, 1986; Wambaugh & Martinez, 2000; Webster et al., 2005; Wilkinson et al., 2011)
- **Verbally produce sentence to picture (Total number of studies: 15)** (Bastiaanse et al., 2006; Byng et al., 1994; Davis & Tan, 1987; Goral et al., 2007; Links et al., 2010; Murray & Karcher, 2000; Nessler et al., 2005; Papathanasiou et al., 2006; Peach & Reuter, 2010; Shewan, 1976; Thompson & McReynolds, 1986; Weinrich et al., 1999; Weinrich et al., 1997; Whitney & Goldstein, 1989; Whitworth, 2010)
- **Name picture, either noun or verb (Total number of studies: 14)** (Antonucci, 2009; Boyle & Coelho, 1995; Conroy et al., 2009; Davis & Tan, 1987; Doesborgh et al., 2004; Greenwood et al., 2010; Kim, 2005; Links et al., 2010; Murray & Karcher, 2000; Papathanasiou et al., 2006; Peach & Reuter, 2010; Rider et al., 2008; Webster et al., 2005; Weinrich et al., 1999)
- **Comprehension treatment - point to requested item (Total number of studies: 14)** (Davis & Tan, 1987; Doyle et al., 1989; Goral et al., 2007; Jacobs & Thompson, 2000; Kim, 2005; Marshall et al., 1997; Nessler et al., 2005; Peach & Wong, 2004; Rochon et

al., 2005; Siguroardottir & Blondahl Sighvatsson, 2006; Stadie et al., 2008; Thompson & McReynolds, 1986; Thompson et al., 2003; Wilkinson et al., 2011)

- **Read sentence orally (Total number of studies: 12)** (Doyle et al., 1989; Jacobs & Thompson, 2000; Links, et al., 2010; Nessler et al., 2005; Rochon et al., 2005; Shewan, 1976; Stadie et al., 2008; Thompson, et al., 1993)
- **Task practice in real-life communication context (Total number of studies: 12)** (Antonucci, 2009; Bose et al., 2001; Cherney et al., 2011; Doyle et al., 1989; Goral et al., 2007; Kendall et al., 2006; Kirmess & Lind, 2011; Marshall et al., 1997; Munoz & Karow, 2007; Munoz & Powers, 2006; Wambaugh & Martinez, 2000; Whitworth, 2010)
- **Educate and move and produce sentence constituents (Total number of studies: 9)** (Byng et al., 1994; Jacobs & Thompson, 2000; Murray et al., 2007; Nessler et al., 2005; Rochon et al., 2005; Stadie et al., 2008; Thompson et al., 1993; Thompson et al., 2003; Wilkinson et al., 2011)
- **Read (and follow directions or match to pic) (Total number of studies: 10)** (Greenwood et al., 2010; Jacobs & Thompson, 2000; Munoz & Karow, 2007; Munoz & Powers, 2006; Rider et al., 2008; Shewan, 1976; Siguroardottir & Blondahl Sighvatsson, 2006; Thompson et al., 1993; Thompson & McReynolds, 1986; Webster et al., 2005)
- **Semantic Processing – includes SFA or semantic decision-making (Total number of studies: 10)** (Antonucci, 2009; Boyle & Coelho, 1995; Edmonds & Babb, 2011; Edmonds et al., 2009; Harvey et al., 2008; Papathanasiou et al. 2006; Peach & Reuter, 2010; Rider et al., 2008; Wambaugh, et al., 2012; Webster et al., 2005)
- **Other (Total number of studies: 8)** (Greenwood, et al., 2010; McNeil, et al., 1997; Rochon, et al., 2005; Siguroardottir & Blondahl Sighvatsson, 2006; van de Sandt-

Koenderman, et al., 1997; Weinrich, et al., 1999; Weinrich, et al., 1997; Whitney & Goldstein, 1989)

- **Pt respond to therapist's statement or question (pt produces statement or question) (Total number of studies: 8)** (Cameron, et al., 2006; Davis & Tan, 1987; Doyle, et al., 1987; Jacobs & Thompson, 2000; Murray & Karcher, 2000; Peach & Reuter, 2010; Wambaugh, et al., 2012; Wambaugh & Martinez, 2000)
- **Ask question (Pt ask a question) (Total number of studies: 8)** (Doyle et al., 1989; Edmonds & Babb, 2011; Edmonds et al., 2009; Nessler et al., 2005; Stadie et al., 2008; Thompson et al., 1993; Thompson & McReynolds, 1986; Wilkinson et al., 2011)
- **Sentence fill / closure (Total number of studies: 7)** (Antonucci, 2009; Cameron et al., 2006; Doyle et al., 1987; Harvey et al., 2008; Links et al., 2010; Marshall et al., 1997)
- **Written production task (Total number of studies: 5)** (Harvey et al., 2008; Murray & Karcher, 2000; Murray et al., 2007; Peach & Wong, 2004; Webster et al., 2005)
- **Use computer (Total number of studies: 5)** (Cherney et al., 2011; Doesborgh et al., 2004; Greenwood et al., 2010; Murray & Karcher, 2000; Whitworth, 2010)
- **Educate about linguistic structure and produce - (Total number of studies: 4)** (Goral et al., 2007; Marshall et al., 1997; Peach & Wong, 2004; Whitworth, 2010)
- **Practice Scripts or Social Convention phrases (Total number of studies: 3)** (Cherney et al., 2011; Munoz & Karow, 2007; Munoz & Powers, 2006)
- **Identify requested linguistic form (Total number of studies: 3)** (Murray et al., 2007; Nessler et al., 2005; Webster et al., 2005)
- **Move and produce sentence constituents (Total number of studies: 3)** (Bastiaanse et al., 2006; Links et al., 2010; Shewan, 1976)

- **Choral reading (Total number of studies: 3)** (Doyle et al., 1989; Hough, 2010; Wilkinson et al., 2011)
- **Homework (Total number of studies: 3)** (Murray et al., 2007; Peach & Reuter, 2010; Webster et al., 2005)
- **Self-generated production of sentences (no picture) (Total number of studies: 3)** (Peach & Wong, 2004; Wambaugh et al., 2012; Webster et al., 2005)
- **Gesture / Hand (Total number of studies: 2)** (Hough, 2010; Wilkinson et al., 2011)
- **Pt revise production (Total number of studies: 2)** (Links et al., 2010; Peach & Wong, 2004)
- **Phoneme-production (Total number of studies: 2)** (Bose et al., 2001; Kendall et al., 2006)

Question #4: What are the forms of feedback and interaction provided by the therapist in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

- **Written cues (Total number of studies: 15)** (Bastiaanse et al., 2006; Bose et al., 2001; Cherney et al., 2011; Doesborgh et al., 2004; Edmonds & Babb, 2011; Hough 2010; Jacobs & Thompson 2000; Links et al., 2010; Rider et al., 2008; Stadie et al., 2008; Thompson et al., 1993; Thompson et al., 2003; Webster et al., 2005; Weinrich et al., 1999; Whitworth, 2010)
- **Elicit response with Wh- ? (Total number of studies: 12)** (Antonucci, 2009; Cameron et al., 2006; Davis & Tan, 1987; Doyle et al., 1987; Edmonds & Babb, 2011; Edmonds et al., 2009; Hough, 2010; Jacobs & Thompson, 2000; Murray & Karcher, 2000; Peach &

Reuter, 2010; Siguroardottir & Blondahl Sighvatsson, 2006; Thompson & McReynolds, 1986)

- **Educate about sentence constituents (Total number of studies: 9)** (Marshall et al., 1997; Murray et al., 2007; Nessler et al., 2005; Peach & Wong, 2004; Rochon et al., 2005; Stadie et al., 2008; Thompson et al., 1993; Thompson et al., 2003; Webster et al., 2005)
- **Model target phrase for subject to repeat ("say..") (Total number of studies: 9)** (Bastiaanse et al., 2006; Davis & Tan, 1987; Links et al., 2010; McNeil et al., 1997; Munoz & Karow, 2007; Munoz & Powers, 2006; Thompson & McReynolds, 1986; Wambaugh & Martinez, 2000; Webster et al., 2005)
- **Assist or guide subject to production (Total number of studies: 10)** (Antonucci, 2009; Boyle & Coelho, 1995; Greenwood et al., 2010; Munoz & Karow, 2007; Munoz & Powers, 2006; Murray et al., 2007; Peach & Reuter, 2010; Rider et al., 2008; Shewan, 1976; Siguroardottir & Blondahl Sighvatsson, 2006)
- **Cueing hierarchy (Total number of studies: 9)** (Cameron et al., 2006; Conroy et al., 2009; Greenwood et al., 2010; Hough, 2010; Links et al., 2010; McNeil et al., 1997; Munoz & Karow, 2007; Munoz & Powers, 2006; Murray & Karcher, 2000)
- **Semantic cues or assistance (Total number of studies: 8)** (Antonucci, 2009; Bastiaanse et al., 2006; Boyle & Coelho, 1995; Links et al., 2010; Papathanasiou et al., 2006; Peach & Reuter, 2010; Rider et al., 2008; Webster et al., 2005)
- **Confirm if accurate (Total number of studies: 9)** (Cameron et al., 2006; Doesborgh et al., 2004; Jacobs & Thompson, 2000; Kendall et al., 2006; Murray et al., 2007; Peach &

Reuter, 2010; Rochon et al., 2005; Thompson et al., 1993; Thompson & McReynolds, 1986)

- **Encouragement / Feedback (Total number of studies: 8)** (Edmonds et al., 2009; Kendall et al., 2006; Papathanasiou et al., 2006; Rochon et al., 2005; Siguroardottir & Blondahl Sighvatsson, 2006; Thompson & McReynolds, 1986; Weinrich et al., 1999; Whitney & Goldstein, 1989)
- **Therapist corrects subject output by shaping or modeling (Total number of studies: 7)** (Goral et al., 2007; Greenwood et al., 2010; Rider et al., 2008; Rochon et al., 2005; Shewan, 1976; Thompson & McReynolds, 1986; Wambaugh & Martinez, 2000)
- **Aural cue (hear voice) (Total number of studies: 7)** (Cherney et al., 2011; Edmonds et al., 2009; Munoz & Karow, 2007; Munoz & Powers, 2006; Thompson & McReynolds, 1986; Thompson et al., 2003; Weinrich, et al., 1999)
- **Model sample example phrase (Total number of studies: 6)** (Goral et al., 2007; Kirmess & Lind, 2011; L. Murray et al., 2007; Nessler et al., 2005; Stadie et al., 2008; Wilkinson et al., 2011)
- **General Sentence completion (Total number of studies: 6)** (Bastiaanse et al., 2006; Cameron et al., 2006; Doyle et al., 1987; McNeil et al., 1997; Nessler et al., 2005; Wilkinson et al., 2011)
- **Elaborate, Forward chaining (Total number of studies: 6)** (Munoz & Karow, 2007; Munoz & Powers, 2006; Thompson & McReynolds, 1986; van de Sandt-Koenderman et al., 1997; Wambaugh et al., 2012; Wambaugh & Martinez, 2000)

- **Education about accuracy or errors (Total number of studies: 6)** (Goral et al., 2007; Murray et al., 2007; Peach & Wong, 2004; Siguroardottir & Blondahl Sighvatsson, 2006; Weinrich et al., 1997; Whitney & Goldstein, 1989)
- **Model card movement (Total number of studies: 5)** (Murray et al., 2007; Nessler et al., 2005; Stadie et al., 2008; Thompson et al., 1993; Thompson et al., 2003)
- **Role Play / Real Life interaction (Total number of studies: 6)** (Goral et al., 2007; Hough, 2010; Kendall et al., 2006; Kirmess & Lind, 2011; Marshall et al., 1997; Whitworth, 2010)
- **Shaping task to meet needs of patient – flexibility with task (Total number of studies: 5)** (Goral et al., 2007; Kirmess & Lind, 2011; Murray et al., 2007; van de Sandt-Koenderman et al., 1997; Whitworth, 2010)
- **Prompt subject to ask a question or respond (Total number of studies: 4)** (Doyle et al., 1989; Wambaugh et al., 2012; Wambaugh & Martinez, 2000; Weinrich et al., 1997)
- **Errors not addressed or corrected (Total number of studies: 4)** (Byng et al., 1994; Goral et al., 2007; Siguroardottir & Blondahl Sighvatsson, 2006; Whitney & Goldstein, 1989)
- **Phonemic cues (Total number of studies: 5)** (Antonucci, 2009; Bastiaanse et al., 2006; Kendall et al., 2006; Links et al., 2010; Siguroardottir & Blondahl Sighvatsson, 2006)
- **Answer provided to subject (Total number of studies: 4)** (Antonucci, 2009; Peach & Reuter, 2010; Rider et al., 2008; Whitworth, 2010)
- **Cued naming (Total number of studies: 4)** (Bastiaanse et al., 2006; Conroy et al., 2009; Papathanasiou et al., 2006; Peach & Reuter, 2010)

- **Model target for delayed repetition (Total number of studies: 4)** (Doyle et al., 1987; Kendall et al., 2006; Wambaugh et al., 2012; Wambaugh & Martinez, 2000)
- **Scripts (Total number of studies: 3)** (Cherney et al., 2011; Munoz & Karow, 2007; Munoz & Powers, 2006)
- **Therapist reads aloud (Total number of studies: 3)** (Thompson & McReynolds, 1986; Whitworth, 2010; Wilkinson et al., 2011)
- **Facilitate monitoring of accuracy (Total number of studies: 3)** (Byng, et al., 1994; Whitney & Goldstein, 1989; Whitworth, 2010)
- **Fade or cues decrease (Total number of studies: 3)** (Cherney et al., 2011; Conroy et al., 2009; Siguroardottir & Blondahl Sighvatsson, 2006)
- **Visual / oral cue (Total number of studies: 3)** (Cherney et al., 2011; Doyle et al., 1989; Weinrich et al., 1999)
- **Confirm if inaccurate (Total number of studies: 3)** (Cameron et al., 2006; Kendall et al., 2006; Thompson et al., 1993)
- **Model target response embedded in verbal stim (Total number of studies: 2)** (Doyle et al., 1987; Nessler et al., 2005)
- **Multi-modal cueing (acoustic, visual, orthographic, tactile, verbal descriptions) (Total number of studies: 2)** (Thompson & McReynolds, 1986; Weinrich et al., 1999)
- **Loose training (Total number of studies: 2)** (Davis & Tan, 1987; Murray et al., 2007)
- **Therapist point to each word as read (Total number of studies: 2)** (Cherney, 1995; Kim, 2005)
- **Choral production / reading (Total number of studies: 2)** (Doyle et al., 1989; Hough, 2010)

- **Integral stimulation (Therapist says "watch me, say …") (Total number of studies: 2)** (Cameron et al., 2006; Hough, 2010)
- **Decreasing assistance over course of therapy sessions (Total number of studies: 2)** (Cherney et al., 2011; Doesborgh et al., 2004)
- **Sentence starter and silently articulate phonemic cue (Total number of studies: 1)** (McNeil et al., 1997)
- **State and demonstrate word and function (Total number of studies: 1)** (McNeil et al., 1997)
- **Encourage use of strategies (Total number of studies: 1)** (Goral et al., 2007)
- **Cues increase (Total number of studies: 1)** (Conroy et al., 2009)
- **Picture and written and spoken name and request subject to repeat (Total number of studies: 1)** (Conroy et al., 2009)
- **Picture and max written and phonemic cue (Total number of studies: 1**) (Conroy et al., 2009)
- **Picture and min written and phonemic cue (Total number of studies: 1)** (Conroy et al., 2009)
- **Picture and semantic cue (Total number of studies: 1)** (Conroy et al., 2009)
- **Therapist judge accuracy (Total number of studies: 1)** (Whitney & Goldstein, 1989)
- **1st phoneme and grapheme of word given (Total number of studies: 1)** (Greenwood et al., 2010)
- **1st syllable (oral and written) (Total number of studies: 1)** (Greenwood et al., 2010)
- **Whole word (oral and written) (Total number of studies: 1)** (Greenwood et al., 2010)
- **Written feedback (Total number of studies: 1)** (Doesborgh et al., 2004)

- **Written cue given, then erased, and delayed production by subject (Total number of studies: 1)** (Hough, 2010)
- **Backward chaining (Total number of studies: 1)** (Davis & Tan, 1987)
- **Integral stimulation visual cue and delayed repetition (Total number of studies: 1)** (Hough, 2010)
- **Integral stimulation and delayed repetition but no visual cue (Total number of studies: 1)** (Hough, 2010)
- **Tactile / Kinesthetic cue (Total number of studies: 1)** (Bose et al., 2001)
- **Semantically loaded sentence completion (Total number of studies: 1)** (Cameron et al., 2006)
- **Semantically loaded sentence completion with phonemic cues (Total number of studies: 1)** (Cameron et al., 2006)
- **Socratic questioning (Total number of studies: 1)** (Kendall et al., 2006)
- **Education about how to make sound (articulation movement) (Total number of studies: 1)** (Kendall et al., 2006)
- **Picture with written 1st letter (Total number of studies: 1)** (Murray & Karcher, 2000)
- **Demonstrate function (Total number of studies: 1)** (McNeil et al., 1997)
- **State function (Total number of studies: 1)** (McNeil et al., 1997)
- **Sentence starter and vocalized 1st or 2nd phoneme (Total number of studies: 1)** (McNeil et al., 1997)
- **Scrambled written anagram (Total number of studies: 1)** (Murray & Karcher, 2000)
- **Therapist hum phrase (Total number of studies: 1)** (Hough, 2010)
- **Choral humming (Total number of studies: 1)** (Hough, 2010)

Question #5: What is the duration and intensity of treatment in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

a) Total number of minutes/hours a session – of those who reported number of minutes/hours

- **60 minutes – 89 minutes [1 hour to 1 hour and 29 minutes] (Total number of studies: 11)** (Boyle & Coelho, 1995; Byng et al., 1994; Goral et al., 2007; Greenwood et al., 2010; Hough, 2010; Peach & Wong, 2004; Rider et al., 2008; Rochon et al., 2005; Siguroardottir & Blondahl Sighvatsson, 2006; Wambaugh & Martinez, 2000; Weinrich et al., 1999)
- **31 minutes – 59 minutes (Total number of studies: 10)** (Cameron et al., 2006; Munoz & Karow, 2007; Munoz & Powers, 2006; Peach & Reuter, 2010; Siguroardottir & Blondahl Sighvatsson, 2006; Stadie et al., 2008; Wambaugh et al., 2012; Webster et al., 2005; Whitney & Goldstein, 1989)
- **Greater than or equal to two hours, less than three hours (Total number of studies: 6)** (Edmonds & Babb, 2011; Edmonds et al., 2009; Marshall et al., 1997; Thompson & McReynolds, 1986; Thompson et al., 2003; Weinrich et al., 1999)
- **90 minutes – 119 minutes [1 ½ hours to 1 hour and 59 minutes] (Total number of studies: 4)** (Antonucci, 2009; Jacobs & Thompson, 2000; Murray & Karcher, 2000; Murray et al., 2007)
- **30 minute (Total number of studies: 3)** (Bastiaanse et al., 2006; Cherney et al., 2011; Links et al., 2010)
- **Greater than or equal to three hours (Total number of studies: 1)** (Kirmess & Lind, 2011)

b) Total number of minutes/hours a week – of those who reported number of minutes/hours

- **1.5 hours (Total number of studies: 8)** (Bastiaanse et al., 2006; Bose et al., 2001; Boyle & Coelho, 1995; Cameron et al., 2006; Doesborgh et al., 2004; Links et al., 2010; Murray & Karcher, 2000; Stadie et al., 2008)
- **3 hours (Total number of studies: 8)** (Antonucci, 2009; Cherney et al., 2011; Hough, 2010; Murray et al., 2007; Peach & Wong, 2004; Rider et al., 2008; Wambaugh et al., 2012; Wambaugh & Martinez, 2000)
- **2 hours (Total number of studies: 7)** (Byng et al., 1994; Conroy et al., 2009; Kim, 2005; Munoz & Karow, 2007; Munoz & Powers, 2006; Rochon et al., 2005; Whitworth, 2010)
- **4 hours (Total number of studies: 5)** (Edmonds & Babb, 2011; Edmonds et al., 2009; Thompson & McReynolds, 1986; Thompson et al., 2003; Webster et al., 2005)
- **8 hours or more (Total number of studies: 3)** (Goral et al., 2007; Kirmess & Lind, 2011; Weinrich et al., 1999)
- **4.5 hours (Total number of studies: 1)** (Jacobs & Thompson, 2000)
- **5 hours (Total number of studies: 1)** (Siguroardottir & Blondahl Sighvatsson, 2006)
- **1 hour (Total number of studies: 1)** (Greenwood et al., 2010)

c) Total number of weeks – of those who reported number of weeks

- **10 weeks (Total number of studies: 5)** (Peach & Reuter, 2010; Peach & Wong, 2004; Rider et al., 2008; Rochon, et al., 2005; Whitworth, 2010)
- **12 weeks (Total number of studies: 4)** (Links et al., 2010; Bastiaanse et al., 2006; Edmonds & Babb, 2011; Whitworth, 2010)

- **8 weeks (Total number of studies: 4)** (Doesborgh et al., 2004; Greenwood et al., 2010; Hough, 2010; Weinrich et al., 1997)
- **6 weeks (Total number of studies: 3)** (Byng et al., 1994; Davis & Tan, 1987; Marshall, et al., 1997)
- **9 weeks (Total number of studies: 2)** (Cherney et al., 2011; Greenwood et al., 2010)
- **14 weeks (Total number of studies: 2)** (Kendall et al., 2006; Weinrich et al., 1997)
- **2 weeks (Total number of studies: 1)** (Kirmess & Lind, 2011)
- **3 weeks (Total number of studies: 1)** (Goral et al., 2007)
- **5 weeks (Total number of studies: 1)** (Conroy et al., 2009)
- **7 weeks (Total number of studies: 1)** (Antonucci, 2009)
- **16 weeks (Total number of studies: 1)** (Weinrich et al., 1999)
- **24 weeks (Total number of studies: 1)** (Doyle et al., 1987)
- **28 weeks (Total number of studies: 1)** (Siguroardottir & Blondahl Sighvatsson, 2006)

Question #6: What are the aphasia characteristics reported in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

In 51 publications: 156 subjects

Age: Of those that reported age, the mean age was 57.19 (range 25 – 89)

Gender: Of those that reported gender; 33 male, 29 female

Aphasia types: *Number of patients* reported with aphasia type:

- **Broca's (Total number of patients: 37)** (Bastiaanse et al., 2006; Bose et al., 2001; Boyle & Coelho, 1995; Byng et al., 1994; Cherney, 1995; Davis & Tan, 1987; Doyle et al., 1987; Doyle et al., 1989; Hough, 2010; Kendall et al., 2006; Murray et al., 2007; Nessler et al., 2005; Peach & Wong, 2004; Siguroardottir & Blondahl Sighvatsson, 2006;

Thompson et al., 2003; van de Sandt-Koenderman et al., 1997; Wambaugh et al., 2012; Wambaugh & Martinez, 2000; Wilkinson et al., 2011)

- **"Nonfluent" (Total number of patients: 12)** (Kim, 2005; Kirmess & Lind, 2011; Papathanasiou et al., 2006; Thompson et al., 1993; Weinrich et al., 1999; Whitworth, 2010)
- **Anomic (Total number of patients: 6)** (Antonucci, 2009; Cameron et al., 2006; Peach & Reuter, 2010; Wambaugh, et al., 2012)
- **Conduction (Total number of patients: 5)** (Antonucci, 2009; Cameron et al., 2006; Edmonds et al., 2009)
- **"Aphasia" (Total number of patients: 5)** (McNeil et al., 1997; Whitney & Goldstein, 1989)
- **Global (Total number of patients: 2)** (Siguroardottir & Blondahl Sighvatsson, 2006)
- **Wernickes (Total number of patients: 2)** (Marshall et al., 1997; Murray & Karcher, 2000)
- **Transcortical Motor (Total number of patients: 2)** (Edmonds et al., 2009)
- **"Fluent" (Total number of patients: 2)** (Kirmess & Lind, 2011; Whitworth, 2010)

Severities: *Number of patients* reported with aphasia severity:

- **Mild-moderate aphasia (Total number of patients: 5)** (Kirmess & Lind, 2011; McNeil et al., 1997)
- **Mild aphasia (Total number of patients: 4)** (Kendall et al., 2006; Peach & Reuter, 2010; Whitney & Goldstein, 1989)
- **Severe aphasia (Total number of patients: 3)** (Murray & Karcher, 2000; Siguroardottir & Blondahl Sighvatsson, 2006; Weinrich et al., 1999)

- **Moderate aphasia (Total number of patients: 3)** (Bose et al., 2001; Papathanasiou et al., 2006; Peach & Wong, 2004)
- **Moderate-Severe aphasia (Total number of patients: 3)** (Davis & Tan, 1987; Murray et al., 2007; Nessler et al., 2005)

Apraxia: **16 patients reported with apraxia** (Antonucci, 2009; Bastiaanse et al., 2006; Bose et al., 2001; Boyle & Coelho, 1995; Byng et al., 1994; Cherney, 1995; Hough, 2010; Kendall et al., 2006; McNeil et al., 1997; Murray et al., 2007; Nessler et al., 2005; Siguroardottir & Blondahl Sighvatsson, 2006; Wambaugh & Martinez, 2000; Wilkinson et al., 2011)

Of those that reported apraxia severity:

- **Just "apraxia" (Total number of patients: 8)** (Antonucci, 2009; Byng et al., 1994; Cherney, 1995; McNeil et al., 1997; Murray et al., 2007; Nessler et al., 2005; Siguroardottir & Blondahl Sighvatsson, 2006)
- **Moderate severe (or marked) apraxia (Total number of patients: 4)** (Hough, 2010; Wambaugh & Martinez, 2000)
- **Moderate apraxia (Total number of patients: 3)** (Bastiaanse et al., 2006; Kendall et al., 2006; Wilkinson et al., 2011)
- **Mild apraxia (Total number of patients: 2)** (Bastiaanse et al., 2006; Boyle & Coelho, 1995)
- **Severe apraxia (Total number of patients: 1)** (Bose et al., 2001)

Time post-onset (TPO): Of those that reported TPO, the mean TPO was 61.25 months (5.09 years) (range 2 – 395 months) (Bastiaanse et al., 2006; Bose et al., 2001; Byng et al., 1994;

Cameron et al., 2006; Cherney, 1995; Davis & Tan, 1987; Doesborgh et al., 2004; Doyle et al., 1987; Doyle et al., 1989; Edmonds et al., 2009; Greenwood et al., 2010; Hough, 2010; Kirmess & Lind, 2011; Marshall et al., 1997; McNeil et al., 1997; Munoz & Karow, 2007; Munoz & Powers, 2006; Murray & Karcher, 2000; Murray et al., 2007; Papathanasiou et al., 2006; Peach & Reuter, 2010; Peach & Wong, 2004; Rochon et al., 2005; Shewan, 1976; Siguroardottir & Blondahl Sighvatsson, 2006; Stadie et al., 2008; Thompson et al., 1993; Thompson & McReynolds, 1986; Thompson et al., 2003; van de Sandt-Koenderman et al., 1997; Wambaugh & Martinez, 2000; Webster et al., 2005; Weinrich et al., 1999; Weinrich et al., 1997; Whitney & Goldstein, 1989; Whitworth, 2010; Wilkinson et al., 2011)

Identification of expert panel members. First, from the 51 papers, 62 first and second authors were identified. However, ten authors were removed because contact information could not be located or because the primary author was a student of another listed secondary author. In the end, 52 experts were invited to participate on the expert panel (Table 1).

Table 1

Demographics of 52 Experts Invited to Participate in Round One

Geographic location		Degree		Affiliation	
American	30 (58%)	PhD	44 (85%)	University	40 (77%)
International	22 (42%)	Masters	5 (10%)	Hospital	4 (8%)
		MD	2 (4%)	School of Medicine (SOM)	4 (8%)
		MD/PhD	1 (2%)	Hospital and SOM	3 (6%)
				Nonprofit company	1 (2%)

Round One: Delphi Stage 2: Creation and Articulation of the Round One Question(s)

The seven round one-study questions were based on issues of interest posed by Byng and Black (1995) (Appendix A).

Round One: Delphi Stage 3: First Dissemination of the Research Question

A letter of invitation to participate in the present study (Appendix B), along with the literature review was sent via email to the 34 first author experts identified in the literature review. Over a period of about two weeks, during which three letters of invitation were sent, of the 34 initial first author experts to whom the letter of request was sent, nine completed the questionnaire, three declined participation, and 22 did not respond.

In an attempt to increase participation, a letter of invitation to participate was sent to an additional 18 second authors of the 51 papers. Over a period of about two weeks, during which two letter of invitation were sent, of the 18 second authors to whom the letter of request was sent, three completed the questionnaire, two declined participation, and 13 did not respond.

In the end, 52 first and second authors were invited to participate on the Delphi expert panel. After three contact attempts with the first authors and two contact attempts with the second authors, nine first authors and three second authors completed the questionnaire, thus totaling 12 experts on the Round one expert panel. A total of five experts declined to participate and 35 did not respond.

Round One: Delphi Stage 4: Accumulation and Organization of the Expert Panel Statements

Through completion of the round one SurveyMonkey questions, 12 of the 52 invited authors agreed to participate in the round one panel, resulting in a 23% participation rate (Table 2). Nine were first authors (75%) and three were second authors (25%). These 12 authors

accounted for 16 of the 51 papers (31%) identified in this systematic literature review. Overall, approximately 60% of papers in the literature review demonstrated successful translation of treatment-related improvements into some form of connected speech with expert panel members authoring approximately 24% of those studies with successful generalization. Twelve of the 16 studies (75%) completed by the expert responders achieved successful translation of treatment-related improvements into connected speech. Of the 12 person expert panel, ten experts (83%) authored papers that achieved successful generalization.

Table 2

Profile of 12 Experts Who Completed Round 1 Delphi Questionnaire

Geographic location		**Degree**		**Affiliation**	
American	6 (50%)	PhD	9 (75%)	University	8 (67%)
International	6 (50%)	MD	2 (17%)	University SOM*	3 (25%)
		Masters	1 (8%)	Hospital	1 (8%)

* SOM = School of Medicine

All 12 experts completed two of the seven Delphi questions, eleven experts completed four of the seven Delphi questions, and nine experts completed one of the questions (Table 3).

Table 3

Number of Experts Who Completed Each Round 1 Question

Question number	**Number of experts completed**
Question 1	11
Question 2	12
Question 3	12
Question 4	11
Question 5	11
Question 6	11
Question 7	9

Organization of round one responses. Responses to the seven round one questions varied from several word responses to full sentences to multiple-sentence length paragraphs (Appendix C).

Formulation of round two questions. Categorization of the statements by the investigator resulted in 175 specific, five-point Likert-scale questions, ordered into seven categories. The number of questions in each category were: focus of therapy, 15; materials, 15; treatment task, 27; feedback/interaction, 26; intensity/treatment schedule, 9; patient characteristics, 67; other considerations, 16 (Appendix D).

The questions took one of three forms and asked experts to provide their insight into:

1) The degree to which a given variable mediates improvements in connected speech.

Example:

"This [variable]…"					
Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) The relative level of importance placed on the need to consider a given variable when determining candidacy for treatment designed to improve connected speech.

Example:

"How important is [variable] when determining candidacy for treatment designed to improve connected speech?"					
Unimportant	Of little importance	Moderately important	Important	Very important	N/A – is not relevant to connected speech

3) The relative goodness of treatment fit for a person with a given quality when determining candidacy for treatment designed to improve connected speech.

Example:

"This [quality] makes a person a …"					
Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

Round Two: Delphi Stage 5: Second Dissemination of the Research Question

Three letters of invitation for Round 2 were sent (December 19th, 2012; December 26th, 2012; January 1st, 2013) to the 12 experts who, by nature of completing the Round one questionnaire, agreed to participate on the Delphi expert panel (Appendix E).

Round Two: Delphi Stage 6: Second Accumulation and Organization of the Expert Panel Statements to Stage Five Questions

After three reminder emails over a period of about one month, eight of the twelve experts responded to the 175 Round Two SurveyMonkey questions (Table 4) resulting in a 67% participation rate from round One. Six were first authors (75%) and two were second authors (25%). These eight authors accounted for nine of the 51 papers (18%) identified in this systematic literature review and approximately 16% of all the papers that achieved generalization. Of the now eight person expert panel, seven experts (88%) authored papers that achieved successful translation of treatment-related improvements into connected speech.

Table 4.

Profile of Eight Experts Who Completed Round 2 Delphi Questionnaire

Geographic location		**Degree**		**Affiliation**	
American	4 (50%)	PhD	6 (75%)	University	5 (63%)
International	4 (50%)	MD	1 (13%)	University SOM	2 (25%)
		Masters	1 (13%)	Hospital	1 (13%)

After eliminations based on mean response score and standard deviation, 66 items (38% of the original 175) remained (Appendix F). These items thus represented those items that experts agreed were important to or that caused improvements in connected speech or that were of little relevance to or inhibited improvements in connected speech. The number of questions maintained in each category for the 66-item questionnaire were as such: focus of therapy, 9 (14%); materials, 9 (14%); treatment task, 10 (15%); feedback/interaction, 7 (11%); intensity/treatment schedule, 4 (6%); patient characteristics, 8 (12%); other considerations, 19 (29%).

Round Three: Delphi Stage 7: Third Dissemination of the Research Question

Over a period of about two weeks, one letter of invitation and four reminder emails for round three were sent via SurveyMonkey to all eight experts who, by nature of completing the round two questionnaire, agreed to participate on the Delphi expert panel (Appendix G).

Round Three: Delphi Stage 8: Accumulation and Organization of the Expert Panel Statements to Stage Seven Questions

Seven of the eight experts (88%) responded to the 66 round three questions (Table 5). Five were first authors (71%) and two were second authors (29%). These seven authors accounted for seven of the 51 papers (14%) identified in this systematic literature review and approximately 12% of all the papers that achieved generalization. Of the 16 successful generalization studies authored by expert responders in round one, now approximately 38% of the papers authored by the expert responders in Round Three achieved successful translation of treatment-related improvements into connected speech. Resultantly, of this final seven person expert panel, six experts (86%) authored papers that achieved successful generalization.

Table 5

Profile of Seven Experts Who Completed Round 3 Delphi Questionnaire

Geographic location		**Degree**		**Affiliation**	
American	3 (43%)	PhD	6 (86%)	University	5 (71%)
International	4 (57%)	MD	1 (14%)	University SOM	2 (29%)

To account for attrition of one expert, for this final round three, the mean upper cut-off was decreased slightly from 3.75 to 3.70 and the mean lower cut-off was increased slightly from 2.25 to 2.30. Items with standard deviations of greater than plus or minus one were then eliminated. After these eliminations, 53 items (30% of the original 175; 80% of the Round two 66 questions) remained. Thus, according to the seven experts in this Delphi panel, these 53 items are important to or cause improvements in connected speech or are of little relevance to or

inhibit improvements in connected speech (Appendix H). The number of questions maintained in each category were as such: focus of therapy, 9 (17%); materials, 5 (10%); treatment task, 7 (13%); feedback/interaction, 5 (10%); intensity/treatment schedule, 4 (8%); patient characteristics, 6 (12%); other considerations and variables that may negatively influence or are unrelated to connected speech, 17 (33%).

The goal of this Delphi study was to identify, through expert insight, the relative importance of variables that may influence connected speech, agreement among experts regarding these variables, and to investigate the stability of the expert agreement across two rounds. Findings for each of the seven questions for round two and round three are presented in Tables 6-13. For each of the seven study questions, each table presents the three pieces of information identified in a Delphi study: 1) item importance (determined by round two and three means), 2) expert agreement (determined by round three percentiles), and 3) stability (determined by Spearman's Rank Correlation Coefficient using mean ranking changes from rounds two to three).

Question One: What is the stated focus of therapy in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Table 6 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the importance of four treatment focuses - transactions, narrative/discourse, production of complex structures, and increasing length of utterances. A moderate degree of consensus existed on the importance of three focuses of treatment – syntax/grammar, word finding, and isolated linguistic components (e.g., nouns, verbs). A low degree of consensus existed on the importance of one focus of treatment – complete sentence production. One item, treatment focused on complex structures, maintained strong stability across rounds. Five treatment focuses maintained moderate stability across rounds (word finding, syntax/grammar, complete sentence production, narrative/discourse, and linguistic components of the sentence). The stability of increasing the length of utterances could not be computed because not all experts responded to that item.

Table 6

Focus of Treatment Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Focus of treatment	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
A treatment focused on transactions (story telling, functional message giving)	4.13 (.83)	4.43 (.79)	6 (75%)	6 (86%)	.02 Weak +
A treatment focused on "functional life skills" (e.g., specific script training) *	4.25 (.89)	4.14 (.69)	6 (75%)	6 (86%)	.54 Moderate +
A treatment focused on narrative/discourse structure	4.25 (.87)	4.14 (.69)	6 (75%)	6 (86%)	.54 Moderate +
A treatment focused on production of complex structures	4.00 (.53)	4.14 (.64)	7 (88%)	6 (86%)	.87 Strong +
A treatment focused on increasing length of utterances (i.e., providing more helpful units even if not a complete sentence)	4.00 (.93)	4.00 (.63)	5 (63%)	5** (83%)	Could not compute
A treatment focused on syntax or grammar in sentence structure	3.86 (.35)	4.00 (.82)	7 (88%)	5 (71%)	.68 Moderate +
A treatment focused on word finding difficulty	4.25 (.46)	4.00 (.82)	8 (100%)	5 (71%)	.68 Moderate +

A treatment focused on the linguistic components of sentences in isolation (e.g., verbs, nouns)	3.75 (.46)	3.86 (.46)	6 (75%)	5 (71%)	.54 Moderate +
A treatment focused on complete sentence production (vs word production or truncating spoken output)	3.88 (.83)	3.71 (.76)	5 (63%)	4 (57%)	.68 Moderate +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* Expert responses to this item were obtained three months following the other questions.

** n of 6

Question two: What materials are employed in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Table 7 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for the materials used in treatments. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the importance of four materials – specific scenarios for role-play, scripts, videos, and structured topics for conversation. A moderate degree of consensus existed on the importance of one focus of treatment – action sequence cards. Two forms of materials, action sequence cards and videos, maintained strong stability across rounds. One material, specific scenarios for role-play, maintained moderate stability across rounds. Finally one material, scripts, maintained weak stability across rounds. The stability of structured topics for conversation could not be computed because not all experts responded to that item.

Table 7

Materials Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Materials	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
Specific scenarios for role-play as stimuli in a treatment	4.13 (.64)	4.43 (.53)	7 (88%)	7 (100%)	.68 Moderate +
Structured topics for conversation as stimuli in a treatment	4.50 (.53)	4.33 (.82)	8 (100%)	5* (83%)	Could not compute
Scripts as stimuli in a treatment	4.00 (.93)	4.29 (.76)	5 (63%)	6 (86%)	.38 Weak +
Action sequence cards as stimuli in a treatment	4.00 (.76)	4.00 (.82)	6 (75%)	5 (71%)	.91 Strong +
Videos (e.g., television shows, news stories) as stimuli in a treatment	4.25 (.71)	3.86 (.38)	7 (88%)	6 (86%)	.79 Strong +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 6

Question three: What are the task requirements in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Table 8 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for the task requirements. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the importance of three tasks – engage in discourse, have a conversation, verbally elaborate on spoken sentences. A moderate degree of consensus existed on the importance of three tasks – scaffold from structured to less structured (e.g, picture naming to picture description, to narrative re-tell or conversation), re-tell stories, and produce sentence or phrase to picture. A low degree of consensus was obtained for one task – produce a full sentence. Three tasks, have a conversation, verbally elaborate on spoken sentences, and produce sentence or phrase relative to a picture, maintained strong stability across rounds. Moderate stability across rounds was achieved by three tasks – produce a full sentence, engage in discourse, and re-tell stories. Finally one task, scaffold from structured to less structured (e.g, picture naming to picture description, to narrative re-tell or conversation), maintained weak stability across rounds.

Table 8

Tasks Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Tasks	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
A treatment task in which the PWA must engage in discourse	4.38 (.74)	4.28 (.76)	7 (88%)	6 (86%)	.68 Moderate +
A treatment task that that scaffolds from structured to less structured (e.g., from picture naming to picture description to narrative re-tell or conversation)	4.38 (.74)	4.14 (.90)	7 (88%)	5 (71%)	.20 Weak +
A treatment task in which the PWA must have a conversation	4.13 (.64)	4.00 (.69)	7 (88%)	6 (86%)	.87 Strong +
A treatment task in which the PWA must verbally elaborate on spoken sentences	4.00 (.76)	4.00 (.58)	6 (75%)	6 (86%)	.87 Strong +
A treatment task in which the PWA must re-tell stories	4.25 (.71)	4.00 (.82)	7 (88%)	5 (71%)	.64 Moderate +

A treatment task in which the PWA must produce sentence or phrase relative to a picture	4.13 (.64)	4.00 (.82)	7 (88%)	5 (71%)	.77 Strong +
A treatment task in which the PWA must produce a full sentence	3.88 (.83)	3.71 (.76)	5 (63%)	4 (57%)	.68 Moderate +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

Question four: What forms of feedback and interaction between the therapist and patient occur in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Table 9 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for feedback/interaction. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the importance of three forms of feedback/interaction – direct instruction (highly focused tasks that use explicit instruction to focus on small building blocks of production), feedback or interaction that improves metalinguistic awareness (of underlying sentence components), varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues). A low degree of consensus was obtained for two forms of feedback/interaction – specific task related feedback and feedback or interaction that involves building on (elaboration of) the PWA's responses. One form of feedback/interaction, feedback that improves metalinguistic awareness, maintained strong stability across rounds. Moderate stability across rounds was achieved by one other form of feedback/interaction – feedback that builds on the PWA's responses. Finally two forms of feedback/interaction, that which has varying levels or a tapering schedule and that which is direct instruction, maintained weak stability across rounds. The stability of specific task related feedback could not be computed because not all experts responded to that item.

Table 9

Feedback and Interaction Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Feedback / Interaction	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
Feedback or interaction via direct instruction (highly focused tasks that use explicit instruction to focus on small building blocks of production)	4.00 (.53)	4.14 (.69)	7 (88%)	6 (86%)	.28 Weak +
Feedback or interaction that has varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues)	3.88 (.53)	4.14 (.69)	5 (63%)	6 (86%)	.46 Weak +
Specific task related feedback	4.00 (.53)	4.14 (.69)	7 (88%)	4* (67%)	Could not compute
Feedback or interaction that improves metalinguistic awareness (e.g., awareness of underlying sentence components)	3.75 (.46)	3.86 (.38)	6 (75%)	6 (86%)	.81 Strong +

Feedback or interaction that involves building on (elaboration of) the PWA's responses	3.75 (.89)	3.86 (.90)	4 (50%)	4 (57%)	.66 Moderate +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 6

Question five: What is the duration and intensity of treatment in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Table 10 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for duration and intensity. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the importance of all four items related to treatment duration and intensity – five or more hours a week of therapy for many months, treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks), treatments of greater 'dose' (i.e., quantity), and practicing outside of therapy. However, two items related to duration and intensity, treatements of greater 'dose' (i.e., quantity) and practicing outside of therapy, maintained weak stability across rounds. The stability of five or more hours a week of therapy for many months and treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks) could not be computed because not all experts responded to that item.

Table 10

Duration and Intensity of Treatments Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Treatment duration / Intensity	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
Five or more hours a week of therapy for many months	3.86 (.90)	4.50 (.55)	4 (50%)	6* (100%)	Could not compute
Treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks)	4.00 (.53)	4.33 (.52)	7 (88%)	6* (100%)	Could not compute
Treatments of greater 'dose' (i.e., quantity)	4.38 (.52)	4.29 (.49)	8 (100%)	7 (100%)	.38 Weak +
Practicing outside of therapy	3.75 (.46)	3.86 (.38)	6 (75%)	6 (86%)	.38 Weak +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 6

Question six: What are the patient characteristics reported in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Table 11 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for patient characteristics. All items presented achieved an importance level mean of at least 3.70. It should be noted that the experts did not identify what could be considered characteristics of the patient, but instead, responses spoke more to the characteristics of aphasia. A high degree of consensus existed on the importance of three items related to patient (aphasia) characteristics – moderate aphasia, mild aphasia, good word finding abilities. A moderate degree of consensus was achieved for two items related to patient (aphasia) characteristics – good sentence production abilities and conduction aphasia. One item obtained low consensus – good auditory comprehension. Three items (moderate aphasia, good sentence production abilities, and good auditory comprehension) maintained moderate stability across rounds. One item, good word finding abilities, maintained weak stability across rounds. The stability of mild aphasia and conduction aphasia could not be computed because not all experts responded to that item.

Table 11

Patient (aphasia) Characteristics Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Patient (aphasia) characteristics	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
A person with mild aphasia is a	4.71 (.49)	4.43 (.79)	7* (100%)	6 (86%)	Could not compute
A person with moderate aphasia is a	4.00 (.76)	4.14 (.38)	6 (75%)	7 (100%)	.68 Moderate +
Good word finding abilities as exhibited by the person with aphasia	3.88 (.35)	4.00 (.58)	7 (88%)	6 (86%)	.49 Weak +
Good sentence production abilities as exhibited by the person with aphasia	4.00 (.53)	4.00 (.82)	7 (88%)	5 (71%)	.68 Moderate +
A person with Conduction aphasia is a	3.86 (.90)	3.71 (.49)	6* (86%)	5 (71%)	Could not compute
Good auditory comprehension abilities as exhibited by the person with aphasia	3.88 (.64)	3.71 (.76)	6 (75%)	4 (57%)	.54 Moderate +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 7

Question seven: What are other variables that mediate improvements in connected speech in persons with post-stroke chronic aphasia.

Table 12 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for other variables. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the importance of all seven items related to other variables to consider - development of a great degree (critical mass) of linguistic skill in treatment settings, development of nonlinguistic cognitive abilities (e.g., working memory), the importance of considering the skill level of the therapist to meet goals set by the patient, a high amount of specificity with which a therapist addresses goals, commonality between the therapy session and the context in which language is used, and treatment focused on a linguistic technique that the PWA can and will use outside of treatment, and high degree of skill level of a therapist to meet goals set by the patient. Three items, development of a great degree (critical mass) of linguistic skill in treatment settings, development of nonlinguistic cognitive abilities (e.g., working memory), and the importance of considering the skill level of the therapist to meet goals set by the patient, maintained moderate stability across rounds. One item, a high amount of specificity with which a therapist addresses goals, maintained weak stability across rounds. Two items, commonality between the therapy session and the context in which language is used, and treatment focused on a linguistic technique that the PWA can and will use outside of treatment, maintained negative weak stability across rounds. The high degree of skill level of a therapist to meet goals set by the patient could not be computed because not all experts responded to that item.

Table 12

Other Considerations Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Other considerations	Mean (SD)		# experts rate 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
Commonality between the therapy session and context in which language is used	4.13 (.64)	4.57 (.53)	7 (88%)	7 (100%)	-.07 Weak -
Treatment focused on a linguistic technique that the PWA can and will use outside of the treatment setting will	4.00 (.53)	4.29 (.49)	7 (88%)	7 (100%)	-.01 Weak -
A high amount of specificity with which a therapist addresses goals set by the patient	3.86 (.69)	4.17 (.41)	5* (71%)	6** (100%)	.44 Weak +
A high degree of skill level of a therapist to meet goals set by the patient	4.00 (.58)	4.14 (.38)	6* (86%)	7 (100%)	Could not compute
Development of a great degree (critical mass) of linguistic skill in treatment settings	4.14 (.69)	4.00 (.63)	6* (86%)	5** (83%)	.57 Moderate +

How important is it to consider the skill level of a therapist to meet goals set by the patient when determining a PWA's candidacy for treatment designed to improve connected speech?	4.13 (.83)	4.00 (.00)	6 (75%)	7 (100%)	.55 Moderate +
Development of nonlinguistic cognitive abilities (e.g., working memory)	3.88 (.35)	3.86 (.38)	7 (88%)	6 (86%)	.56 Moderate +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 7

** n of 6

Variables that may negatively influence or are unimportant to connected speech

Table 13 presents results according to degree of item importance, level of agreement between experts, and strength of stability across rounds for variables that may negatively influence or are unrelated to connected speech. All items presented achieved an importance level mean of at least 3.70. A high degree of consensus existed on the negative influence of four of the nine items – person with aphasia who is not very motivated, poor auditory comprehension, a person with aphasia and severe apraxia of speech, and a low degree of skill level of a therapist to meet goals set by the patient. A high degree of consensus also existed regarding the relative unimportance of six of nine items – education level, age, occupation, gender, handedness, and language dominance. One item unimportant to connected speech (gender) and one item negatively related to connected speech (person not very motivated) maintained strong stability across rounds. One item negatively related to connected speech (poor auditory comprehension) maintained moderate stability across rounds and one item unimportant to connected speech (language dominance) maintained weak stability across rounds. The stability of six items could not be computed because not all experts responded to those items.

Table 13

Variables that may Negatively Influence or may be Unrelated to Connected Speech Ordered by Importance (mean), Consensus (%), and Stability (r_s) (determined by round three results)

Variables that may negatively influence or are unrelated to connected speech	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
A person with aphasia and severe apraxia of speech is a	2.13 (.83)	2.33 (.82)	7 (88%)	5** (83%)	Unable to compute
A low degree of skill level of a therapist to meet goals set by the patient	1.71 (.76)	2.29 (.49)	7* (100%)	5 (71%)	Unable to compute
Poor auditory comprehension abilities as exhibited by the person with aphasia	2.13 (.35)	2.14 (.38)	7 (88%)	6 (86%)	.56 Moderate +
How important is it to consider language dominance when determining candidacy for treatment designed to improve connected speech (in English)?	1.86 (.90)	2.00 (.63)	5* (71%)	5** (86%)	.21 Weak +
How important is it to consider education level when determining candidacy for treatment designed to improve connected speech?	2.00 (1.15)	1.71 (.49)	5* (71%)	7 (100%)	Unable to compute
A person with aphasia who is not very motivated is a	1.88 (.35)	1.71 (.49)	8 (100%)	7 (100%)	.81 Strong +

How important is it to consider age when determining candidacy for treatment designed to improve connected speech?	1.57 (.53)	1.71 (.49)	7* (100%)	7 (100%)	.79 Strong +
How important is it to consider occupation when determining candidacy for treatment designed to improve connected speech?	1.57 (.53)	1.43 (.53)	7* (100%)	7 (100%)	.45 Weak +
How important is it to consider gender when determining candidacy for treatment designed to improve connected speech?	1.13 (.35)	1.00 (.00)	8/8 (100%)	7/7 (100%)	.81 Strong +
How important is it to consider handedness when determining candidacy for treatment designed to improve connected speech?	1.00 (.00)	1.00 (.00)	8/8 (100%)	6/6 (100%)	.93 Strong +

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 7

** n of 6

Consensus

Finally, consensus among experts, for each question across the two rounds was investigated by using percentages to determine agreement after Round three. All items received a mean importance rating of at least 3.70 or higher or 2.30 or lower, and as such were deemed to have high or low relevance to improvements in connected speech. However, consensus regarding degree of importance of each item varied between experts. Additionally, each expert's ratings between round two and three occasionally varied enough that the stability, measured by r_s, was negatively affected. Tables 14, 15, and 16 present the final 53 "high consensus", "moderate consensus", and "low consensus" items. The final items, i.e., those achieving highest consensus and importance as rated by the expert panel members, are presented in Table 17.

Table 14

Treatment Components and Patient Characteristics that Obtained a High Degree of Consensus (items scoring 80% or greater agreement) Among Experts Regarding Their Relative Importance (determined by round three results)

High consensus items (those items scoring greater than or equal to 80% agreement)	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
Treatment Focus					
A treatment focused on transactions (story telling, functional message giving)	4.13 (.83)	4.43 (.79)	6 (75%)	6 (86%)	.02 Weak +
A treatment focused on narrative/discourse structure	4.25 (.87)	4.14 (.69)	6 (75%)	6 (86%)	.54 Moderate +
A treatment focused on "functional life skills" (e.g., specific script training)	4.25 (.89)	4.14 (.69)	6 (75%)	6 (86%)	.54 Moderate +
A treatment focused on production of complex structures	4.00 (.53)	4.14 (.69)	7 (88%)	6 (86%)	.87 Strong +
A treatment focused on increasing length of utterances (i.e., providing more helpful units even if not a complete sentence)	4.00 (.93)	4.00 (.63)	5 (63%)	5* (83%)	Unable to compute

Materials					
Specific scenarios for role-play as stimuli in a treatment	4.13 (.64)	4.43 (.53)	7 (88%)	7 (100%)	.68 Moderate +
Scripts as stimuli in a treatment	4.00 (.93)	4.29 (.76)	5 (63%)	6 (86%)	.38 Weak +
Videos (e.g., television shows, news stories) as stimuli in a treatment	4.25 (.71)	3.86 (.38)	7 (88%)	6 (86%)	.79 Strong +
Structured topics for conversation as stimuli in a treatment	4.50 (.53)	4.33 (.82)	8 (100%)	5* (83%)	Unable to compute
Treatment task					
A treatment task in which the PWA must engage in discourse	4.38 (.74)	4.28 (.76)	7 (88%)	6 (86%)	.68 Moderate +
A treatment task in which the PWA must have a conversation	4.13 (.64)	4.00 (.69)	7 (88%)	6 (86%)	.87 Strong +
A treatment task in which the PWA must verbally elaborate on spoken sentences	4.00 (.76)	4.00 (.58)	6 (75%)	6 (86%)	.87 Strong +
Feedback / Interaction					
Feedback or interaction via direct instruction (highly focused tasks that use explicit instruction to focus on small building blocks of production)	4.00 (.53)	4.14 (.69)	7 (88%)	6 (86%)	.28 Weak +
Feedback or interaction that improves metalinguistic awareness (e.g., awareness of underlying sentence components)	3.75 (.46)	3.86 (.38)	6 (75%)	6 (86%)	.81 Strong +

Feedback or interaction that has varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues)	3.88 (.53)	4.14 (.69)	5 (63%)	6 (86%)	.46 Weak +
Treatment intensity / duration					
Five or more hours a week of therapy for many months	3.86 (.90)	4.50 (.55)	4 (50%)	6* (100%)	.53 Moderate +
Treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks)	4.00 (.53)	4.33 (.52)	7 (88%)	6* (100%)	.67 Moderate +
Treatments of greater 'dose' (i.e., quantity)	4.38 (.52)	4.29 (.49)	8 (100%)	7* (100%)	.38 Weak +
Practicing outside of therapy	3.75 (.46)	3.86 (.38)	6 (75%)	6 (86%)	.38 Weak +
Patient characteristics					
A person with moderate aphasia is a	4.00 (.76)	4.14 (.38)	6 (75%)	7 (100%)	.68 Moderate +
A person with mild aphasia is a	4.71 (.49)	4.43 (.79)	7 (100%)	6 (86%)	.80 Strong +
Good word finding abilities as exhibited by the person with aphasia	3.88 (.35)	4.00 (.58)	7 (88%)	6 (86%)	.49 Weak +
Other considerations					
Commonality between the therapy session and context in which language is used	4.13 (.64)	4.57 (.53)	7 (88%)	7 (100%)	-.07 Weak -

Treatment focused on a linguistic technique that the PWA can and will use outside of the treatment setting will	4.00 (.53)	4.29 (.49)	7 (88%)	7 (100%)	-.01 Weak -
A high amount of specificity with which a therapist addresses goals set by the patient	3.86 (.69)	4.17 (.41)	5 (71%)	6* (100%)	.44 Weak +
A high degree of skill level of a therapist to meet goals set by the patient	4.00 (.58)	4.14 (.38)	6 (86%)	7 (100%)	.82 Strong +
How important is it to consider the skill level of a therapist to meet goals set by the patient when determining a PWA's candidacy for treatment designed to improve connected speech?	4.13 (.83)	4.00 (.00)	6 (75%)	7 (100%)	.55 Moderate +
Development of nonlinguistic cognitive abilities (e.g., working memory)	3.88 (.35)	3.86 (.38)	7 (88%)	6 (86%)	.56 Moderate +
Development of a great degree (critical mass) of linguistic skill in treatment settings	4.14 (.69)	4.00 (.63)	6 (86%)	5* (83%)	.57 Moderate +
Variables that may negatively influence or are unrelated to connected speech					
How important is it to consider education level when determining candidacy for treatment designed to	2.00 (1.15)	1.71 (.49)	5 (71%)	7 (100%)	Unable to compute

improve connected speech?					
A person with aphasia who is not very motivated is a	1.88 (.35)	1.71 (.49)	8/8 (100%)	7 (100%)	.81 Strong +
How important is it to consider age when determining candidacy for treatment designed to improve connected speech?	1.57 (.53)	1.71 (.49)	7** (100%)	7 (100%)	Unable to compute
How important is it to consider occupation when determining candidacy for treatment designed to improve connected speech?	1.57 (.53)	1.43 (.53)	7** (100%)	7 (100%)	Unable to compute
How important is it to consider gender when determining candidacy for treatment designed to improve connected speech?	1.13 (.35)	1.00 (.00)	8 (100%)	7 (100%)	.81 Strong +
How important is it to consider handedness when determining candidacy for treatment designed to improve connected speech?	1.00 (.00)	1.00 (.00)	8 (100%)	6* (100%)	Unable to compute
Poor auditory comprehension abilities as exhibited by the person with aphasia	2.13 (.35)	2.14 (.38)	7 (88%)	6 (86%)	.56 Moderate +
How important is it to consider language dominance when determining candidacy for treatment designed to improve connected speech (in English)?	1.86 (.90)	2.00 (.63)	5 (71%)	5* (86%)	.21 Weak +

A person with aphasia and severe apraxia of speech is a	2.13 (.83)	2.33 (.82)	7 (88%)	5* (83%)	Unable to compute

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 6

** n of 7

Table 15

Treatment Components and Patient Characteristics that Obtained a Moderate Degree of Consensus (items scoring 65 - 79% or greater agreement) Among Experts Regarding Their Relative Importance (determined by round three results)

Moderate consensus items (those items scoring 65 - 80% agreement)	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 n = 8	Round 3 n = 7	Round 2 n = 8	Round 3 n = 7	
Treatment focus					
A treatment focused on syntax or grammar in sentence structure	3.86 (.35)	4.00 (.82)	7 (88%)	5 (71%)	.68 Moderate +
A treatment focused on word finding difficulty	4.25 (.46)	4.00 (.82)	8 (100%)	5 (71%)	.68 Moderate +
A treatment focused on the linguistic components of sentences in isolation (e.g., verbs, nouns in isolation)	3.75 (.46)	3.86 (.46)	6 (75%)	5 (71%)	.54 Moderate +
Materials / Stimuli					
Action sequence cards as stimuli in a treatment	4.00 (.76)	4.00 (.82)	6 (75%)	5 (71%)	.91 Strong +
Treatment task					
A treatment task that that scaffolds from structured to less structured (e.g., from picture naming to picture description to narrative re-tell or conversation)	4.38 (.74)	4.14 (.90)	7 (88%)	5 (71%)	.20 Weak +

A treatment task in which the PWA must re-tell stories	4.25 (.71)	4.00 (.82)	7 (88%)	5 (71%)	.64 Moderate +
A treatment task in which the PWA must produce sentence or phrase relative to a picture	4.13 (.64)	4.00 (.82)	7 (88%)	5 (71%)	.77 Strong +
Feedback / Interaction					
Specific task related feedback	4.00 (.53)	4.14 (.69)	7 (88%)	4* (67%)	.75 Strong +
Patient characteristics					
Good sentence production abilities as exhibited by the person with aphasia	4.00 (.53)	4.00 (.82)	7 (88%)	5 (71%)	.68 Moderate +
A person with Conduction aphasia is a	3.86 (.90)	3.71 (.49)	6** (86%)	5 (71%)	.43 Weak +
Other considerations	N/A				
Variables that may negatively influence or are unrelated to connected speech					
A low degree of skill level of a therapist to meet goals set by the patient	1.71 (.76)	2.29 (.49)	7** (100%)	5 (71%)	Unable to compute

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

* n of 6

** n of 7

Table 16

Treatment Components and Patient Characteristics that Obtained a Low Degree of Consensus (items scoring less than 65% agreement) Among Experts Regarding Their Relative Importance (determined by round three results)

Low consensus items (those items scoring less than 65% agreement)	Mean (SD)		# experts rate Likert 4/5 or 1/2 (% consensus)		Rating Stability (r_s) (n = 7)
	Round 2 (n = 8)	Round 3 (n = 7)	Round 2 (n = 8)	Round 3 (n = 7)	
Treatment focus					
A treatment focused on complete sentence production (vs word production or truncating spoken output)	3.88 (.83)	3.71 (.76)	5 (63%)	4 (57%)	.68 Moderate +
Materials / Stimuli	N/A				
Treatment task					
A treatment task in which the PWA must produce a full sentence	3.88 (.83)	3.71 (.76)	5 (63%)	4 (57%)	.68 Moderate +
Feedback / Interaction					
Feedback or interaction that involves building on (elaboration of) the PWA's responses	3.75 (.89)	3.86 (.90)	4 (50%)	4 (57%)	.66 Moderate +

Patient characteristics					
Good auditory comprehension abilities as exhibited by the person with aphasia	3.88 (.64)	3.71 (.76)	6 (75%)	4 (57%)	.54 Moderate +
Other considerations	N/A				
Variables that may negatively influence or are unrelated to connected speech	N/A				

Note: Rating stability determined by Spearman rank correlation (r_s) between round two and round three responses.

Table 17

Items achieving highest consensus and importance

Focus	Materials	Task	Feedback	Schedule	Aphasia	Other	Negative impact	Does not impact
Transaction (story-telling, functional message giving)	Specific scenarios for role-play	Engage in discourse	Direct instruction (highly focused tasks with explicit instruction to focus on the building blocks of production)	5 + hours of therapy a week for many months	Moderate aphasia	Commonality between the therapy session and context in which language is used	A person with aphasia who is not very motivated	Education level
Narrative / Discourse structure	Scripts	Have a conversation	Improves metalinguistic awareness (e.g., underlying sentence components)	Sessions occur 2-3 times/week, for 2-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks	Mild aphasia	Treatment focused on a linguistic technique that the PWA can and will use outside of the treatment session	Poor auditory comprehension	Age
"Functional life skills" (specific script training)	Videos	PWA must verbally elaborate on spoken sentences	Has varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues)	Treatment of greater 'dose' (quantity)	Good word finding abilities	A high degree of skill level of therapist to meet goals set by the patient	Person with aphasia and severe apraxia of speech	Occupation
Production of complex structures	Structured topics			Practice outside of therapy		Development of nonlinguistic cognitive abilities (e.g., working		Gender

			memory)	
Increasing length of utterances			Development of a great degree (critical mass) of linguistic skills in treatment settings	Handedness Language dominance

DISCUSSION

The need for generalization of treatment-related improvements in aphasia rehabilitation has been clearly established and researchers have diligently pursued evidence for treatment generalization. Studies have explored generalization of aphasia treatment by focusing on a variety of variables including cueing type (Greenwood, et al., 2010; Herbert, Best, Hickin, Howard, & Osborne, 2003), outcome assessment (Herbert, Hickin, Howard, Osborne, & Best, 2008; Kirmess & Lind, 2011), stimuli (Conroy, et al., 2009; Goral & Kempler, 2009; Marshall, et al., 1997; Raymer, et al., 2007), and treatment type (Antonucci, 2009; Boyle, 2004; Goral & Kempler, 2009; Goral, et al., 2007), however the success of such efforts, and explanation of inconsistent findings, has been less clear.

It was thus the goal of this dissertation to investigate and achieve expert consensus on variables that influence generalization of treatment-related improvements to connected speech. The Delphi study method facilitated acquisition of expert insight to first, identify the relative importance of variables that may influence connected speech, second, investigate agreement among experts regarding these variables, and third, to investigate the stability of the expert agreement across rounds. Through three rounds of participation, national and international experts generated and rated generalization related items in seven treatment-related categories and came to high, moderate, and low degrees of consensus regarding the importance of items. Stability of responses across rounds was inconsistent.

A systematic literature review revealed that relative to the body of literature on other aspects of aphasia recovery, there are very few studies specifically directed toward generalization of treatment-related improvements to connected speech following post-stroke

aphasia. As such, there exist a limited number of experts, as well as limited data, to inform a general discussion of mechanisms that mediate improvements in connected speech. In an attempt to address the need for treatment deconstruction, this conclusion will combine information gathered from the literature review and the Delphi study to propel discussion of patient characteristics and treatment components that mediate improvements in connected speech.

Focus of Therapy in Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

Comparison of the literature and Delphi results regarding the focus of treatments aimed at connected speech revealed two contrasting approaches. The majority of generalization related studies identified in the literature review targeted what would be considered microlinguistic level changes in the connected speech of persons with aphasia e.g., grammar, semantics, word class. In comparison, the Delphi study revealed expert's consensus that treatments designed to improve connected speech should focus on macrolinguistic changes. Treatments directed toward transactions (i.e., exchanging information), functional life skills (e.g., specific scripts), narrative production, complex language production, and increased utterance length were rated most important by experts and achieved the highest expert agreement, however, the stability of expert responses from round two to three was moderate at best. Treatments directed toward linguistic elements (e.g., syntax, word finding, word class), achieved a slightly lesser degree of importance and agreement between experts, and a moderate degree of stability across rounds. So despite the experts achieving relatively strong agreement on the importance of some treatment focuses, their ratings of those items were inconsistent, tending to change by one number on the Likert scale from round two to three.

Materials in Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

Again, there existed an interesting dichotomy between materials used in studies from the literature that investigated improvements in connected speech and materials agreed upon by experts in the Delphi study. Materials reported in the literature often include pictures, written words, and objects, all of which were often paired with a verbally presented word. The experts in the Delphi study achieved high agreement regarding the importance of materials that included specific scenarios, structured topics, and scripts however again, the stability of responses across rounds was relatively moderate. While some experts rated the inclusion of action sequence cards as important, and did so consistently from round two to three, not all the experts rated this type of material as important, and so the degree of consensus for this item was not strong.

Task Requirements in Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

The literature review revealed that in studies for which generalization to connected speech was a stated goal, PWA were required to repeat the therapist's verbal production, produce a sentence to describe a picture, name a picture, point to a verbally requested item, and read sentences orally. Studies that practiced tasks in real-life communication contexts were represented in the literature review, however relative to the frequency of tasks focused on discrete linguistic components, these types of tasks were less common. From the Delphi study, experts strongly agreed on the importance of tasks that reflected real-world language needs e.g., discourse, conversation, and elaboration of spoken sentences. The stability or consistency of the expert responses across rounds was relatively strong.

Feedback and Interaction in Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

The ways in which clinicians inform a PWA about their productions or facilitate production are quite varied. The literature describes methods such as written cues, semantic cues, education about the sentence structure, and elicitation of a production either through wh-questions, repetition (e.g., "say ___"), or guidance. Experts on the Delphi panel indicated that specificity (e.g., task expectations, directions, and behavioral response) was an important element of interaction and feedback. Experts also agreed that clinicians should vary the types of feedback or interaction and also provide education to facilitate understanding of sentence components. However, while the importance of each variable and degree of consensus between experts increased across rounds, the difference between the mean responses of experts across rounds was large enough that the Spearman rank correlation coefficients were relatively weak.

Duration and Intensity of Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

The majority of studies in the literature offered between one and a half to three hours of therapy per week. For the most part, treatment sessions were between 30 and 90 minutes long and continued for between two to three months. The Delphi expert panel however recommended a minimum of four hours of therapy a week for a least a month and a half, as well as practicing outside of therapy. However, while agreement between the experts was very high, the stability of the mean responses across rounds was relatively weak.

Patient (Aphasia) Characteristics Reported in Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

Treatment construction requires consideration of those patient features that make for good treatment fit. While the goal of this review was to gain insight into the myriad of characteristics that may influence a person's ability to make improvements in connected speech (e.g., stroke severity, lesion location, education, etc.), most often, only the aphasia was well characterized. The majority of persons in studies of connected speech are characterized as nonfluent or Broca's aphasia. Fluent aphasias are included in studies with much lower frequency. All severities of aphasia are included with mild-moderate aphasia predominating. All degrees of apraxia severity are studied in the literature on connected speech and, given that apraxia and aphasia are often co-occurring, this might be a necessary challenge.

The Delphi panel agreed only upon Conduction aphasia as a type that responds well to treatments targeting connected speech. Like the literature review findings, experts agreed on the severity of aphasia, recommending that the most appropriate persons for treatments targeting connected speech are those with mild and moderate aphasia. The Delphi panel also achieved consensus on the language and praxis abilities of persons who respond well to treatment of connected speech. Experts stated that presence of good word finding, sentence production, and auditory comprehension mediate improvements in connected speech. The Delphi panel also identified that presence of poor auditory comprehension, severe apraxia of speech, and amotivation deem a person a poor candidate for treatments directed toward improving connected speech. The experts on the Delphi panel agree that persons with aphasia and severe apraxia of speech are not good candidates for treatments directed toward improved connected speech. In the

opinion this study's expert panel, variables unrelated to treatment outcomes include education level, age, occupation, gender, handedness, and language dominance.

Other Variables in Treatments that Mediate Improvements in Connected Speech in Persons with Post-Stroke Chronic Aphasia

Interestingly, both discussion (as opposed to the actual study design) in the literature and the Delphi expert panel offer concordant approaches to generalization but speak to different treatment variables than those already addressed. Themes from the motor learning literature, although somewhat limited, that have made it into language discussion include specificity (in task directions and production), treatment of greater dose (quantity), practice of greater complexity, and feedback regarding performance results. There are some themes that are discussed both in the aphasia literature and by the Delphi expert panel, and that are addressed in study design. Strategies to facilitate generalization include: training stimuli common to the generalization context, specificity of goals, training sufficient exemplars, practicing across a variety of contexts, allowing for variable responses dependent on the context, integrating varying levels of cueing, and developing underlying non-linguistic neural functions (e.g., working memory).

Clinical Implications

There are several clinical implications from this research:

Translation or generalization of treatment-session gains to daily communication needs: Publications in the literature review make a strong case for more critical investigation of how treatment-related improvements translate to real-world function. Even if a patient improves their ability to name objects, or expands the length of their verbal sentences, or increases the number of content information units (CIUs) produced during a narrative, these gains are virtually

irrelevant if demonstrated only on standardized assessment or during the treatment session, without evidence of use in real-world communication contexts. Generalization of treatment-related gains to daily function means the guiding principle of treatment is the same for persons with severe, moderate, or mild aphasia – what do the real-world communication needs of that person look like and how do we ensure that they will be influenced by treatment sessions? Clinically, this means that the language needs of the PWA must be identified and well-defined so that the treatment emulates the final language goals.

Consideration of connected speech: Findings from this study reveal the dearth of literature in which direct investigation of connected speech was a dependent variable. If supported by the patient's language abilities, improvements in connected speech reflect the ideal treatment outcomes. Expressing oneself in verbal strings of at least two words facilitates the effectiveness and efficiency by which we can engage in communication (Kirmess & Lind, 2011). Furthermore, successful communication is accomplished when both parties bear the weight of the language burden and when exchanges move fluidity, without undue pauses. If a person with aphasia is able to meet the needs of natural communication exchanges, and express more information in a shorter period of time, the burden will be lifted from communication partners and they will be more likely to embrace future interactions. By focusing treatments toward daily conversation, clinicians target a skill that can be in high demand and thus of true saliency to the PWA. Additionally, we address a skill that the PWA will have many opportunities to practice in a real-world setting.

Delphi method: Many topics in the speech, language, and hearing sciences have yet to be explored. Some issues are more easily explored than others and challenges related to study design, subject recruitment, concept definition, etc can hinder our field's ability to advance the

understanding of many topics. This study demonstrates that the Delphi method, an expert-panel mediated consensus, can be used to gain insight into this topic, which to the authors knowledge, has yet to be fully explored.

In two ways, this study emphasizes the value of ecologically-valid treatment. First, aphasia rehabilitation must direct efforts toward treatment-related changes that translate to real-world improvement. Second, given the dearth of literature to support the efficacy of aphasia rehabilitation directed at connected speech, use of the Delphi method to go straight to the source (i.e., experts) may overcome some of the logistical challenges that beset aphasia research and help to make key findings more accessible to clinicians and thus more apt to be translated into clinical practice. At the least, these Delphi results can serve as a springboard for development of studies that pursue additional evidence to support the expert opinions.

Treatment deconstruction: This study also revealed that this approach - deconstruction of treatment – can be used to think more critically about how we construct treatments. A focus on outcomes (i.e., does treatment work or not) is important, but conceptualization of treatment by the current Delphi categories allows us to more systematically investigate, and replicate, variables and components of treatments that may influence outcomes.

Treatment construction: The present study reveals that the majority of materials, tasks, interaction/cueing methods, and duration/intensity of treatment presented in the literature as methods for treatments of connected speech may not reflect more current expert thoughts about key elements of treatments for connected speech. Treatment variables detailed in the literature reviewed for this study weigh heavily on what some consider the "building blocks of language" e.g., nouns, verbs, syntax, etc. Goals directed toward improving what could be characterized as microlinguistic aspect of language are often addressed by having the PWA repeat, name, or

complete sentences relative to pictures, written words, or objects. Treatments aimed to improve connected speech from a microlinguistic perspective use materials and tasks constructed from this frame-of-mind and populate a large portion of the literature regarding generalization of treatment-related improvements to connected speech.

However, in about the year 2003, a shift in the literature occurred and investigators not only began to present novel approaches to treatment construction, but they also more consistently achieved successful generalization. While the goals, materials, and treatment tasks of these more recent publications populate a much smaller portion of the connected speech literature, responses from this study's Delphi expert panel reflect this shift. Comparison of the more recent post-shift literature and the Delphi expert opinion reveals a few novel themes that, if considered in treatment construction, may ensure a related effect on connected speech in persons with aphasia.

Complexity, as related to the treatment task or materials, is a familiar concept in the motor literature and is gaining momentum in aphasia research. The "challenge point framework" described in motor learning (Guadagnoli & Lee, 2004), poses that every learner has a point at which the desired learning can occur. Learning can be obstructed if the task is too challenging or not challenging enough relative to the person's skill level.

In the aphasia literature, Thompson et al. (Thompson, Ballard, & Shapiro, 1998; Thompson, et al., 1993; Thompson, 2007; Thompson, et al., 2003) have recognized how complexity can be embraced as a mechanism of change and included in treatment construction. In their studies of improved agrammatism in persons with aphasia, Thompson and Shapiro (2005) had success with Treatment of Underlying Forms, a linguistic approach that focuses on complex sentence structures, to target production and comprehension in persons with

agrammatic aphasia. Treatment-related generalization occurred between production of trained and untrained noncanonical sentences and also to connected speech.

A second common theme across successful generalization studies is one in which the treatment context mirrors the context in which improved language is desired (Brady & Kotkin, 2011; Cherney, et al., 2011; Costello Ingham, 1989; Harvey, et al., 2008; Nadeau, et al., 2008). This concept may suggest a script-like approach such as Cherney's computer-based AphasiaScripts (Cherney, et al., 2011) in which training scripts are constructed from the person's daily communication needs. Similarly, if, in their real-world communication environment, a person is able to express themselves in utterances of greater than two words, then practice in the treatment context should occur at the connected speech, not isolated word level (Antonucci, 2009; Peach & Reuter, 2010; Peach & Wong, 2004).

Relatedly, more recently published studies are making a shift from treatment tasks that emphasize microlinguistic elements of language to treatment tasks that parallel natural communication. Studies that contain tasks in which the PWA must engage in transactions, conversations, and discourse are demonstrating improvements in connected speech. Many of these tasks emphasize the exchange of information between the clinician and the PWA, often using a barrier between the two speakers (Goral, et al., 2007) sometimes paired with constraint to spoken language only (Kirmess & Lind, 2011). Studies are also recognizing the value of integrating into treatment sessions, phrases that are personally-relevant to the PWA (Doyle, et al., 1989; Nadeau, et al., 2008; Thompson, 1989b).

Undeniably, the Delphi study revealed that the panel participants, i.e., investigators who by nature of having studied improvements in connected speech were deemed experts, rated macro-linguistic elements of treatment construction to be most important. They agreed that

treatments must focus on improving the transactional elements, complexity, and length of connected speech, the materials need to be scenarios and scripts that reflect real-world contexts, and the task needs to focus on discourse, narratives, and interactions. However, the experts achieved moderate agreement on the degree of importance on a secondary layer of treatment elements. While experts strongly agreed on the importance of treatments constructed to meet macrolinguistic abilities, they achieved moderate agreement on the importance of including discrete linguistic elements. This second layer of treatment component seemed to suggest that while treatment constructed to address macrolinguistic abilities was necessary for improvements in connected speech, this was not to the exclusion of microlinguistic elements. The building blocks of language (e.g., lexicon, semantics, syntax, morphology) help support our ability to produce longer sentences, describe pictures, re-tell stories, and have conversations. Perhaps they are necessary, but not sufficient components of treatments whose aim is to improve connected speech.

Study Limitations

Historically, investigation of generalization in aphasia rehabilitation has focused on treatment outcomes rather than treatment construction. Although the past decade of aphasia research has produced a shift in how treatment-related generalization is approached, study design to investigate treatment-related generalization is unclear and unstandardized. It should thus be acknowledged that relative to the current Delphi study, there are risks to approaching treatment-related questions in a non-traditional manner. While the Delphi method is used with increasing frequency in the healthcare literature (Berquez, et al., 2011; Cramer, et al., 2008; Keeney, et al., 2006; Keeney, Hasson, & McKenna, 2001; Lemberg, Kirchberger, Stucki, & Cieza, 2010; Morrison & Barratt, 2010; Sharkey & Sharples, 2001; Vernon, 2009), its utilization in

specifically the communication disorders field is somewhat unconventional. Additionally, a study focused on treatment construction is less common than a study focused on treatment outcomes. Consequently, there exists a small pool of literature and no universal methods to inform study design and data interpretation for a research question of this nature. Because there were no studies to which one could refer when faced with the few methodological challenges that surfaced in this investigation, the data acquisition method used in this Delphi study may restrict how confidently we can extract findings to inform clinical practice. Even though a high degree of consensus was achieved for one question related to "treatment goal" ("Treatment goals addressing 'functional skills' e.g., scripts") the fact that this was acquired three months post-completion of round three means that experts did not rate this treatment component in the same frame-of-mind as the other treatment components. Had this question been addressed with the other round three questions, it may not have achieved the same degree of importance or expert consensus as it did during this study's belated acquisition. That being said, despite being rated in a delayed manner, the level of importance and agreement obtained by this treatment goal was in concordance with similar treatment goals that achieved a high level of importance and consensus from the expert panel.

By obtaining input from experts, this study also attempted to address the limited amount of information available to inform a research question of this nature. However, given the small sample size, or number of experts who completed all three rounds of this Delphi study, it would be unwise to suggest that these findings are requirements for treatments directed toward connected speech improvements. With that caution, we can however obtain useful information from this study in that this response rate is acceptable and common for a Delphi method. As stated by Nworie (2011) "Factors that influence the number of Delphi study participants and the

successful use of the methodology rest more on group dynamics than on statistical power" (p. 26).

The results of this study are influenced by the scope of the literature review, the expert panel, and the study design. In light of the limited number of publications identified by the search terms in the literature review, it is possible that the findings from the literature review do not reflect the full status of publications aimed to affect change on connected speech. The search terms "aphasia", "speech", and "generalization" may have limited not only the number of studies identified, but also the full scope of literature. For example, recent studies of constraint-induced aphasia therapy (CIAT) (Pulvermuller, et al., 2001) have achieved noteworthy improvements of what could be characterized as connected speech. However, only two studies reflecting this type of treatment approach were identified in the literature review (Goral, et al., 2007; Kirmess & Lind, 2011). While this may be a result of the limitations placed on the search by the three search terms, this result also reflects inconsistent and nonspecific terminology in the aphasia literature. A post-study review of the CIAT literature revealed that abstracts used terminology such as "speech acts", "clinical tests", "self-ratings", "communicative effectiveness", and "narrative discourse" (Maher, et al., 2006; Pulvermuller, et al., 2001). The terminology used to reflect treatment-related changes in connected speech is extremely inconsistent, making difficult the systematic identification of successful treatment studies. Furthermore, a limited number of publications identified in the literature review then restrict the author pool from which to draw a Delphi expert panel.

Finally, while a sample size of seven for a Delphi study is quite acceptable, the composition of this final study population might have created a biased sample. Of the seven experts who complete all three Delphi rounds, five obtained successful treatment-related

generalization in their studies of connected speech. One expert achieved questionable generalization and the final expert was unsuccessful in acquiring treatment-related generalization to connected speech. This final expert panel might have been vested in completing this study because of their positive success with treatment designed to affect change on connected speech.

Future investigations

Without question, the goal for translation of treatment-related improvements to real-world function is a universal goal in the field of aphasia rehabilitation (Carragher, et al., 2012). However, there is less of a universal approach for how to make that translation happen. While this study has not necessarily identified universal problems with nor solutions for treatments targeting connected speech, a few issues have surfaced that warrant discussion. Further investigation of research methodology, clinical approaches, and definitions may provide better insight into the issues that have prohibited, and therapeutic approaches that may produce, successful generalization.

The limited number of studies that have achieved generalization of treatment-related gains to connected speech may result from a lack of specificity or clarity about the study's outcome goal. There seems to be a methodological pattern in which investigators design treatment tasks in ways that could achieve response generalization (stimuli to stimuli improvement) but then assess stimulus generalization (stimuli to novel context improvement). In other words, investigators design treatment to address improvements at the semantic or lexical (i.e., word) or grammatical (i.e., sentence) level, but include as dependent variables, change in behavior unrelated to the trained behavior. In order to better investigate (and perhaps achieve) generalization, researchers need to better align the independent and dependent variables.

The problem with clarity of expectations applies also to the clinical setting. This Delphi study produced a clear message that treatment task design must be concordant with the behavior or context to which generalization is expected. In traditional therapy, there is a tendency to train at the discrete word or sentence level, but expect related improvements to affect change on other stimuli or materialize in other contexts. At this point, there exists some evidence to support "transfer" of improved production abilities from one stimulus to another stimulus or even context. If the goal is for a person to improve use of a word or sentence in connected speech (i.e., "transfer" a word into connected speech), it is fine to train specific words, but the context to which generalization is desired must be included in the training. However, there exists little to no evidence to support the notion that improvements in a stimulus "translates" to more effective or efficient communication in a notably different stimulus or context. If the goal is to improve a person's ability to expand the quantity or quality of their spoken language, clincians cannot expect that practice at the word level will result in improved connected speech.

Another clinical consideration is that therapist's need to embrace the notion of planning for generalization. Clincians cannot accept that there is a phenomenon in which improved performance of one behavior in the treatment session automatically results in improved performance on another unrelated behavior or in another unrelated context. Instead, clinicians must first clearly define outcome goals and then construct treatments to align with the behavior or context to which generalization is desired. Planning for generalization requires explicit thought into treatment construction. For some goals, improved production of specific content (e.g., words) may matter, so the materials selected may be important (e.g., words, scripts). For other goals, the content or materials may not matter, but the type of communication exchange

does, and emphasis must be placed not on the materials, but rather on appropriate selection of the treatment task.

Taking treatment construction further, this Delphi study elucidates that in the minds of aphasia experts, the linguistic components of a sentence and the ensuing communicative output are not mutually exclusive. Is it not the case that in aphasia therapy we should address either microlinguistic elements or macrolinguistic form. However, if translation to connected speech is the primary goal of treatment, there may be a best practice to treatment construction. Per the expert panel from this Delphi study, improvement in connected speech (i.e., daily communication) is unlikely to result from treatment aimed primarily at linguistic components. In order to affect change on connected speech the clinician and person with aphasia must first clarify the context in which or the intent with which connected speech may be used. Treatment construction continues by embracing the premise that linguistic and language elements vary with relative consistency according to the communication need or context (e.g., discourse, narrative, story-retell, script)

Finally, while behaviors may be consistent within the discipline or across studies, the terminology used to describe these behaviors is not. Inconsistent terminology will not allow for a clear understanding of clinical presentations, treatment, or treatment outcomes. Terms such as "connected speech", "discourse", "narrative", "real-world speech" are often used interchangeably. This becomes a problem especially with research. Even though all of these are considered "connected speech", their production may require different cognitive (including linguistic) skills.

The goal of aphasia rehabilitation is to help the PWA achieve more efficient and effective spoken language. However, currently there is no standard of care for aphasia rehabilitation, and

thus clinicians must make many decisions regarding treatment methods. Recognizing that treatment approaches vary relative to patient abilities and specific goals, clinicians still have the potent opportunity to be pilots, not passengers, in treatments aimed to improved connected speech. Treatment related generalization does not magically materialize and a one-size-fits all treatment approach to connected speech is not going to achieve our generalization goals. Clinicians can and must choose the constructs of treatment with purpose and saliency. Through this Delphi study, a panel of international aphasia rehabilitation experts has in essence, identified and agreed upon a blueprint that can inform treatment construction. The key elements of this blueprint help to move aphasia rehabilitation beyond merely the identification of variables that influence outcomes. Instead, when the tasks, materials, and types of feedback are considered, and treatment is constructed, these key elements can be integrated and manipulated and thus be used as mechanisms of, not just variables in, change.

REFERENCES

Allaire, J. (2005). *Functional generalization of skills in aphasia: a systematic review*. Paper presented at the Clinical aphasiology. Retrieved from http://aphasiology.pitt.edu/archive/00001511/

Antonucci, S. (2009). Use of semantic feature analysis in group aphasia treatment. *Aphasiology, 23*(7-8), 854-866. DOI:10.1080/02687030802634405

Armstrong, E., & Ferguson, A. (2010). Language, meaning, context, and functional communication. *Aphasiology, 24*(4), 480-496. DOI:10.1080/02687030902775157

Armstrong, J. S., & Brodie, R. J. (1999). Forecasting for Marketing. In G. J. Hooley & M. K. Hussey (Eds.), *Quantitative Methods in Marketing* (2nd ed., pp. 92-119). London: International Thompson Business Press.

Baker, J., Lovell, K., & Harris, N. (2006). How expert are the experts? An exploration of the concept of 'expert' within Delphi panel techniques. *Nurse Res, 14*(1), 59-70.

Bandur, D. L., & Shewan, C. M. (2008). Language-Oriented Treatment: A Psycholinguistic Approach to Aphasia. In R. Chapey (Ed.), *Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders* (5th ed., pp. 756-799). Baltimore, MD: Lippincott Williams & Wilkins.

Bastiaanse, R., Hurkmans, J., & Links, P. (2006). The training of verb production in Broca's aphasia: A multiple-baseline across-behaviors study. *Aphasiology, 20*(2-4), 298-311. DOI:10.1080/02687030500474922

Berquez, A. E., Cook, F. M., Millard, S. K., & Jarvis, E. (2011). The stammering information programme: a Delphi study. *J Fluency Disord, 36*(3), 206-221. Retrieved from http://dx.doi.org/10.1016/j.jfludis.2011.02.007

Best, W., Greenwood, A., Grassly, J., & Hickin, J. (2008). Bridging the gap: can impairment-based therapy for anomia have an impact at the psycho-social level? *Int J Lang Commun Disord, 43*(4), 390-407. DOI: 10.1080/13682820701608001

Best, W., Howard, D., Bruce, C., & Gatehouse, C. (1997). Cueing the words: a single case study of treatments for anomia. *Neuropsychol Rehabil, 1997*(7), 105-114.

Boone, R.R., & Zraik, R.I. (1991). Spouse attitudes toward the person with aphasia. *Journal of Speech and Hearing Research, 34,* 123-128.

Bose, A., Square, P., Schlosser, R., & van Lieshout, P. (2001). Effect of PROMPT therapy on speech motor function in a person with aphasia and apraxia of speech. *Aphasiology, 15*(8), 767-785. DOI:10.1080/02687040143000186

Boyle, M. (2004). Semantic Feature Analysis Treatment for Anomia in Two Fluent Aphasia Syndromes. *American Journal of Speech Language Pathology, 13*, 236-249. doi:10.1044/1058-0360(2004/025

Boyle, M. (2011). Discourse treatment for word retrieval impairment in aphasia: The story so far. *Aphasiology, 25*(11), 1308-1326. DOI:10.1080/02687038.2011.596185

Boyle, M., & Coelho, C. A. (1995). Application of Semantic Feature analysis as a treatment for aphasic dysnomia. *American Journal of Speech Language Pathology, 4*(4), 94-98.

Brady, J., & Kotkin, R. (2011). Creating Lasting Behavioral Change through the Generalization Analysis Worksheet. *Contemporary School Psychology, 15*, 131-137.

Brown, B., Cochran, S., Dalkey, N. The Delphi Method, II: Structure of experiments. Santa Monica, CA: Rand; 1969.

Byng, S., & Black, M. (1995). What makes a therapy? Some parameters of therapeutic intervention in aphasia. *International Journal of Language and Communication Disorders, 30*, 303-316. DOI: 10.3109/13682829509021444

Byng, S., Nickels, L., & Black, M. (1994). Replicating therapy for mapping deficits in agrammatism: remapping the deficit? *Aphasiology, 8*(4), 315-341. DOI:10.1080/02687039408248663

Cameron, R., Wambaugh, J. L., Wright, S., & Nessler, C. (2006). Effects of a combined semantic/phonologic cueing treatment on word retrieval in discourse. *Aphasiology, 20*(02-04), 269-285. DOI:10.1080/02687030500473387

Caramazza, A. (1989). Cognitive neuropsychology and rehabilitation: an unfulfilled promise? In X. Seron & G. Deloche (Eds.), *Cognitive Approaches in Neuropsychological Rehabilitation* (pp. 383-398). Hillsdale, NJ: Lawrence Erlbaum Associates.

Carragher, M., Conroy, P., Sage, K., & Wilkinson, R. (2012). Can impairment-focused therapy change the everyday conversations of people with aphasia? A review of the literature and future directions. *Aphasiology, 26*(7), 895-916. DOI:10.1080/02687038.2012.676164

Chapey, R., Duchan, J., Elman, R., Garcia, L. J., Kagan, A., Lyon, J. G., et al. (2008). Life-Participation Approach to Aphasia: A Statement of Values for the Future. In R. Chapey (Ed.), *Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders* (5th ed., pp. 279-289). Baltimore, MD: Lippincott Williams & Wilkins.

Cherney, L. R. (1995). Efficacy of oral reading in the treatment of two patients with chronic Broca's aphasia. *Topics in Stroke Rehabilitation, 2*(1), 57-67.

Cherney, L. R., Halper, A. S., & Kaye, R. C. (2011). Computer-based script training for aphasia: emerging themes from post-treatment interviews. *J Commun Disord, 44*(4), 493-501. http://dx.doi.org/10.1016/j.jcomdis.2011.04.002

Chomsky, N. (1972). *Language and mind*. New York: Harourt, Brace & World.

Clayton, M. J. (1997). Delphi: A technique to harness expert opinion for critical decision-making tasks in education. *Education Psychology, 17*(4), 373-386.

Conroy, P., Sage, K., & Ralph, M. L. (2009). Improved vocabulary production after naming therapy in aphasia: can gains in picture naming generalize to connected speech? *Int J Lang Commun Disord, 44*(6), 1036-1062. DOI: 10.1080/13682820802585975

Costello Ingham, J. (1989). Generalization in the treatment of stuttering. In L. V. McReynolds & J. Spradlin (Eds.), *Generalization Strategies in the Treatment of Communication Disorders*. Burlington, Ontario: B.C. Decker, Inc.

Cramer, C. K., Klasser, G. D., Epstein, J. B., & Sheps, S. B. (2008). The Delphi process in dental research. *J Evid Based Dent Pract, 8*(4), 211-220.

Croteau, C., & LeDorze,G. (2006). Overprotection, "speaking for", and conversational participation: A study of couples with aphasia. *Aphasiology*, *20 (10-04),* 327-336. DOI:10.1080/02687030500475051

Dalkey, N., & Helmer, O. (1963). An Experimental Appication of the Delphi Method to the Use of Experts. *Management Saence, 9*(3), 458. doi: 10.1287/mnsc.9.3.458

Davidson, B., Worrall, L., & Hickson, L. (2003). Identifying the communication activities of older people with aphasia: Evidence from naturalistic observation. *Aphasiology, 17*, 243-264. DOI:10.1080/729255457

Davis, G. A., & Tan, L. L. (1987). Stimulation of sentence production in a case with agrammatism. *J Commun Disord, 20*(6), 447-457. http://dx.doi.org/10.1016/0021-9924(87)90032-3

Doesborgh, S., van de Sandt-Koenderman, M., Dippel, D., van Harskamp, F., Koudstaal, P., Visch-Brink, E., et al. (2004). Cues on request: The efficacy of Multicue, a computer program for wordfinding therapy. *Aphasiology, 18*(3), 213-222. DOI:10.1080/02687030344000580

Doyle, P. J., Goldstein, H., & Bourgeois, M. S. (1987). Experimental analysis of syntax training in Broca's aphasia: a generalization and social validation study. *J Speech Hear Disord, 52*(2), 143-155.

Doyle, P. J., Goldstein, H., Bourgeois, M. S., & Nakles, K. O. (1989). Facilitating generalized requesting behavior in Broca's aphasia: an experimental analysis of a generalization training procedure. *J Appl Behav Anal, 22*(2), 157-170. doi: 10.1901/jaba.1989.22-157

Duffield, C. (1993). The Delphi technique: a comparison of results obtained using two expert panels. *Int J Nurs Stud, 30*(3), 227-237. http://dx.doi.org/10.1016/0020-7489(93)90033-Q

Edmonds, L. A., & Babb, M. (2011). Effect of verb network strengthening treatment in moderate-to-severe aphasia. *Am J Speech Lang Pathol, 20*(2), 131-145. doi:10.1044/1058-0360(2011/10-0036

Edmonds, L. A., Nadeau, S. E., & Kiran, S. (2009). Effect of Verb Network Strengthening Treatment (VNeST) on Lexical Retrieval of Content Words in Sentences in Persons with Aphasia. *Aphasiology, 23*(3), 402-424. DOI:10.1080/02687030802291339

Fisher, R. J., Gaynor, C., Kerr, M., Langhorne, P., Anderson, C. A., Bautz-Holter, E., et al. (2011). A Consensus on Stroke: Early Supported Discharge. *Stroke, 42*, 1392--1397. doi: 10.1161/ STROKEAHA.110.606285

Frey, K., Newman, J., Arciniegas, D. B., Anderson, C. A., & Ramsberger, G. (2011). Assessing neuropsychiatric disturbances associated with post-stroke aphasia. *J Neuropsychiatry Clin Neurosci, 23*(4), E4. 10.1176/appi.neuropsych.23.4.e4

Goral, M., & Kempler, D. (2009). Training verb production in communicative context: Evidence from a person with chronic non-fluent aphasia. *Aphasiology, 24*, 991-1016. DOI:10.1080/02687030802235203

Goral, M., Levy, E. S., & Kastl, R. (2007). Cross-language treatment generalisation: A case of trilingual aphasia. *Aphasiology, 103*(1-2), 203-204. DOI:10.1080/02687030902958308

Gordon, T. J., & Helmer, O. (1964). *Report on a Long-range Forecasting Study*: Rand Corporation.

Greenwood, A., Grassly, J., Hickin, J., & Best, W. (2010). Phonological and orthographic cueing therapy: A case of generalised improvement. *Aphasiology, 24*(9), 991-1016. DOI:10.1080/02687030903168220

Guadagnoli, M. A., & Lee, T. D. (2004). Challenge point: A framework for conceptualizaing the effects of various practice conditions in motor learning. *Journal of Motor Behavior, 36*, 212-224. DOI:10.3200/JMBR.36.2.212-224

Hallowell, B., & Chapey, R. (2008). Introduction to Language Intervention Strategies in Adult Aphasia. In R. Chapey (Ed.), *Language Intervention Strategies in Adult and Related Neurogenic Communication Disorders* (5ht ed., pp. 3-19). Baltimore, MD: Lippincott Williams & Wilkins.

Harvey, J., Murray, L., & Eberle, R. (2008). *Semantic and contextual writing treatments for severe anomia*. Paper presented at the 38th Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00001927/.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *J Adv Nurs, 32*(4), 1008-1015. DOI: 10.1046/j.1365-2648.2000.t01-1-01567.x

Herbert, R., Best, W., Hickin, J., Howard, D., & Osborne, F. (2003). Combining lexical and interactional approaches to therapy for word finding deficits in aphasia. *Aphasiology, 17*, 1163-1186. DOI:10.1080/02687030344000454

Herbert, R., Hickin, J., Howard, D., Osborne, F., & Best, W. (2008). Do picture-naming tests provide a valid assessment of lexical retrieval in conversation in aphasia. *Aphasiology, 22*(2), 184-203. DOI:10.1080/02687030701262613

Holey, E. A., Feeley, J. L., Dixon, J., & Whittaker, V. J. (2007). An exploration of the use of simple statistics to measure consensus and stability in Delphi studies. *BMC Med Res Methodol, 7*, 52. doi:10.1186/1471-2288-7-52

Holloway, I., & Wheeler, S. (1996). *Qualitative Research for Nurses*. Oxford: Blackwell Science.

Holloway, R., Vickrey, B., Benesch, C., Hinchey, J., & Bieber, J. (2001). Development of Performance Measures for Acute Ischemic Stroke. *Stroke, 32*, 2058-2074. doi: 10.1161/hs0901.94620

Hough, M. S. (2010). Melodic Intonation Therapy and aphasia: Another variation on a theme. *Aphasiology, 24*(6-8), 775-786. DOI:10.1080/02687030903501941

Howard, D., Patterson, K., Franklin, S., Orchard-Lisle, V., & Morton, J. (1985). Treatment of word retrieval deficits in aphasia: A comparison of two therapy methods. *Brain 108*, 817-829.

Huang, L. W., Inouye, S. K., Jones, R. N., Fong, T. G., Rudolph, J. L., O'Connor, M. G., et al. (2012). Indentifying indicators of important diagnostic features of delirium. *J Amer Geriatr Soc, 60*(6), 1044-1050.

Huston, P., & Rowan, M. (1998). Qualitative studies. Their role in medical research. *Can Fam Physician, 44*, 2453-2458.

Jacobs, B. J., & Thompson, C. K. (2000). Cross-modal generalization effects of training noncanonical sentence comprehension and production in agrammatic aphasia. *J Speech Lang Hear Res, 43*(1), 5-20.

Jones, J., & Hunter, D. (1995). Qualitative research: consensus methods for medical and health services research. *British Medical Journal, 311*, 376-380. doi: http://dx.doi.org/10.1136/bmj.311.7001.376

Judd, R. C. (1972). Use of Delphi Methods in Higher Education. *Technological Forecasting and Social Change, 4*, 173-186

Kagan, A., Simmons-Mackie, N., Rowland, A., Huijbregts, M., Shumway, E., McEwen, S., et al. (2008). Counting what counts: A framework for capturing real-life outcomes of aphasia intervention. *Aphasiology*, 22(3), 258-280. DOI:10.1080/02687030701282595

Kearns, K.P. (1989). Methodologies for studying generalization. In L. V. McReynolds & J. Spradlin (Eds.), *Generalization Strategies in the Treatment of Communication Disorders* (pp. 13). Burlington, Ontario: B.C. Decker Inc.

Kearns, K., & Salmon, S. J. (1984). An experimental analysis of auxiliary and copula verb generalization in aphasia. *J Speech Hear Disord, 49*, 152-163.

Keeney, S., Hasson, F., & McKenna, H. (2006). Consulting the oracle: ten lessons from using the Delphi technique in nursing research. *J Adv Nurs, 53*(2), 205-212. DOI: 10.1111/j.1365-2648.2006.03716.x

Keeney, S., Hasson, F., & McKenna, H. P. (2001). A critical review of the Delphi technique as a research methodology for nursing. *Int J Nurs Stud, 38*(2), 195-200. PII: S0020-7489(00)00044-4

Kendall, D. L., Rodriguez, A. D., Rosenbek, J. C., Conway, T., & Gonzalez Rothi, L. J. (2006). Influence of intensive phonomotor rehabilitation on apraxia of speech. *J Rehabil Res Dev, 43*(3), 409-418. PII: S0020-7489(00)00044-4

Kim, M. (2005). *Argument structure enhanced verb haming treatment: two case studies*. Paper presented at the 35th Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00001567/.

Kirmess, M., & Lind, M. (2011). Spoken language production as outcome measurement following constraint induced language therapy. *Aphasiology, 25*(10), 1207-1238. DOI:10.1080/02687038.2011.589986

Lemberg, I., Kirchberger, I., Stucki, G., & Cieza, A. (2010). The ICF Core Set for stroke from the perspective of physicians: a worldwide validation study using the Delphi technique. *Eur J Phys Rehabil Med, 46*(3), 377-388.

Li, E. C., Volpe, A. D., Ritterman, S., & Williams, S. E. (1996). Variations in grammatic complexity across three types of discourse. *Journal of Speech-Language Pathology and Audiology, 30*, 180-186.

Links, P., Hurkmans, J., & Bastiaanse, R. (2010). Training verb and sentence production in agrammatic Broca's aphasia. *Aphasiology, 24*(11), 1303-1325. DOI:10.1080/02687030903437666

Linstone, H., & Turoff, M. (1975). *The Delphi method: techniques and applications*: Addison-Wesley Advanced Book Program.

Linstone, H., & Turoff, M. (2002). *The Delphi Method: Techniques and Application*.

Loughlin, K. G., & Moore, L. F. (1979). Using Delphi to achieve congruent objectives and activities in a pediatrics department. *J Med Educ, 54*(2), 101-106.

Ludwig, T. D., & Geller, E. S. (1997). Assigned versus participative goal setting and response generalization: managing injury control among professional pizza deliverers. *J Appl Psychol, 82*(2), 253-261.

Maas, E., Robin, D., Austermann Hula, S. N., Freedman, S., Wulf, G., Ballard, K., et al. (2008). Principles of motor learning in treatment of motor speech disorders. *American Journal of Speech Language Pathology, 17*, 277-298. doi:10.1044/1058-0360(2008/025

Maher, L., Kendall, D., Swearengin, J. A., Rodriguez, A., Leon, S., Pingel, K., et al. (2006). A pilot study of use-dependent learning in the context of Constraint Induced Language Therapy. *Journal of the International Neuropsychological Society, 12*, 843-852. DOI: http://dx.doi.org/10.1017/S1355617706061029

Marshall, J., Chiat, S., & Pring, T. (1997). An impairment in processing verbs' thematic roles: A therapy study. *Aphasiology, 11*(9), 855-876. DOI:10.1080/02687039708250461

Marshall, S., Bayley, M., McCullagh, S., Velikonja, D., & Berrigan, L. (2012). Clinical practice guidelines for mild traumatic brain injury and persistent symptoms. *Can Fam Physician, 58*(March), 257-267.

Martino, J. P. (1972). *Technological forecasting for decision-making*. New York, NY: Elsevier.

McKenna, H., Bradley, M., & Keeney, S. (2000). *Primary Care Nursing: A Study Exploring Key Issues for Future Developments*. Ulster.

McKenna, H. P. (1994). The essential elements of a practitioners' nursing model: a survey of psychiatric nurse managers. *J Adv Nurs, 19*(5), 870-877. DOI: 10.1111/j.1365-2648.1994.tb01163.x

McNeil, M. R., Doyle, P. J., Spencer, K. A., Goda, A. J., Flores, D., & Small, S. L. (1997). A double-blind, placebo-controlled study of pharmacological and behavioural treatment of lexical-semantic deficits in aphasia. *Aphasiology, 11*(4-5), 385-400. DOI:10.1080/02687039708248479

McReynolds, L. V. (1989). Generalization issues in the treatment of communiation disorders. In L. V. McReynolds & J. Spradlin (Eds.), *Generalization Strategies in the Treatment of Communication Disorders*. Burlington, Ontario: B.C. Decker, Inc.

Morrison, A. P., & Barratt, S. (2010). What are the components of CBT for psychosis? A Delphi study. *Schizophrenia Bulletin, 36*(1), 136-142. doi: 10.1093/schbul/sbp118

Munoz, M., & Karow, C. (2007). *A comparison of treatment outcomes following whole-task and part-task methods for training scripts*. Paper presented at the 37th Clinical Aphasiology conference. Retrieved from http://aphasiology.pitt.edu/archive/00001887/

Munoz, M., & Powers, H. (2006). *A comparison of treatment outcomes following whole-task and part-task methods for training scripts*. Paper presented at the 36th Clinical Aphasiology conference. Retrieved from http://aphasiology.pitt.edu/archive/00001709/.

Murphy, J. (2006). Perceptions of communication between people with communication disability and general practice staff. *Health Experience*, 9, 49-59. DOI: 10.1111/j.1369-7625.2006.00366.x

Murray, J. V. (1968). *The development and test of a concept and methodology for long-range forecasting.* University of Colorado.

Murray, L., & Karcher, L. (2000). A treatment for written verb retrieval and sentence construction skills. *Aphasiology, 14*(5-6), 585-602. DOI:10.1080/026870300401333

Murray, L., Timberlake, A., & Eberle, R. (2007). Treatment of Underlying Forms in a discourse context. *Aphasiology, 21*(2), 139-163. DOI:10.1080/02687030601026530

Nadeau, S. E., Gonzalez Rothi, L. J., & Rosenbeck, J. (2008). Language Rehabilitation from a Neural Perspective. In R. Chapey (Ed.), *Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders* (5yh ed., pp. 689-734). Baltimore, MD: Lippincott Williams & Wilkins.

Nessler, C., Pinkowski, J., & Wambaugh, J. L. (2005). *Linguistic specific treatment of wh- and NP movement structures: a systematic peplication*. Paper presented at the 35th Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00001575/

Nickels, L. (2002). Therapy for naming disorders: Revisiting, revising and reviewing. *Aphasiology, 16*, 935-980. DOI:10.1080/02687030244000563

Nickels, L., & Best, W. (1996). Therapy for naming deficits (part II): Specifics, surprises and suggestions. *Aphasiology, 10*, 109-136.

Nworie, J. (2011). Using the Delphi Technique in Educational Technology Research. *TechTrends, 55*(5), 24 - 30.

Papathanasiou, I., Mesolora, A., Mihou, E., & Papachristou, G. (2006). *Elaborated Semantic Feature Analysis Treatment: Lexicality and Generaliation effects in a case with anomic aphasia*. Paper presented at the 36th Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00002180/

Peach, R. K., & Reuter, K. A. (2010). A discourse-based approach to semantic feature analysis for the treatment of aphasic word retrieval failures. *Aphasiology, 24*(9), 971-990.

Peach, R. K., & Wong, P. C. M. (2004). Integrating the message level into treatment for agrammatism using story retelling. *Aphasiology, 18*(5-7), 429-441. DOI:10.1080/02687030903058629

Prins, R., & Bastiaanse, R. (2004). Analysing the spontaneous speech of aphasic speakers. *Aphasiology, 18*(12), 1075-1091.

Pulvermuller, F., Neininger, B., Elbert, T., Mohr, B., Rockstroh, B., Koebbel, P., et al. (2001). Constraint-induced therapy of chronic aphasia after stroke. *Stroke, 32*(7), 1621-1626. doi: 10.1161/ 01.STR.32.7.1621

Ramsberger, G., & Marie, B. (2007). Self-administered cued naming therapy: A single-participant investigation of a computer-based therapy program replicated in four cases. *American Journal of Speech Language Pathology, 16*, 343--358. doi:10.1044/1058-0360(2007/038

Raymer, A. M., Ciampitti, M., Holliway, B., Singletary, F., Blonder, L. X., Ketterson, T., et al. (2007). Semantic-phonologic treatment for noun and verb retrieval impairments in aphasia. *Neuropsychol Rehabil, 17*(2), 244-270. DOI:10.1080/09602010600814661

Rider, J. D., Wright, H. H., Marshall, R. C., & Page, J. L. (2008). Using semantic feature analysis to improve contextual discourse in adults with aphasia. *Am J Speech Lang Pathol, 17*(2), 161-172. doi:10.1044/1058-0360(2008/016

Rochon, E., Laird, L., Bose, A., & Scofield, J. (2005). Mapping therapy for sentence production impairments in nonfluent aphasia. *Neuropsychol Rehabil, 15*(1), 1-36.

Seron, X., Deloche, G., Bastard, V., Chassin, G., Hermand, N. (1979). Word-finding difficulty and learning transfer in aphasic patients. *Cortex, 15*, 149-155.

Sharkey, S. B., & Sharples, A. Y. (2001). An approach to consensus building using the Delphi technique: developing a learning resource in mental health. *Nurse Educ Today, 21*(5), 398-408.

Shewan, C. M. (1976). Facilitating sentence formulation: a case study. *J Commun Disord, 9*(3), 191-197. http://dx.doi.org/10.1016/0021-9924(76)90010-1,

Shewan, C. M. (1988). Expressive language recovery in sphasia using the Shewan Spontaneous Language Analysis (SSLA) system. *J Commun Disord, 21*, 155-169. http://dx.doi.org/10.1016/0021-9924(88)90003-2

Siguroardottir, Z., & Blondahl Sighvatsson, M. (2006). Operant conditioning and errorless learning procedures in the treatment of chronic aphasia. *International Journal of Psychology, 41*(6), 527-540.

Simmons-Mackie, N., Threats, T. T., & Kagan, A. (2005). Outcome assessment in aphasia: a survey. *J Commun Disord, 38*(1), 1-27. http://dx.doi.org/10.1016/j.jcomdis.2004.03.007,

Smart, K. M., Curley, A., Blake, C., Staines, A., & Doody, C. (2010). The reliability of clinical judgments and criteria associated with mechanisms-based classifications of pain in patients with low back pain disorders: a preliminary reliability study. *J Man Manip Ther, 18*(2), 102-110.

Stadie, N., Schroder, A., Postler, J., Lorenz, A., Swoboda-Moll, M., Burchert, F., et al. (2008). Unambiguous generalization effects after treatment of non-canonical sentence production in German agrammatism. *Brain and Language, 104*(3), 211-229. http://dx.doi.org/10.1016/j.bandl.2007.08.006

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10*, 349-367.

Sullivan, M. P., & Brookshire, R. (1989). *Can Generalization Differentiate Whether Learning or Facilitation of a Process Occurred?* Paper presented at the 18th Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00000077/

Sweigert, R., & Schabacker, W. H. (1974). *The Delphi technique: how well does it work in setting educational goals?* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago.

Swinburn, K., & Byng, S. (2006). The Communication Disability Profile. London: Connect.

Thompson, C. (1988). *Generalization research in aphasia: a review of the literature.* Paper presented at the Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00000075/

Thompson, C. (1989a). Generalization in the treatment of aphasia. In L. V. McReynolds & J. Spradlin (Eds.), *Generalization Strategies in the Treatment of Communication Disorders* (pp. 82-115). Burlington, Ontario: B.C. Decker Inc.

Thompson, C. (1989b). Generalization Research in Aphasia: A Review of the Literature. *Clinical Aphasiology, 18*, 195-222.

Thompson, C., Ballard, K., & Shapiro, L. P. (1998). The role of syntactic complexity in training wh-movement structures in agrammatic aphasia: Optimal order for promoting generalization. *Journal of the International Neuropsychological Society, 4(6)*, 661-674. DOI: http://dx.doi.org/

Thompson, C., & Shapiro, L. P. (2005). Treating agrammatic aphasia within a linguistic framework: Treatment of Underlying Forms. *Aphasiology, 19*(10-11), 1021-1036. DOI:10.1080/02687030544000227

Thompson, C., Shapiro, L. P., Ballard, K., Jacobs, B. J., Schneider, S., & Tait, M. (1997). Training and Generalized Production of wh- and NP-Movement Structures in Agrammatic Aphasia. *Journal of Speech Language Hearing Research, 40*, 228-244.

Thompson, C., Shapiro, L. P., & Roberts, M. (1993). Treatment of sentence production deficits in aphasia: a linguistic-specific approach to wh-interrogative training and generalization. *Aphasiology, 7*(1), 111-133. DOI:10.1080/02687039308249501

Thompson, C. K. (2007). Complexity in language learning and treatment. *Am J Speech Lang Pathol, 16*(1), 3-5. doi:10.1044/1058-0360(2007/002

Thompson, C. K., & Kearns, K. P. (1981). *An experimental analysis of acquisition, generalization and maintenance in a patient with anomia.* Paper presented at the Clinical Aphasiology Conference, Minneapolis, MN. Retrieved from http://aphasiology.pitt.edu/archive/00000675/

Thompson, C. K., & McReynolds, L. V. (1986). Wh interrogative production in agrammatic aphasia: an experimental analysis of auditory-visual stimulation and direct-production treatment. *J Speech Hear Res, 29*(2), 193-206.

Thompson, C. K., Shapiro, L. P., Kiran, S., & Sobecks, J. (2003). The role of syntactic complexity in treatment of sentence deficits in agrammatic aphasia: the complexity account of treatment efficacy (CATE). *J Speech Lang Hear Res, 46*(3), 591-607. doi:10.1044/1092-4388(2003/047

van de Sandt-Koenderman, M., Bonta, E., Wielaert, S. M., & Visch-Brink, E. (1997). Stimulating sentence production in agrammatic patients: The effect of the Visual Cue Programme on spontaneous speech. *Aphasiology, 11*(8), 735-759. DOI:10.1080/02687039708250454

Vernon, W. (2009). The Delphi technique: A review. *International Journal of Therapy & Rehabilitation, 16*(2), 69-76.

Vitali, P., Tetttamanti, M., Abutalebi, J., Ansaldo, A. I., Perani, D., Cappa, S. F., et al. (2010). Generalization of the effects of phonological training for anomia using structural equation modelling: A multiple single-case study. *Neurocase, 16*(2), 93-105. DOI:10.1080/13554790903329117

Wambaugh, J., Nesser, C., & Wright, S. (2012). *Response Elaboration Training: Application to Procedural Discourse and Personal Recounts*. Paper presented at the Clinical Aphasiology Conference. Retrieved from http://aphasiology.pitt.edu/archive/00002364/01/202-498-1-RV_(Wambaugh_Nesser_Wright).pdf

Wambaugh, J. L., & Ferguson, M. (2007). Application of semantic feature analysis to retrieval of action names in aphasia. *J Rehabil Res Dev, 44*(3), 381-394. DOI: 10.1682/JRRD.2006.05.0038

Wambaugh, J. L., & Martinez, A. (2000). Effects of modified response elaboration training with apraxic and aphasic speakers. *Aphasiology, 14*, 603-617. DOI:10.1080/026870300401342

Webster, J., Morris, J., & Franklin, S. (2005). Effects of therapy targeted at verb retrieval and the realisation of the predicate argument structure: A case study. *Aphasiology, 19*(8), 748-764. DOI:10.1080/02687030500166957

Weinrich, M., Shelton, J.R., Cox, D.M., McCall, D. (1997). Remediating production of tense morphology improves verb retrieval in chronic aphasia. *Brain and Language*, *58*(1), 23-45. http://dx.doi.org/10.1006/brln.1997.1757

Weinrich, M., Boser, K., & McCall, D. (1999). Representation of Linguistic Rules in the Brain: Evidence from Training an Aphasic Patient to Produce Past Tense Verb Morphology. *Brain and Language, 70*, 144-158. http://dx.doi.org/10.1006/brln.1999.2141

Wepman, J. (1972). Aphasia therapy: A new look. *Journal of Speech and Hearing Disorders, 37*, 203-214.

Whitney, J. L., & Goldstein, H. (1989). Using self-monitoring to reduce disfluencies in speakers with mild aphasia. *J Speech Hear Disord, 54*(4), 576-586.

Whitworth, A. (2010). Using narrative as a bridge: linking language processing models with real-life communication. *Semin Speech Lang, 31*(1), 64-75. DOI: 10.1055/s-0029-1244954

Wilkinson, L., Wambaugh, J. L., & Nessler, C. (2011). *Application of Melodic Intonation Therapy Using Linguistic principles: Acquisition and Generalization Effects*. Paper presented at the 41st Clinical Aphasiology conference Retrieved from http://aphasiology.pitt.edu/archive/00002287/

Ylvisaker, M., & Szekeres, S. (1985). *Cognitive-language intervention with brain-injured adolescents and adults.* Paper presented at the Illinois Speech-Language-Hearing Association annual convention.

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

Appendix A

Round 1 Questions

Glossary

Terms referenced throughout this study are defined as follows:

- *Connected speech:* Verbal combinations of two or more words in any form e.g., phrase, sentence, semi-spontaneous expression (e.g., picture description, story re-tell, role-play) or spontaneous expression (e.g., conversations, interviews). May be measured in many ways e.g., linguistic success, communicative abilities, or articulatory fluency.

- *Generalization:* The transfer of treatment-related improvements from trained to untrained stimuli (e.g., novel words, linguistic elements of sentence, sentence construct) or from the treatment setting to a novel setting.

- *Focus of therapy:* The aspect of language processing being targeted by treatment tasks e.g., understanding the relationship between the subject and object in a sentence or expanding semantic-lexical mapping.

- *Materials:* The types of items or structures used in therapy e.g., types of sentences used, written/spoken stimuli, pictures/objects, etc.

- *Task requirements:* What the patient has to do (or not) to understand the task, complete the task, or evaluate his responses during the task e.g., circle the verb in a sentence, underline a requested constituent of a sentence, write the object name and then say it aloud, etc.

- *Feedback and interactions between therapist and patient:* How the therapist responds to a patient's production struggle or success, e.g., phonemic cue, verbal reinforcement, whole sentence verbal model, no response, etc.

- *Duration and intensity of treatment:* Treatment task, session, or schedule is how long, how frequent, completed in what period of time, etc.
- *Patient characteristics*: Descriptions of patients (if reported) including number of subjects, gender, age, aphasia type, aphasia severity, time post onset

Please respond to these questions in text:

1) What is the **stated focus of therapy** in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

2) What **materials** are employed in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

3) What are **the task requirements** in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

4) What **forms of feedback and interaction between the therapist and patient** occur in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

5) What is the **duration and intensity of treatment** in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

6) What are the **patient characteristics** reported in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

7) Please list any other categories or patient/treatment characteristics you deem relevant to treatment-related improvements in connected speech in persons with chronic post-stroke aphasia.

Appendix B

Round one letter of invitation

Dear aphasia expert,

I am writing to request your participation on an expert panel for a dissertation project conducted by Kimberly L. Frey, a doctoral student under the advisement of Gail Ramsberger, ScD., CCC, Board Certified – ANCDS in Cognitive Science and Speech-Language and Hearing Sciences at the University of Colorado. This study is acquiring expert insight regarding patient characteristics and components of treatment that influence improvement on connected speech in persons with chronic aphasia. You were identified as an expert on this topic from a systematic literature review. Using the search terms "aphasia", "generalization or generalisation" and "speech", this literature review identified you as a primary author on a treatment study in which improvement in connected speech was discussed.

This study is being conducted using a systematic consensus building approach (a Delphi process) and will be completed in approximately three rounds of questions. It is anticipated that each round of questions will take about 20 minutes of your time and will be completed over a couple of weeks.

The University of Colorado requires your agreement to participate in this exempt project. Your agreement will be considered proxy for consent. If you agree to participate, then please continue to the survey. If you do not agree to participate, please exit out now.

Your responses will remain anonymous and confidential. Data obtained from this Delphi study will be used to complete my dissertation and may be published or presented at conferences. All data will be presented and shared in aggregate form.

Participation in this Delphi project is completely voluntary; you may withdraw at any time by exiting out of the survey or notifying the Primary Investigator, Kim Frey at Kimberlylynnefrey@yahoo.com. If you decline participation or decide to withdraw later, you will not lose any benefits or rights to which you are entitled as a study participant. The study PI will be able to use any data acquired from you up to the point of your withdrawal from the study.

Thank you for your time and valuable expertise should you agree to participate.

Sincerely,
Kim Frey, PhD-ABD, CCC
The University of Colorado

Appendix C

Expert responses to seven round one questions

1) What is the **stated focus of therapy** in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Page 2, Q1. What is the stated focus of therapy in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?		
1	activating semantic networks	Dec 12, 2012 12:50 PM
2	These are very varied. Primary focus is often verbs and/or sentence structure in which changes in connected speech may be expected. There are also a series of studies investgatign narrative/discourse structure.	Dec 3, 2012 12:30 AM
3	In general, increase in content words or length of utterance.	Dec 1, 2012 7:36 AM
4	varies: 1. linguistic (impairment) components of sentences (e.g. verbs in isolation, verbs in syntactic structures, sentence shapers, 2. cognitive/message /thinking for speaking 3. transactional : story telling/functioanal message giving 4. conversation: working with partner to allow perosn with aphasia more space/time/resources to speak 5. using AAC devices	Nov 30, 2012 12:34 PM
5	While all clinical treatment aims to improve connected speech, not all research studies do - some aim to improve a basic impairment and/or compare two treatments in the effectiveness of this, and may aim to examine as a secondary aim whether connected speech is also improved. Assuming the aim is to improve connected speech - rather than (as I had assumed in my earlier response) to determine whether a treatment generalises into spontaneous speech, then most probably these will be studies with an explicit output focus - so sentence production, verb or noun retrieval, but also more 'functional' types of treatment such as script training.	Nov 28, 2012 8:31 PM
6	improved language production, including decreasing word finding difficulty, producing verbs, producing grammatically correct sentences, improved communication, improved quality of life.	Nov 18, 2012 5:07 PM
7	sentence production or comprehenson (e.g., mapping)	Nov 14, 2012 7:22 PM
8	This varies across a range of studies. They have had either a lexical focus (e.g. Conroy studies, Best studies) or basic syntax (e.g. REST studies - Ruiter et al., mapping, Sentence Shaper studies) or more complex structures (CATE, Thompson et al.). Event perception studies have also examined connected speech outcomes (Marshall et al.).	Nov 9, 2012 3:54 AM
9	Various aspects of speech and language use and understanding	Nov 8, 2012 9:11 AM
10	Connected speech	Nov 7, 2012 11:03 AM
11	Restoration of function	Nov 5, 2012 6:18 AM

Identified items – Stated focus of therapy

Verbs (e.g., verbs in isolation, verbs in syntactic structures).

Linguistic components of sentences in isolation (e.g., verbs, nouns)

Linguistic impairment in isolation – lexical focus (tx focus on word level e.g., verbs)

Sentence structure

Syntactic focus

Mapping

Structure of or comprehension of structures of sentence

Syntax or grammar

Narrative / discourse structure

Increased content words (specific words)

Cognitive / thinking for speaking

Transactional (story-telling, functional message giving)

Partner education

Using AAC devices

All clinical treatment studies aim to improve connected speech

Sentence production

Functional (“script training”)

Improved language production

Decrease word finding difficulty

Improved communication

Improved quality of life

Producing grammatically correct sentences

Sentence comprehension (mapping)

Sentence production

Lexical focus

Basic syntax focus (mapping, sentence shaper)

Produce Complex structures

Speech and language use and understanding

Connected speech

Restoration of function

2) What materials are employed in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Page 3, Q1. What materials are employed in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?		
1	pictures of real life situations	Dec 12, 2012 12:51 PM
2	Again these are varied. The materials often involve a combination of verbal, written and picture stimuli. Stimuli vary as to whether critical variables are controlled for.	Dec 3, 2012 12:31 AM
3	Depends on the study.	Dec 1, 2012 7:36 AM
4	pictures/photos objects videos paper for writing and drawing computer software	Nov 30, 2012 12:36 PM
5	In this and subsequent questions I have responded with my (non-evidence based) intuition as to what clinicians would believe was important in getting effects on connected speech. - Materials can vary immensely but most often involving pictures to some extent - photographs of the individual's real life and/or news stories; can involve video retell, structured TV viewing, but may also involve role play .	Nov 28, 2012 8:33 PM
6	mostly picture stimuli, some topics for conversation, some video clips, written words, scripts	Nov 18, 2012 5:10 PM
7	pictures, written word, combination of these	Nov 14, 2012 7:23 PM
8	I collect narratives prior to and following experimental treatments -- i.e., telling the Cinderella story after viewing a wordless picture book of the story. Narratives are analyzed using a linguistic coding system developed in my lab.	Nov 9, 2012 8:59 AM
9	picture stimuli (objects, actions), action sequence cards, underlining/colour coding of thematic roles, software e.g. sentactics, sentence shaper.	Nov 9, 2012 3:55 AM
10	Pictures, words, real physical stimuli, drawings, scripts.	Nov 8, 2012 9:14 AM
11	Personal Narratives, Picture Discriptions, Procedural Discriptions, Stories, & Scripts.	Nov 7, 2012 11:05 AM
12	Variety of stimuli	Nov 5, 2012 6:18 AM

Identified items - Materials

Combination of verbal, written, picture stimuli

Photos

Pictures of objects

Pictures of actions

Objects

Videos

Paper for writing and drawing

Computer software

Photos of individual's real life

Photos of news stories

Video / TV stories

Role play

Topics for conversation

Written words

Scripts

Action sequence cards

Markers for underlining/color coding thematic roles

Real physical stimuli

Personal stories to re-tell

3) What are the task requirements in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Page 4, Q3. What are the task requirements in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?		
1	produce sentence/phrase relative to picture	Dec 12, 2012 12:52 PM
2	Again varied. Tasks involve comprehension and/or naming and/or verbal repetition.	Dec 3, 2012 12:33 AM
3	Depends on the study.	Dec 1, 2012 7:37 AM
4	for someone with aphasia to complete the tasks, they will need to : think of the message they want to convey think of the words needed (meaning and sounds/lettters etc.), decide whether these fit the message they want (semantics); decide how to structure it with what they have;decide what else they need/can use if they cannot access it all in spoken output (total communication stuff);hold it all together conceptually while they bring it out sequentially	Nov 30, 2012 12:42 PM
5	Usually will use some kind of output task - most probably supported by cueing and/or repetition/reading ; most probably involve scaffolding from structured to less structured/more 'real life' tasks (eg. picture naming/description, to narrative retell/conversation)	Nov 28, 2012 8:34 PM
6	repetition; producing picture description, responses to questions;read; have a conversation	Nov 18, 2012 5:12 PM
7	repeating modeled response, producing a sentence, naming or pointing to a picture	Nov 14, 2012 7:24 PM
8	See item 2	Nov 9, 2012 8:59 AM
9	Often metalinguistics, e.g. identifying predicate, agent, patient, theme etc. in basic or complex sentences. Movement of certain items in Linguistic specific treatment work. Comprehension in mapping work, before production. Identification and use of core verbs in event perception work.	Nov 9, 2012 3:57 AM
10	Imitate therapist, name stimuli, make sentences, recognize stimuli given a text that has been read, real life conversations, read, answer questions, demonstrate understanding of a task, write words or sentences, fill in missing words of sentences, manual signing, do homework, do grammar tasks, use computer to work on tasks, answer questions,	Nov 8, 2012 9:21 AM
11	Elaboration, Story Retell, Discourse, Recount Procedure	Nov 7, 2012 11:07 AM
12	Vaires, but relatively few studies actually sample speech in natural environments	Nov 5, 2012 6:19 AM

Identified items – Task requirements

Comprehension

Naming

Verbal repetition

Patient must think of the message they want to convey

Patient must think of the words needed (meaning and sounds and letters)

Patient must decide whether these fit the message they want (semantics)

Patient must decide how to structure it with what they have / decide what else they need if cannot access spoken output

Patient must hold it all together conceptually while they bring it out sequentially

Some kind of output task with reading

Task scaffolds from structured to less structured / more 'real-life' tasks (picture naming / description to narrative re-tell/conversation)

Producing picture description

Respond to questions

Read

Have a conversation

Repeat modeled response

Produce a sentence

Pointing to a picture

Metalinguistics – identify predicate, agent, patient, theme in basic or complex sentences

Movement of certain items in linguistic specific treatment work

Comprehension in mapping work before production

Identification and use of core verbs in event perception work

Imitate therapist

Make sentences

Recognize stimuli given a text that has been read

Write words or sentences

Fill in missing words of sentences

Manual signing

Do homework

Do grammar tasks

Use computer to work on tasks

Answer questions

Elaboration task

Story re-tell

Discourse

Recount procedure

4) What forms of feedback and interaction between the therapist and patient occur in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Page 5, Q1. What forms of feedback and interaction between the therapist and patient occur in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?		
1	cueing hierarchies both written and verbal	Dec 12, 2012 12:53 PM
2	Some tasks involve feedback which is said to improve metalinguistic awareness. Many studies do not state feedback. Need to think about the aims of feedback not just the type of feedback given.	Dec 3, 2012 12:34 AM
3	Errorless vs error permitted approaches. Performance and results based feedback. Varying levels of feedback/tapering feedback schedule.	Dec 1, 2012 7:39 AM
4	in structured impairment type tasks: feedback: positive reinforcement when correct, shaping when incorrect via cueing of varying types, providing the frame, asking repetition, providign sentecne for them to read etc. Interaction for these tasks: therapist decides the structures, patient does these. for functional tasks feedback: feedback from partner about what they have received of message (e.g. PACE): indirect positive and negative reinforcement of what they did. observation of others and how they do and how successful conversation feedback: video playing to show chnage before and after interctions for these: stil ltherapist directed but can be agreed more collaboratively	Nov 30, 2012 12:49 PM
5	Generally interactive with feedback on accuracy, and most probably involving building on the clients response.	Nov 28, 2012 8:34 PM
6	modeling of response, eliciting with wh- question, written cues, explaining underlying constituents (e.g., mapping therapy)	Nov 14, 2012 7:26 PM
7	Feedback is not provided as the production patterns in narratives serve as a dependent variable in these studies.	Nov 9, 2012 9:00 AM
8	Fairly standard types of interaction - explanation of the task using concrete examples, demonstration, feedback, encouragement, explanation as to why errors and errors, cueing, withdrawing cues, recapping, clarifying etc.	Nov 9, 2012 3:58 AM
9	Models, asks wh questions, provides cues to enable answering, provides information, confirms correct answers, corrects wrong answers, prompts, elaborates on sentences, completes sentences, provides performance feedback, provides scripts, answers questions, ignores errors, role plays, reads aloud, fades stimuli or prompts in or out, monitors performance, provideees guidance and recommendations	Nov 8, 2012 9:30 AM
10	Cueing, Response Elaboration, Open ended questions, General Feedback, Specific Task related feedback	Nov 7, 2012 11:14 AM
11	Direct instruction, modeling, cueing	Nov 5, 2012 6:19 AM

Identified items – Feedback and interaction

Feedback which is said to improve metalinguistic awareness

Need to think about the aims of feedback not just the type of feedback given.

Errorless vs error permitted approaches.

Performance and results based feedback.

Varying levels of feedback/tapering feedback schedule.

Positive reinforcement when correct

Shaping when incorrect via cueing of varying types

Providing the frame

Asking repetition

Providign sentecne for them to read etc.

Therapist decides the structures, patient does these.

Feedback from partner about what they have received of message (e.g. PACE):

Indirect positive and negative reinforcement of what they did.

Observation of others and how they do and how successful conversation feedback:

Video playing to show chnage before and after interctions for these

Generally interactive with feedback on accuracy

Involving building on the clients response.

Modeling of response

Eiciting with wh- question

Written cues

Explaining underlying constituents (e.g., mapping therapy)

Explanation of task using concrete examples

Demonstration

Encouragement

Explanation as to why errors

Cueing

Withdrawing cues

Recapping

Clarifying

Asks wh-questions

Provides cues to enable answers

Provides information

Confirms correct answers

Corrects wrong answers

Prompts

Elaborates on sentences (response elaboration)

Completes sentences

Provides performance feedback

Provides scripts

Answers questions

Ignores errors

Role plays

Reads aloud

Fades stimuli or prompts in or out

Monitors performance

Providees guidance and recommendations

Open ended questions

General Feedback

Specific Task related feedback

Direct instruction

5) What is the duration and intensity of treatment in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Page 6, Q1. What is the duration and intensity of treatment in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?		
1	3 hours per week over 6 wks	Dec 12, 2012 12:54 PM
2	Very varied. Very difficult to draw consensus.	Dec 3, 2012 12:36 AM
3	Depends on the study.	Dec 1, 2012 7:39 AM
4	varies rather too much for any sensible idea of how to recommend clinically. also unclear effect of working alone on computer (with softeware) or homework sheets, practice Some studies provide amount linked to the clincial realisms of their country.	Nov 30, 2012 12:52 PM
5	It is likely that treatments of greater 'dose' will be more effective, but not necessarily greater intensity (but there may be a minimum intensity required)	Nov 28, 2012 8:35 PM
6	varies from 30 mins to 3 hours	Nov 14, 2012 7:26 PM
7	2-3 times per week for 2 hour sessions, up to 20 sessions	Nov 9, 2012 9:00 AM
8	Usually greater in US than UK studies. Often daily probes etc. in us studies. UK studies more closely reflect standard NHS care, i.e. low intensity and brief, e.g. 8 or 10 or 12 sessions biweekly or weekly.	Nov 9, 2012 3:59 AM
9	From 30 minutes to several hours, three or more in every session; 1-8 hours per week, for 2-28 weeks.	Nov 8, 2012 9:34 AM
10	The duration varies generally across studies from 10 to 20 treatment sessions for each condition.	Nov 7, 2012 11:14 AM
11	Vaires from a few sessions to years. In general, studies are overly optimistic about the effects of a few hours/wk of treatment	Nov 5, 2012 6:20 AM

Identified items – Duration and intensity

Varied

Difficult to draw consensus

Varies rather too much for any sensible idea of how to recommend clinically

Unclear of effect of working alone on computer (with software) or homework sheets or practice

Some studies amount linked to clinical realisms of their country

It is likely that treatments of greater 'dose' will be more effective, but not necessarily greater intensity (but there may be a minimum intensity required)

Varies from 30 mins to 3 hours

2-3 times per week for 2 hour sessions, up to 20 sessions

Low intensity and brief, e.g. 8 or 10 or 12 sessions biweekly or weekly

From 30 mínutes to several hours, three or more in every session; 1-8 hours per week, for 2-28 weeks.

The duration varies generally across studies from 10 to 20 treatment sessions for each condition.

Varies from a few sessions to years. In general, studies are overly optimistic about the effects of a few hours/wk of treatment

6) What are the patient characteristics reported in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?

Page 7, Q1. What are the patient characteristics reported in studies that investigate treatment-related effect on connected speech in persons with post-stroke chronic aphasia?		
1	severity and type of aphasia, age, gender, TPO	Dec 12, 2012 12:55 PM
2	Varied but primarily non-fluent Broca's aphasia. Would fit with patients who have verb and/ore sentence diffiuclties	Dec 3, 2012 12:37 AM
3	Depends on the study.	Dec 1, 2012 7:40 AM
4	tendency to be Broca's type though a few wernicke's type patients and a few conduction. this taxonomy not used much in uk but same profile of patients in their studies nonetheless (good comprehenders, telegrammatic speech) but will describe them differently: e.g. mapoping difficulties, event perception problems etc. functional and conversation studies always seem to have partners who care about the perosn with aphasia. Those with no partners (relatives) not included.	Nov 30, 2012 12:56 PM
5	This will depend - so an individual given word retrieval therapy is likely to only show generalisation into connected speech if they do not also have sentence processing deficits for example, an individual given mapping therapy needs to have intact lexical retrieval. All individuals will need to have skills in "thinking for speaking" (cognitive planning of spontaneous utterances)	Nov 28, 2012 8:36 PM
6	mean age just under 60, more men than women, all kinds of aphasias	Nov 14, 2012 7:28 PM
7	I have only studied aphasic individuals with nonfluent, agrammatic aphasia.	Nov 9, 2012 9:01 AM
8	Usually chronic stroke, often very motivated - willing able to engage in research projects. Often other disabilities, cognitive and physical.	Nov 9, 2012 3:59 AM
9	Mean age 57.19, age range 25-89, more men than women, mostly Broca's aphasia, different types of it, with mild to moderate to severa aphasia, some with apraxia too, time post-onset over 5 years, range 2-395 months.	Nov 8, 2012 9:39 AM
10	Participants typically are 6 mpo of a single language dominant hemisphere stroke, with normal hearing, normal speech prior to stroke, normal intelligence, no other neurological disease, native speakers of English (unless bilingual study), and between the ages of 19 and 80.	Nov 7, 2012 11:14 AM
11	Vaires between studies	Nov 5, 2012 6:21 AM

Identified items – Patient characteristics

Varied but primarily non-fluent Broca's aphasia.

Agrammatic aphasia

Would fit with patients who have verb and/or sentence difficulties

A few Wernickes

A few Conduction

Good comprehenders

Telegrammatic speech

Functional and conversation studies always seem to have partners who care about the

person with aphasia

If given word retrieval therapy needs to have functional sentence processing (e.g., individual given mapping therapy needs to have intact lexical retrieval

All individuals need to have skills in “thinking for speaking” (cognitive planning of spontaneous utterances)

Mean age just under 60

More men than woman

All kinds of aphasias

Chronic stroke

Very motivated

Willing to engage in research projects

Often concomitant disabilities e.g., cognitive and physical

Mean age 57

Age range 25-89

Mild to moderate to severe aphasia

Some with apraxia

Time post onset usually greater than 5 years

Range of TPO 2-395 months

Typically 6 months post

Single language dominant hemisphere stroke

Normal hearing

Normal speech prior to stroke

Normal intelligence

No other neurological disease

Native speaker of English

Between ages of 19-80

7) Please list any other categories or patient/treatment characteristics you deem relevant to treatment-related improvements in connected speech in persons with chronic post-stroke aphasia.

Page 8, Q1. Please list any other categories or patient/treatment characteristics you deem relevant to treatment-related improvements in connected speech in persons with chronic post-stroke aphasia.		
1	education level, handedness, occupation	Dec 12, 2012 12:56 PM
2	Need to consider lexical changes in peoples' connected speech following lexical based treatment for nouns and verbs.	Dec 3, 2012 12:38 AM
3	The treatment must engage a domain of knowledge that is characterized by regularities, which can be leveraged by the treatment, e.g., phonological sequence knowledge, semantic knowledge, sentence-level sequence knowledge (syntactic knowledge). Development of a linguistic technique that provides the basis for continued growth of language capacity after completion of therapy, e.g., establishment of phonological sequence knowledge and lead to long-term vocabulary growth in aphasic adults in analogy to the process of language acquisition in infants. Development of a linguistic technique in therapy that patients can and will use on their own outside of therapy to continue the treatment process. Development of a nonlinguistic brain resources, e.g., working memory, that may aid language function. Development of a critical mass of linguistic capacity such that the patient will be able to speak well enough outside of therapy to continue the therapeutic process. Enhancement of commonality between the learning experience (in speech therapy sessions) and circumstances at the time of recall (a mechanism of the spacing effect: see Glenberg AM. Component-levels theory of the effects of spacing of repetitions on recall and recognition. Memory and Cognition. 1979;7:95-112; Glenberg AM, Lehmann TS. Spacing repetitions over 1 week. Memory and Cognition. 1980;8:528-38. Alteration in the perception of the subject and his or her family regarding his or her role in the family unit, with the adoption of a new/revised role that subsumes more expectation of speech, more pressure to speak, and greater language production.	Dec 1, 2012 7:53 AM
4	not sure what this question is after: if it is to find out what i think are hte mechanisms of chnage which i have seen working? combination of age, severity, site of lesion, intensity of treatment, skill and specificity of therapist to meet goals set by patient, persistence of treatment and appropriate intensity according to time post onset and the needs of the patient.	Nov 30, 2012 12:59 PM
5	Participants must meet inclusionary and exclusionary criterion, including poor production and comprehension of noncanonical (versus canonical) sentences, poor production of verbs (versus nouns), only mild motor speech deficits, etc.	Nov 9, 2012 9:03 AM
6	Usually less severe to moderate in linguistic skill and often confidence as narrative or connected speech sampling methods can be challenging e.g story retell.	Nov 9, 2012 4:00 AM
7	Early rehabilitation, no less than 5 hours per week for many months	Nov 8, 2012 9:40 AM
8	Family Training.	Nov 7, 2012 11:15 AM
9	Coexisting cognitive deficits	Nov 5, 2012 6:21 AM

Identified items – Other considerations

Need to consider lexical changes in peoples' connected speech following lexical based treatment for nouns and verbs.

The treatment must engage a domain of knowledge that is characterized by regularities, which can be leveraged by the treatment, e.g., phonological sequence knowledge, semantic knowledge, sentence-level sequence knowledge (syntactic knowledge).

Development of a linguistic technique that provides the basis for continued growth of language capacity after completion of therapy, e.g., establishment of phonological sequence knowledge and lead to long-term vocabulary growth in aphasic adults in analogy to the process of language acquisition in infants.

Development of a linguistic technique in therapy that patients can and will use on their own outside of therapy to continue the treatment process.

Development of a nonlinguistic brain resources, e.g., working memory, that may aid language function.

Development of a critical mass of linguistic capacity such that the patient will be able to speak well enough outside of therapy to continue the therapeutic process.

Enhancement of commonality between the learning experience (in speech therapy sessions) and circumstances at the time of recall (a mechanism of the spacing effect: see Glenberg AM. Component-levels theory of the effects of spacing of repetitions on recall and recognition. Memory and Cognition. 1979;7:95-112; Glenberg AM, Lehmann TS.

Spacing repetitions over 1 week. Memory and Cognition. 1980;8:528-38.

Alteration in the perception of the subject and his or her family regarding his or her role in the family unit, with the adoption of a new/revised role that subsumes more expectation of speech, more pressure to speak, and greater language production.

Combination of age, severity, site of lesion

Intensity of treatment

Skill and specificity of therapist to meet goals set by patient

Persistence of treatment and appropriate intensity according to time post onset and the needs of the patient.

Participants must meet inclusionary and exclusionary criterion, including poor production and comprehension of noncanonical (versus canonical) sentences, poor production of verbs (versus nouns), only mild motor speech deficits, etc.

Less severe to moderate in linguistic skill

Early rehabilitation, no less than 5 hours per week for many months

Family Training

Coexisting cognitive deficits

Appendix D

Round two questionnaire

Thank you for participating in the expert panel for this study "Patient characteristics and treatment components that mediate improvements in connected speech in persons with chronic post-stroke aphasia: A Delphi study involving a communication disorders expert panel".

Round One of questions is complete and the responses from national and international experts have been compiled and built into questions with Likert-style responses for a Round Two. While notably large in number, the 175 questions that follow here in Round Two are constructed from the expert insight and will inform you of the variables your national and international colleagues deem relevant to improvements in connected speech. I greatly appreciate the 20-25 minutes of time you offer to complete these questions and inform this study. You will be able to re-enter the survey should you be unable to complete the questions in one sitting.

In these questions you will rate the degree to which each factor relates to connected speech. For example:

"This [variable]…"					
Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Or

"This [quality] makes a person a …"					
Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

or

"How important is [variable] when determining candidacy for treatment designed to improve connected speech?"				
Unimportant	Of little importance	Moderately important	Important	Very important

Thank you for providing your expertise as you respond to the following questions and your continued participation in this study.

Most sincerely,

Kim Frey, PhD-ABD, CCC-SLP

Listed below are the expert responses regarding the *focus of therapy* in treatments designed to improve connected speech (i.e., focus of therapy being the aspect of language processing being targeted by treatment tasks). Please rate how focusing treatment on the given goal will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) A treatment focused on the linguistic components of sentences in isolation (e.g., verbs, nouns in isolation)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) A treatment focused on syntax or grammar in sentence structure

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

3) A treatment focused on narrative/discourse structure

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

4) A treatment focused on production of complex structures

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) A treatment focused on increasing the length of utterances (i.e., providing more helpful units even if not complete sentence)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) A treatment focused on thinking for speaking (i.e., the underlying pre-verbal message and the actors and actions that comprise it)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) A treatment focused on transactions (story telling, functional message giving)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) A treatment focused on educating communication partners on increasing expectations and pressure for speech and language use by the PWA

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) A treatment focused on using AAC devices

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

10) A treatment focused on complete sentence production (vs word production or truncating spoken output)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

11) A treatment focused on "functional" skills (e.g., specific script training)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

12) A treatment focused on improved quality of life

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

13) A treatment focused on decreasing word-finding difficulty

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

14) A treatment focused on improved communication

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

15) A treatment focused on activating semantic networks

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the *materials* in treatments designed to improve connected speech. Please rate how the given material will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) The combination of verbal, written, and picture stimuli in treatment

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) Markers for underlining and color-coding thematic roles as materials in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

3) Pictures of objects as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

4) Pictures of actions as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

5) Videos (e.g., television shows, news stories) as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

6) Paper for writing and drawing as materials in a treatment

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) Real objects as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

8) Computer software as stimuli in a treatment

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) Photos of the individual's real life as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

10) Action sequence cards as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

11) Specific scenarios for role-play as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

12) Structured topics for conversation as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

13) Written words as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

14) Scripts as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

15) Photos of news stories as stimuli in a treatment

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the *tasks* in treatments designed to improve connected speech. Please rate how the given task will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) A treatment task in which the PWA must comprehend aspects of stimuli

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) A treatment task in which the PWA must name stimuli

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

3) A treatment task in which the PWA must verbally repeat a modeled verbal production

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

4) A treatment task in which the PWA must effortfully think of the MESSAGE they want to convey

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) A treatment task in which the PWA must re-tell stories

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) A treatment task that that scaffolds from structured to less structured (e.g., from picture naming to picture description to narrative re-tell or conversation)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) A treatment task in which the PWA must effortfully think of the WORDS needed (i.e., meaning and sound and letters) to convey a message

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) A treatment task in which the PWA must verbally respond to verbally presented questions

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) A treatment task in which the PWA must do oral reading

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

10) A treatment task in which the PWA must have a conversation

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

11) A treatment task in which the PWA must produce a sentence or phrase relative to a picture

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

12) A treatment task in which the PWA must produce a full sentence

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

13) A treatment task in which the PWA must point to a picture

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

14) A treatment task in which the PWA must maintain the concept mentally while stating it sequentially

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

15) A treatment task in which the PWA must identify sentence components (e.g., predicate, agent, patient, theme) in basic or complex sentences

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

16) A treatment task in which the PWA must imitate the therapist

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

17) A treatment task in which the PWA must write words or sentences

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

18) A treatment task in which the PWA must manually sign

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

19) A treatment task in which the PWA must do homework

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

20) A treatment task in which the PWA must decide how else to communicate if they cannot access spoken output

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

21) A treatment task in which the PWA must move certain items in linguistic specific treatment (focus on verbs, thematic role- assignment, wh- questions requiring noun phrase movement)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

22) A treatment task in which the PWA must fill in missing words of the sentence

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

23) A treatment task in which the PWA must read a text and then point to the related picture

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

24) A treatment task in which the PWA must engage in discourse

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

25) A treatment task in which the PWA must use the computer

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

26) A treatment task in which the PWA must verbally elaborate on spoken sentences

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

27) A treatment task in which the PWA must identify the main actors and their roles and the associated verb in pictures before speaking (i.e., thinking for speaking)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the *feedback or interactions between the therapist and PWA (i.e., how the therapist responds to a PWA's production struggle or success)* in treatments designed to improve connected speech. Please rate how the given feedback or interaction will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) Feedback or interaction that improves metalinguistic awareness (e.g., awareness of underlying sentence components)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) Feedback or interaction via direct instruction (highly focused tasks that use explicit instruction to focus on small building blocks of production)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

3) Feedback or interaction that ensures errorless production by the PWA

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

4) Feedback or interaction that provides feedback on performance and results

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) Feedback or interaction that facilitates the PWA's repetition of their own verbal productions

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) Feedback or interaction in which the aims of feedback, not just the type of feedback, are identified

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) Feedback or interaction that has varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) Feedback or interaction that provides positive reinforcement when the production is correct (confirms correct answers)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) Feedback or interaction that provides a frame (i.e., model) for the production

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

10) Feedback or interaction that permits (i.e., ignores) errors made by the PWA

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

11) Feedback or interaction that SHAPES incorrect responses by cueing of various types

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

12) Feedback or interaction that provides *indirect* positive or negative reinforcement of what the PWA did

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

13) Feedback or interaction that allows observation of others and how they complete a task

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

14) Feedback or interaction that uses video to show changes before and after therapy

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

15) Feedback or interaction that involves building on (elaboration of) the PWA's responses

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

16) Feedback or interaction that facilitates responses by asking wh- questions

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

17) Feedback or interaction via written cues

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

18) Feedback or interaction in the form of concrete examples to explain the task

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

19) Feedback or interaction involving encouragement

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

20) Feedback or interaction to explain why errors were produced

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

21) Feedback or interaction using general feedback (vs specific feedback)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

22) Feedback or interaction that recaps tasks and methods in the session

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

23) Feedback or interaction using prompts to enable answers

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

24) Feedback or interaction in which the therapist completes the PWA's sentences

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

25) Specific task related feedback

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

26) Feedback or interaction via guidance and recommendations

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the *duration and intensity* of treatments designed to improve connected speech. Please rate how the duration or intensity will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) Working alone on a computer

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) Doing homework sheets

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

3) Practicing outside of therapy

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

4) Treatments of greater 'dose' (i.e., quantity)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) Treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) Several (e.g., 8, 10, or 12 sessions) brief sessions over a week or two-weeks

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) Treatment sessions of 8 or less hours per week

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) Treatment of greater (vs lower) intensity (intensity meaning the ratio of treatment hours to treatment days – i.e., greater intensity means more therapy in a shorter period of time)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) Five or more hours a week of therapy for many months

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the *characteristics of patients* involved in treatments designed to improve connected speech. Please rate how the patient characteristic will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) How important is verb confrontation naming ability when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

2) How important is consideration of stroke severity when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

3) How important is consideration of gender when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

4) How important is noun naming ability when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

5) How important is word-finding ability when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

6) How important is sentence production ability when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

7) How important is consideration of time-post-aphasia onset when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

8) How important is consideration of language dominance when determining candidacy for treatment designed to improve connected speech (in English)?

Unimportant	Of little importance	Moderately important	Important	Very important

9) How important is consideration of occupation when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

10) How important is production/comprehension of noncanonical sentences when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

11) How important is consideration of age when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

12) How important is auditory comprehension ability when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

13) How important is consideration of aphasia type when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

14) How important is family/caregiver involvement when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

15) How important is consideration of handedness when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

16) How important is it to consider the presence of apraxia of speech when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

17) How important is hearing ability when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

18) How important is aphasia severity when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

19) How important is education level when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

20) A person with aphasia who is 60 years or older is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

21) A person with good ability for "thinking for speaking" (i.e., planning the pre-verbal message usually as related to sentence assembly or grammar) is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

22) A person with aphasia who also has mild apraxia of speech is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

23) A person with mild aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

24) A person with less than twelve years of education is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

25) Good auditory comprehension abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

26) A person with aphasia who has concomitant physical disabilities is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

27) Good noun confrontation naming abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

28) A person who has had multiple or bilateral strokes is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

29) A person with aphasia and severe apraxia of speech is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

30) A person with aphasia who is under 60 years of age is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

31) A person with Wernicke's aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

32) Good comprehension and production of noncanonical sentences as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

33) A person with aphasia who does not have family/caregiver involvement is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

34)Poor word finding abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

35) A person with poor ability for "thinking for speaking" (i.e., planning the pre-verbal message usually as related to sentence assembly or grammar) is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

36) A person who has chronic aphasia (one year or greater post-aphasia onset) is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

37) A person with aphasia who also has moderate apraxia of speech is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

38) A person with Conduction aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

39) Good verb confrontation naming abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

40) A person who is left-hand dominant is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

41) A person with aphasia who is very motivated is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

42) A person with aphasia who is male is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

43) Good sentence production abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

44) A person with aphasia who has a mild hearing loss is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

45) Poor auditory comprehension abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

46) A person with severe aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

47) Poor verb confrontation naming abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

48) A person with aphasia who is not very motivated is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

49) Poor comprehension and production of noncanonical sentences as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

50) A person with agrammatic aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

51) A person with aphasia who has a severe hearing loss is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

52) A person who has acute aphasia (onset to six months post-aphasia onset) is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

53) A person who is right-hand dominant is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

54) Poor sentence production abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

55) A person with aphasia who has normal hearing is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

56) A person with aphasia who has a moderate hearing loss is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

57) A person with greater than or equal to twelve years of education is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

58) A person with aphasia for whom English is a second language is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

59) A person who has subacute aphasia (six months to one year post-aphasia onset) is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

60) Good word finding abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

61) A person with moderate aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

62) A person with non-fluent Broca's aphasia is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

63) A person with aphasia who is female is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

64) A person with aphasia who has family/caregiver involvement is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

65) Poor noun confrontation naming abilities as exhibited by the person with aphasia

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

66) A person with aphasia for whom English is a first language is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

67) A person who has had a single language dominant hemisphere stroke (vs multiple or bilateral strokes) is a

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding *other considerations* in treatments designed to improve connected speech. Please rate how these other considerations will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

1) How important is it to consider the skill level of a therapist to meet goals set by the patient when determining a PWA's candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

2) How important is lesion location when determining candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

3) How important is it to consider the specificity with which a therapist addresses goals set by the patient when determining a PWA's candidacy for treatment designed to improve connected speech?

Unimportant	Of little importance	Moderately important	Important	Very important

4) Treatment focused on a linguistic technique that the PWA can and will use outside of the treatment setting will

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) A high degree of skill level of a therapist to meet goals set by the patient

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) A low amount of specificity with which a therapist addresses goals set by the patient

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) Development of nonlinguistic cognitive abilities (e.g., working memory)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) Treatments that engage and leverage domains of knowledge characterized by regularities (e.g., phonological sequence knowledge, semantic knowledge, sentence-level sequence knowledge [syntax])

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) Commonality between the therapy session and context in which language is used

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

10) The impact of a more medial-posterior lesion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

11) Use of a linguistic technique that provides the basis for continued language growth after treatment completion (e.g., phonological sequence knowledge leading to enhanced vocabulary growth)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

12) A high amount of specificity with which a therapist addresses goals set by the patient

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

13) Development of a great degree (critical mass) of linguistic skill in treatment settings

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

14) A short amount of space (time) between the treatment session and time-of-recall (i.e., spacing effect)

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

15) A low degree of skill level of a therapist to meet goals set by the patient

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

16) The impact of a more medial-anterior lesion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

If a question needs revision, provide the question number and your revision here:

If you have additional considerations, provide them here:

Appendix E – Round 2 Letter of invitation

Dear [expert name],

Thank you for your participation in the expert panel for this study "Patient characteristics and treatment components that mediate improvements in connected speech in persons with chronic post-stroke aphasia: A Delphi study involving a communication disorders expert panel", being conducted by Kim Frey, PhD-ABD, CCC-SLP at the University of Colorado under the advisement of Gail Ramsberger, ScD, CCC-SLP, Board Certified-ANCD.

This goal of this study is, through a series of questions, to obtain expert consensus regarding the characteristics of patients and the aspects of treatment that may influence improvements in connected speech. In other words, if a clinician wanted to improve a patient's connect speech, what patient characteristics and treatment components needs to be considered and included in order to construct that treatment?

Round One of questions is complete and the responses from national and international experts regarding factors that mediate improvements in connected speech have been compiled and now built into questions with Likert-style responses for a Round Two. The content of these questions will inform you of the variables your national and international colleagues deem relevant to improve connected speech.

The expertise you shared in Round One helped to shape these next series of questions. I would greatly appreciate your continued participation in this study.

If you are willing to provide your insight for this Round Two, click here to enter the survey: [SurveyMonkey link].

This second survey will be open until _____. However, if all panelists have responded before then, the survey will close and we will move on to the next round.

Should you have any questions, please contact the Primary Investigator at Kim.Frey@UCDenver.edu. If you continue or decline to continue with this study, you will not lose any rights to which you are entitled as a study participant.

Sincerely,

Kim Frey, PhD-ABD, CCC-SLP
The University of Colorado

Appendix F

Round three 1uestionnaire (including round two means)

Listed below are the expert responses regarding the focus of therapy (i.e., focus of therapy being the aspect of language processing being targeted by treatment tasks) in treatments designed to improve connected speech. Please rate how focusing treatment on a given goal will related to changes in connected speech in persons with chronic post-stroke aphasia

1) A treatment focused on the linguistic components of sentences in isolation (e.g., verbs, nouns in isolation)

Expert panel mean: 3.75

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) A treatment focused on syntax or grammar in sentence structure

Expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

3) A treatment focused on narrative/discourse structure

Expert panel mean: 4.25

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

4) A treatment focused on production of complex structures

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) A treatment focused on increasing the length of utterances (i.e., providing more helpful units even if not complete sentence)

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) A treatment focused on transactions (story telling, functional message giving)

Expert panel mean: 4.13

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) A treatment focused on complete sentence production (vs word production or truncating spoken output)

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) A treatment focused on decreasing word-finding difficulty

Expert panel mean: 4.25

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the materials in treatments designed to improve connected speech. Please rate how the given material will related to changes in connected speech in persons with chronic post-stroke aphasia

9) Markers for underlining and color-coding thematic roles as materials in a treatment
Expert panel mean: 3.75

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

10) Pictures of actions as stimuli in a treatment
Expert panel mean: 3.88

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

11) Videos (e.g., television shows, news stories) as stimuli in a treatment

Expert panel mean: 4.25

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

12) Paper for writing and drawing as materials in a treatment

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

13) Photos of the individual's real life as stimuli in a treatment

Expert panel mean: 3.88

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

14) Action sequence cards as stimuli in a treatment

Expert panel mean: 4.00

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

15) Specific scenarios for role-play as stimuli in a treatment

Expert panel mean: 4.13

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

16) Structured topics for conversation as stimuli in a treatment

Expert panel mean: 4.50

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

17) Scripts as stimuli in a treatment

Expert panel mean: 4.00

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the tasks in treatments designed to improve connected speech. Please rate how the given task will related to changes in connected speech in persons with chronic post-stroke aphasia

18) A treatment task in which the PWA must name stimuli
Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

19) A treatment task in which the PWA must verbally repeat a modeled verbal production
Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

20) A treatment task in which the PWA must re-tell stories

Expert panel mean: 4.25

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

21) A treatment task that that scaffolds from structured to less structured (e.g., from picture naming to picture description to narrative re-tell or conversation)

Expert panel mean: 4.38

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

22) A treatment task in which the PWA must verbally respond to verbally presented questions

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

23) A treatment task in which the PWA must have a conversation

Expert panel mean: 4.13

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

24) A treatment task in which the PWA must produce a sentence or phrase relative to a picture

Expert panel mean: 4.13

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

25) A treatment task in which the PWA must produce a full sentence

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

26) A treatment task in which the PWA must engage in discourse

Expert panel mean: 4.38

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

27) A treatment task in which the PWA must verbally elaborate on spoken sentences

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the FEEDBACK OR INTERACTIONS between the therapist and PWA (i.e., how the therapist responds to a PWA's production struggle or success) in treatments designed to improve connected speech. Please rate how the given feedback or interaction will relate to changes in connected speech in persons with chronic post-stroke aphasia

28) Feedback or interaction that improves metalinguistic awareness (e.g., awareness of underlying sentence components)

Expert panel mean: 3.75

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

29) Feedback or interaction via direct instruction (highly focused tasks that use explicit instruction to focus on small building blocks of production)

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

30) Feedback or interaction that has varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues)

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

31) Feedback or interaction that involves building on (elaboration of) the PWA's responses

Expert panel mean: 3.75

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

32) Feedback or interaction that facilitates responses by asking wh- questions

Expert panel mean: 3.75

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

33) Feedback or interaction using prompts to enable answers

Expert panel mean: 3.75

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

34) Specific task related feedback

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the duration and intensity of treatments designed to improve connected speech. Please rate how the duration or intensity will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

35) Practicing outside of therapy

Expert panel mean: 3.75

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

36) Treatments of greater 'dose' (i.e., quantity)

Expert panel mean: 4.38

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

37) Treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks)

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

38) Five or more hours a week of therapy for many months

Expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the characteristics of patients involved in treatments designed to improve connected speech. Please rate how the patient characteristic will relate to changes in connected speech in persons with chronic post-stroke aphasia

39) A person with mild aphasia is a
Expert panel mean: 4.71

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

40) Good auditory comprehension abilities as exhibited by the person with aphasia
Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

41) A person with Conduction aphasia is a
Expert panel mean: 3.86

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

42) A person with aphasia who is very motivated is a

Expert panel mean: 4.25

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

43) Good sentence production abilities as exhibited by the person with aphasia

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

44) Good word finding abilities as exhibited by the person with aphasia

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

45) A person with moderate aphasia is a

Expert panel mean: 4.00

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

46) A person with non-fluent Broca's aphasia is a

Expert panel mean: 3.88

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the other considerations in treatments designed to improve connected speech. Please rate how the given material will related to changes in connected speech in persons with chronic post-stroke aphasia

47) How important is it to consider the skill level of a therapist to meet goals set by the patient when determining a PWA's candidacy for treatment designed to improve connected speech?
Expert panel mean: 4.13

Unimportant	Of little importance	Moderately important	Important	Very important

48) Treatment focused on a linguistic technique that the PWA can and will use outside of the treatment setting will
Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

49) A high degree of skill level of a therapist to meet goals set by the patient
Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

50) Development of nonlinguistic cognitive abilities (e.g., working memory)

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

51) Treatments that engage and leverage domains of knowledge characterized by regularities (e.g., phonological sequence knowledge, semantic knowledge, sentence-level sequence knowledge [syntax])

Expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

52) Commonality between the therapy session and context in which language is used

Expert panel mean: 4.13

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

53) Use of a linguistic technique that provides the basis for continued language growth after treatment completion (e.g., phonological sequence knowledge leading to enhanced vocabulary growth)

Expert panel mean: 3.88

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

54) A high amount of specificity with which a therapist addresses goals set by the patient

Expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

55) Development of a great degree (critical mass) of linguistic skill in treatment settings

Expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

56) A person with aphasia and severe apraxia of speech is a

Expert panel mean: 2.13

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

57) Poor auditory comprehension abilities as exhibited by the person with aphasia

Expert panel mean: 2.13

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

58) How important is education level when determining candidacy for treatment designed to improve connected speech?

Expert panel mean: 2.00

Unimportant	Of little importance	Moderately important	Important	Very important

59) A person with aphasia who is not very motivated is a

Expert panel mean: 1.88

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

60) How important is consideration of language dominance when determining candidacy for treatment designed to improve connected speech (in English)?

Expert panel mean: 1.86

Unimportant	Of little importance	Moderately important	Important	Very important

61) A low degree of skill level of a therapist to meet goals set by the patient

Expert panel mean: 1.71

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

62) How important is consideration of occupation when determining candidacy for treatment designed to improve connected speech?

Expert panel mean: 1.57

Unimportant	Of little importance	Moderately important	Important	Very important

63) How important is consideration of age when determining candidacy for treatment designed to improve connected speech?

Expert panel mean: 1.57

Unimportant	Of little importance	Moderately important	Important	Very important

64) How important is consideration of gender when determining candidacy for treatment designed to improve connected speech?

Expert panel mean: 1.13

Unimportant	Of little importance	Moderately important	Important	Very important

65) How important is consideration of handedness when determining candidacy for treatment designed to improve connected speech?

Expert panel mean: 1.00

Unimportant	Of little importance	Moderately important	Important	Very important

Appendix G

Round three letter of invitation

Dear [expert name],

Thank you for your continued participation in the expert panel for this study "Patient characteristics and treatment components that mediate improvements in connected speech in persons with chronic post-stroke aphasia: A Delphi study involving a communication disorders expert panel", being conducted by Kim Frey, PhD-ABD, CCC-SLP at the University of Colorado under the advisement of Gail Ramsberger, ScD, CCC-SLP, Board Certified-ANCD.

Round Two of questions is complete and the responses from national and international experts have been compiled and built into questions with Likert-style responses for a Round Three.

This will be the final Round and thus complete your participation in this study.

This round thus consists of 65 total questions, phrased in the same wording and presented in the same Likert-scale format as in Round 2. Questions from Round Two that received a mean rating of 3.75 or greater (indicating high importance) or 2.25 or less (indicating low importance) were continued into this Round Three.

Each of the questions again gives you insight into the variables your national and international colleagues deem relevant to improvements in connected speech. You will notice one addition to the questions. For each question, the mean score from Round 2 is included to provide you insight into the relative importance of each variable as rated by your colleagues.

As there are only 65 questions in this Round, the questions should take about 5-10 minutes to complete.

I again greatly appreciate the time and expertise you offer to complete these questions and inform this study. You will be able to re-enter the survey should you be unable to complete the

questions in one sitting.

I cannot express enough how valuable your final insight is to completion of this study. It is critical that every expert respond in order to obtain enough data. Please take 5-10 minutes to help complete this study.

If you are willing to provide your insight for this Round Three, click here to enter the survey: [SurveyMonkey link].

This final survey will be open until _____.

Should you have any questions, please contact the Primary Investigator at Kim.Frey@UCDenver.edu. If you continue or decline to continue with this study, you will not lose any rights to which you are entitled as a study participant.

Sincerely,
Kim Frey, PhD-ABD, CCC-SLP
The University of Colorado

Appendix H

Responses to round three - final characteristics and components that mediate improvements in connected speech

Listed below are the expert responses regarding the focus of therapy (i.e., focus of therapy being the aspect of language processing being targeted by treatment tasks) in treatments designed to improve connected speech. Please rate how focusing treatment on a given goal will related to changes in connected speech in persons with chronic post-stroke aphasia

1) A treatment focused on the linguistic components of sentences in isolation (e.g., verbs, nouns in isolation)

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

2) A treatment focused on syntax or grammar in sentence structure

Round 2 expert panel mean: 3.86

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

3) A treatment focused on "functional skills" (e.g, specific script training)

Round 2 expert panel mean: 4.25

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

4) A treatment focused on narrative/discourse structure (From here can continue to add in Round 3 means for comparison to Round 2)

Round 2 expert panel mean: 4.25

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

5) A treatment focused on production of complex structures

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

6) A treatment focused on increasing the length of utterances (i.e., providing more helpful units even if not complete sentence)

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

7) A treatment focused on transactions (story telling, functional message giving)

Round 2 expert panel mean: 4.13

Round 3 expert panel mean: 4.43

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

8) A treatment focused on complete sentence production (vs word production or truncating spoken output)

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: 3.71

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

9) A treatment focused on decreasing word-finding difficulty

Round 2 expert panel mean: 4.25

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the materials in treatments designed to improve connected speech. Please rate how the given material will related to changes in connected speech in persons with chronic post-stroke aphasia

10) Markers for underlining and color-coding thematic roles as materials in a treatment
Round 2 expert panel mean: 3.75
Round 3 expert panel mean: Did not reach criterion

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

11) Pictures of actions as stimuli in a treatment
Round 2 expert panel mean: 3.88
Round 3 expert panel mean: Did not reach criterion

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

12) Videos (e.g., television shows, news stories) as stimuli in a treatment

Round 2 expert panel mean: 4.25

Round 3 expert panel mean: 3.86

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

13) Paper for writing and drawing as materials in a treatment

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: Did not reach criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

14) Photos of the individual's real life as stimuli in a treatment

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: Did not reach criterion

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

15) Action sequence cards as stimuli in a treatment

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.00

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

16) Specific scenarios for role-play as stimuli in a treatment

Round 2 expert panel mean: 4.13

Round 3 expert panel mean: 4.43

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

17) Structured topics for conversation as stimuli in a treatment

Round 2 expert panel mean: 4.50

Round 3 expert panel mean: 4.33

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

18) Scripts as stimuli in a treatment

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.29

Inhibit improvement in connected speech	Attenuate improvement in connected speech	Neither inhibit nor cause improvement in connected speech	Mediate improvement in connected speech	Cause improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the tasks in treatments designed to improve connected speech. Please rate how the given task will related to changes in connected speech in persons with chronic post-stroke aphasia

19) A treatment task in which the PWA must name stimuli
Round 2 expert panel mean: 3.88
Round 3 expert panel mean: Did not reach criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

20) A treatment task in which the PWA must verbally repeat a modeled verbal production
Round 2 expert panel mean: 3.88
Round 3 expert panel mean: Did not reach criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

21) A treatment task in which the PWA must re-tell stories

Round 2 expert panel mean: 4.25

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

22) A treatment task that that scaffolds from structured to less structured (e.g., from picture naming to picture description to narrative re-tell or conversation)

Round 2 expert panel mean: 4.38

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

23) A treatment task in which the PWA must verbally respond to verbally presented questions

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: Did not reach criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

24) A treatment task in which the PWA must have a conversation

Round 2 expert panel mean: 4.13

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

25) A treatment task in which the PWA must produce a sentence or phrase relative to a picture

Round 2 expert panel mean: 4.13

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

26) A treatment task in which the PWA must produce a full sentence

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: 3.71

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

27) A treatment task in which the PWA must engage in discourse

Round 2 expert panel mean: 4.38

Round 3 expert panel mean: 4.28

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

28) A treatment task in which the PWA must verbally elaborate on spoken sentences

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the feedback or interactions between the therapist and PWA (i.e., how the therapist responds to a PWA's production struggle or success) in treatments designed to improve connected speech. Please rate how the given feedback or interaction will relate to changes in connected speech in persons with chronic post-stroke aphasia

29) Feedback or interaction that improves metalinguistic awareness (e.g., awareness of underlying sentence components)

Round 2 expert panel mean: 3.75

Round 3 expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

30) Feedback or interaction via direct instruction (highly focused tasks that use explicit instruction to focus on small building blocks of production)

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

31) Feedback or interaction that has varying levels or a tapering schedule (e.g., cueing hierarchy or fading cues)

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

32) Feedback or interaction that involves building on (elaboration of) the PWA's responses

Round 2 expert panel mean: 3.75

Round 3 expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

33) Feedback or interaction that facilitates responses by asking wh- questions

Round 2 expert panel mean: 3.75

Round 3 expert panel mean: Did not meet criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

34) Feedback or interaction using prompts to enable answers

Round 2 expert panel mean: 3.75

Round 3 expert panel mean: Did not meet criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

35) Specific task related feedback

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the duration and intensity of treatments designed to improve connected speech. Please rate how the duration or intensity will relate to changes in connected speech in persons with chronic post-stroke aphasia (PWA)

36) Practicing outside of therapy
Round 2 expert panel mean: 3.75
Round 3 expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

37) Treatments of greater 'dose' (i.e., quantity)
Round 2 expert panel mean: 4.38
Round 3 expert panel mean: 4.29

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

38) Treatment sessions that occur 2-3 times per week, for two-hour long sessions, up to 20 sessions (i.e., 4-6 hours of therapy a week for 6-10 weeks)

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.33

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

39) Five or more hours a week of therapy for many months

Round 2 expert panel mean: 4.86

Round 3 expert panel mean: 4.50

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the characteristics of patiens involved in treatments designed to improve connected speech. Please rate how the patient characteristic will relate to changes in connected speech in persons with chronic post-stroke aphasia

40) A person with mild aphasia is a
Round 2 expert panel mean: 4.71
Round 3 expert panel mean: 4.43

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

41) Good auditory comprehension abilities as exhibited by the person with aphasia
Round 2 expert panel mean: 3.88
Round 3 expert panel mean: 3.71

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

42) A person with Conduction aphasia is a

Round 2 expert panel mean: 3.86

Round 3 expert panel mean: 3.71

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

43) A person with aphasia who is very motivated is a

Round 2 expert panel mean: 4.25

Round 3 expert panel mean: Did not meet criterion

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

44) Good sentence production abilities as exhibited by the person with aphasia

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

45) Good word finding abilities as exhibited by the person with aphasia

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

46) A person with moderate aphasia is a

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.14

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

47) A person with non-fluent Broca's aphasia is a

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: Did not meet criterion

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

Listed below are the expert responses regarding the other considerations in treatments designed to improve connected speech. Please rate how the given material will related to changes in connected speech in persons with chronic post-stroke aphasia

48) How important is it to consider the skill level of a therapist to meet goals set by the patient when determining a PWA's candidacy for treatment designed to improve connected speech?
Round 2 expert panel mean: 4.13
Round 3 expert panel mean: 4.00

Unimportant	Of little importance	Moderately important	Important	Very important

49) Treatment focused on a linguistic technique that the PWA can and will use outside of the treatment setting will
Round 2 expert panel mean: 4.00
Round 3 expert panel mean: 4.29

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

50) A high degree of skill level of a therapist to meet goals set by the patient

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: 4.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

51) Development of nonlinguistic cognitive abilities (e.g., working memory)

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: 3.86

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

52) Treatments that engage and leverage domains of knowledge characterized by regularities (e.g., phonological sequence knowledge, semantic knowledge, sentence-level sequence knowledge [syntax])

Round 2 expert panel mean: 4.00

Round 3 expert panel mean: Did not meet criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

53) Commonality between the therapy session and context in which language is used

Round 2 expert panel mean: 4.13

Round 3 expert panel mean: 4.57

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

54) Use of a linguistic technique that provides the basis for continued language growth after treatment completion (e.g., phonological sequence knowledge leading to enhanced vocabulary growth)

Round 2 expert panel mean: 3.88

Round 3 expert panel mean: Did not meet criterion

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

55) A high amount of specificity with which a therapist addresses goals set by the patient

Round 2 expert panel mean: 3.86

Round 3 expert panel mean: 4.17

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

56) Development of a great degree (critical mass) of linguistic skill in treatment settings

Round 2 expert panel mean: 4.14

Round 3 expert panel mean: 4.00

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

57) A person with aphasia and severe apraxia of speech is a

Round 2 expert panel mean: 2.13

Round 3 expert panel mean: 2.33

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

58) Poor auditory comprehension abilities as exhibited by the person with aphasia

Round 2 expert panel mean: 2.13

Round 3 expert panel mean: 2.14

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

59) How important is education level when determining candidacy for treatment designed to improve connected speech?

Round 2 expert panel mean: 2.00

Round 3 expert panel mean: 1.71

Unimportant	Of little importance	Moderately important	Important	Very important

60) A person with aphasia who is not very motivated is a

Round 2 expert panel mean: 1.88

Round 3 expert panel mean: 1.71

Very poor candidate for treatment of connected speech	Poor candidate for treatment of connected speech	Fair candidate for treatment of connected speech	Good candidate for treatment of connected speech	Very good candidate for treatment of connected speech	N/A – is not relevant to connected speech

61) How important is consideration of language dominance when determining candidacy for treatment designed to improve connected speech (in English)?

Round 2 expert panel mean: 1.86

Round 3 expert panel mean: 2.00

Unimportant	Of little importance	Moderately important	Important	Very important

62) A low degree of skill level of a therapist to meet goals set by the patient

Round 2 expert panel mean: 1.71

Round 3 expert panel mean: 2.29

Inhibits improvement in connected speech	Attenuates improvement in connected speech	Neither inhibits nor causes improvement in connected speech	Mediates improvement in connected speech	Causes improvement in connected speech	N/A – is not relevant to connected speech

63) How important is consideration of occupation when determining candidacy for treatment designed to improve connected speech?

Round 2 expert panel mean: 1.57

Round 3 expert panel mean: 1.43

Unimportant	Of little importance	Moderately important	Important	Very important

64) How important is consideration of age when determining candidacy for treatment designed to improve connected speech?

Round 2 expert panel mean: 1.57

Round 3 expert panel mean: 1.71

Unimportant	Of little importance	Moderately important	Important	Very important

65) How important is consideration of gender when determining candidacy for treatment designed to improve connected speech?

Round 2 expert panel mean: 1.13

Round 3 expert panel mean: 1.00

Unimportant	Of little importance	Moderately important	Important	Very important

66) How important is consideration of handedness when determining candidacy for treatment designed to improve connected speech?

Round 2 expert panel mean: 1.00

Round 3 expert panel mean: 1.00

Unimportant	Of little importance	Moderately important	Important	Very important