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Quantitative Differences in the Conversational Performance of People with Severe Expressive Aphasia Using Three Types of Visual Screen Displays on Speech Generating Devices

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ABSTRACT

This multiple single-subject research study measured quantitative differences in communication success, communicator roles and act functions during dyadic conversational interactions between six people with severe aphasia and their peer communication partners across three conditions involving a type of augmentative communication intervention, speech generating devices (SGDs). Researchers assessed these variables across four conditions involving the message display of the SGD: no display (Condition A), visual scenes (contextual photographic) display (Condition B), Traditional Grid Display (Condition C), while participants engage in conversational story telling. This study is important because technology is currently being developed to assist people with aphasia to access messages stored on an SGD by activating photographic representations that access a set of spoken messages that are related to the photo. This contrasts with a more traditional method of representing messages, in which decontextual line drawings associated with individual concepts are displayed on the screen. Results from this study indicate that interactions between peer communication partners and people with aphasia can and do benefit from external, symbolic representation of messages on AAC devices. However, an unexpected finding was that given too much contextual information as with visual scenes, peer communication partners can deduce the content and context of the story, thereby being more apt to dominate the conversation than they are with no display.

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Chapter 1

INTRODUCTION AND REVIEW OF LITERATURE

Injuries or lesions in the left hemisphere of the brain are known to cause an "impairment of the ability to use and/or understand language" (NAA, 1999), or aphasia. Aphasia is typically caused by left cerebrovascular accidents (CVAs); however, aphasia can also be caused by a traumatic brain injury, infection, brain tumors, and progressive degeneration of the cortex (e.g., primary progressive aphasia). The severity of impairments and the modalities affected in people who acquire aphasia are variable and depend mostly upon the size and site of the lesion, and age at the time of onset (Murray & Chapey, 2001).

Communication Problems for People with Aphasia

The various types of aphasia are characterized by an impaired ability to manipulate spoken and written language symbols accompanied by a reduced capacity for understanding these symbols. This symbolic deficit is most pronounced in global aphasia syndrome. In global aphasia, a lesion large enough to affect Broca's Area, Wernicke 's Area and the surrounding associative cortices results in significant impairments across all language modalities (Collins, 2005). Individuals who acquire a lesion of this magnitude demonstrate severe-to-profoundly impaired expression and comprehension of spoken and written language symbols. This significantly restricts the communication ability of individuals with severe, or Global, aphasia.

Alternative and Augmentative Communication

Clinical intervention for people with severe aphasia may assist them in recovering some communication abilities such as natural speech, gestures, drawing, or writing (Chapey et al., 2001). Yet, in many cases, people with severe aphasia are unable to recover the ability to use verbal language symbols to achieve this clinical goal (Hux, Manasse, Weiss, & Beukelman, 2001). These individuals may be candidates for augmentative and alternative communication (AAC) strategies (Hux et al., 2001). AAC encompasses aspects of research, as well as clinical and educational practice. The American Speech-Language Hearing Association, *Special Interest Division 12* defines AAC as the study of temporary or permanent impairments of an individual's participation in activities of daily living (e.g., hobbies, conversation) and restricted quality of life due to severe speech-language expression and comprehension deficits (ASHA, 2004).

Clinically, AAC is defined as the use of any instrument or strategy to sustain and supplement residual cognitive-linguistic skills (Fried-Oken, Rau, & Oken, 2000). For some individuals with severe aphasia, speech generating devices (SGDs) have been implemented to restore participation in communicative interactions (Garrett & Lasker, 2005). An SGD has a computer-like interface that represents communicative messages symbolically on a screen. When specific message locations are accessed, SGDs produce the messages via synthesized or digitized speech. Researchers are currently challenged to develop an AAC device for people with severe aphasia that symbolically represents messages in a meaningful manner, meets the demands of rapid conversation, and conveys personal and specific information in conversational interactions.

Potential benefits of AAC in severe aphasia

Most AAC strategies, and almost all SGDs, use visual representations of language that may be more comprehensible to people with severe aphasia than spoken language symbols. SGDs supplement the visual representation of symbols with speech output. People with severe aphasia have demonstrated a relatively preserved ability to associate messages with visual symbols (Hux et al., 2001; Thorburn et al., 1995). Theoretically, people with severe aphasia who can access visual symbols can use SGDs as a venue for participating in socio-communicative activities. They should also be able to use an SGD to convey wants and needs. Furthermore, SGDs might be able to extend communicative exchanges by including more semantically specific and personally relevant information, thereby achieving greater social closeness with communication partners (Garrett & Lasker, 2005). The synthesized or digitized speech generated from SGDs can potentially serve as a substitute for premorbid speech output in people with severe aphasia. However, despite their visual strengths, people with severe aphasia have not always been successful when attempting to use visually-based AAC strategies to communicate.

Problems with AAC in severe aphasia

Current AAC strategies have been successfully implemented in populations with impaired motor ability for speech, writing or gestures (Garrett & Kimelman, 2000). However, individuals with severe aphasia have not experienced comparable success with traditional AAC strategies (Jacobs, Drew, Ogletree, & Pierce, 2004; Kraat, 1990). Several reasons for this mismatch have been proposed. Garrett and Kimelman (2000)

suggested that people with aphasia have a history of unsuccessful AAC use because clinicians did not select AAC strategies that were appropriate for their profile of cognitive linguistic deficits and strengths. For example, partner initiated strategies (e.g., written choice, tagged yes-no questions) are more beneficial than complex, stored messages for communicators who are not able to independently think to use an external augmentative device. Another type of AAC system mismatch may occur when people with severe aphasia are unable to decode the symbolic meaning for visual or pictorial symbols (e.g., Blissymbols, Dynasyms).

Although many available symbol sets attempt to clearly represent concepts, and people with aphasia generally understand familiar visual symbols, only a few AAC symbols are exact representations of the real construct (e.g., a picture of a cup represents a cup instead of the concepts 'drink' or 'tea'). People with aphasia have demonstrated the ability to learn and recall iconic symbols that are concrete (Beck & Fritz, 1998). However, complex meanings (e.g., remembered events, comments, jokes, etc.) can seldom be represented in a transparent manner with individual, decontextualized visual symbols, particularly line drawing symbols that are commonly used on commercial AAC systems. Therefore, most communicators must expend cognitive-linguistic effort to learn the messages that are associated with each complex visual symbol on their AAC display. In addition, conversational breakdowns occur when they need to use multiple iconic symbols to convey meaning (Beck & Fritz, 1998).

Communicators must also decode the meaning of symbols within the dynamic time constraints of real conversations. The dilemma for adults with severe aphasia is that they have much to say, but may not have the processing skills to quickly access and

encode symbols from a large symbol set. Therefore, they cannot select an appropriate conversational message in a timely manner.

Most current SGDs represent messages symbolically in a way that supports either a broad conversational scope or a rapid rate of communication (Venkatagiri, 1995). An AAC strategy that affords the communicator the opportunity to create unlimited novel messages is "broad in scope" (e.g., spelling display, Blyssymbols) (Venkatagiri, 1995). However, communication rate (number of utterances per minute) is compromised by an AAC strategy that offers a broad scope of message access (Venkatagiri, 1995).

In contrast, displays that represent whole messages with single symbols facilitate a rapid rate of communication. For example, a picture of a car may represent the message, "I want to go for a drive". Prestored messages consisting of words and phrases that are tied to a single topic minimize the degree to which communication rate is compromised (Beukelman & Mirenda, 2005; Venkatagiri, 1995). In other words, people with limited symbol sequencing skills can convey a lot of semantically specific information in a short amount of time when they access prestored phrases on an SGD. The downside of this "rapid rate" option is that the individual cannot easily formulate novel ideas because whole messages are difficult to resequence to convey new meaning. Therefore, this type of display is limited in the scope of its ability to represent conversationally relevant messages.

People with aphasia typically cannot utilize devices that present a broad scope of message access because they have limited abilities to combine symbols (e.g., letters, pictures) to formulate novel utterances. The dilemma is that prestored messages can be inadequate and insincere when conveying a message that is specific to a certain situation

or conversation in a different context (Venkatagiri, 1995). In addition, available symbol sets may not be meaningful to adults with aphasia who have no prior associations with abstract pictorial symbols. Recent research is beginning to explore alternate symbol types and arrangements in order for people with severe aphasia to meet the demand for rapid, conversationally competitive communication rates as well as meaningful and flexible representations of important conversational messages.

Influence of Cognitive Variables on SGD Display Access

Individuals who acquire severe aphasia have not lost their knowledge of the world that existed premorbidly. However, the neurolinguistic networks previously used to access language to express this knowledge have been severed or altered (McNeil, 1983). The ability of an individual with severe aphasia to process linguistic information effectively and efficiently is dependent upon the difficulty of a given task, the environment, the rate (e.g., rapid/slow speaking rate) of and type (e.g., visual representations/auditory) of information presented, in addition to support provided by the communication partner (Chapey 2001; Garrett & Kimelman, 2000).

Fragile neural networks commonly result in variability in communicative performances of people who have aphasia. Some researchers suggest that variability indicates an impairment of higher level cognitive processes, such as executive functioning (McNeil, 1983; Murray & Chapey, 2001). Higher level processes may affect behaviors associated with a communication exchange, such as initiating conversation, attending to the conversation, and maintaining a conversational topic. These pragmatic features of conversation depend on foundational symbolic processes including: retrieving

spoken language symbols from long-term memory (LTM), storing spoken language symbols in short-term memory (STM), encoding spoken language symbols to create a meaningful message, as well as decoding, processing and responding to the symbolic messages sent by the communication partner. However, the improved communicative performance of individuals who have aphasia in familiar surroundings or when communicating about emotional topics suggest that activation of alternate, relatively intact neural networks may facilitate access to language (Glosser, Weiner, & Kaplan, 1988).

Variables that affect communication with visual symbols

External variables can be manipulated to minimize the demands placed on cognitive-linguistic processes and maximize the communicative potential in each individual with severe aphasia. Because of their potential impact on the ability of people with severe aphasia to use visually-based AAC systems, these factors are reviewed below.

First, individuals with aphasia perform more successfully in communicative and structured language tasks when they are given contextual support (Glosser, Weiner, & Kaplan, 1988). For example, contextual redundancy (e.g., familiarity with the topic), familiarity with the communication partners, emotionality of the topic, and access to nonlinguistic information (e.g., pragmatics, referential material) can influence the communicative performance of people with severe aphasia (Glosser, et. al, 1988). Syntactical and semantic complexity of language generated by people with severe aphasia is dependent upon the contextual supports that are available. In other words,

people with aphasia are better communicators when social contextual support is available compared to when it is absent (Glosser, et. al, 1988). In addition, Glosser and colleagues substantiated that the communicative performance of individuals with aphasia is more successful when the communication partner and conversational topic is relatively familiar to the person with aphasia (1988).

Previous research on auditory processing has shown that many people with aphasia can benefit from extralinguistic cues (e.g., exaggerated intonation, slower rate of speech) to interpret messages being sent by their communication partner (Pierce & Beekman, 1995). Visual cues have also been found to facilitate language processing during language comprehension and expression (Hux, et al., 2001; Thorburn et al., 1995). For example, one person with severe, nonfluent aphasia improved conversational initiations and success at conveying messages when "graphic topic setters" were available to augment the visual context associated with the conversational topic (Garrett & Huth, 2002). Written and/or pictorial contextual information creates a shared field for visual reference between communication partners, which may, when combined with AAC features such as speech output, improve the communicative abilities of people with aphasia.

Each of these extrinsic variables can aid or interfere with an individual's ability to communicate with visually-based AAC methods. Some evidence exists to support the use of familiar, contextual, and emotionally evocative visual symbols in AAC strategies. Other evidence suggests that people with aphasia may not have the processing skills (e.g., sequencing, memory, and discrimination skills) to access symbols in a meaningful and efficient manner for a listener. This dilemma is at the core of the purpose of this clinical

investigation; that is, to identify alternate visual symbol displays and message arrangements that may be easier for people with severe aphasia to access in conversation.

Previously studied methods of representation include written choice, individual iconic symbols, line drawing symbols, photo albums and remnant books. However, there is no research to date that systematically measures the independence and accuracy with which persons with severe aphasia access messages across different types of screen displays on speech generating devices. Two types of symbols commonly used for representing messages are discussed below.

Types of displays

The organization or placement of each symbolically represented informational unit on a display should take into consideration the strengths and deficits for each individual (Doyle, Kennedy, Jausalaitis, & Phillips, 2000). It is important to consider location of symbols on the display to avoid limited message access due to visual field cuts. Also important to consider is the detail within each symbol and number of symbols contained on the display page (Doyle, et al., 2000).

Traditional grid displays. Traditional grid displays (TGD) represent information units as decontextualized symbols, orthography or line drawings (Light, 2004). The decontextualized symbols limit the amount of personalization possible on an SGD. These iconic representations of informational units are laid out on the display in rows and columns (Light, 2004). Information units may be stored on TGDs according to salient letter, categorically or thematically (Beukelman & Mirenda, 2005). This representation of information units in a decontextualized manner allows individuals to combine the units in

a variety of sequences to generate a vast span of novel communicative messages. This sequencing and resequencing requirement is potentially responsible for the lack of success for people with severe aphasia using SGDs with a TGD. An impaired ability in sequencing reduces the potential for generating novel messages, and further limits the communicative function of TGDs to primarily wants and needs (Light, 2004).

Visual scenes displays. Visual scenes displays (VSDs) are a recent development in the field of AAC that offers AAC users with aphasia increased contextual support (Beukelman, Hux, Weissling, Dietz & McKelvey, 2006**;** Blackstone, 2005). VSDs represent specific informational units as people, objects, events and actions in the foreground and background of the display within the context in which they occur (Blackstone, 2004). Informational units can be generic (e.g., line drawing of a trip to an ice cream shop) or personalized (e.g., photograph of a trip to the ice cream shop) depictions that are represented within a continuous schematic scene portrayed on all or part of the SGD (Light, 2004).

As previous research has indicated, the performance of individuals with aphasia in communicative tasks and conversations is improved when contextual support is provided. Therefore, people with aphasia using VSD technology may achieve functional communication uses beyond conveying wants and needs. Functional communication supported by VSDs can include "conversational support [e.g., topic maintenance, shared visual reference], shared activities, social interaction, learning, and communication (e.g., informational exchange, social closeness)" (Light, 2004).

Statement of the Problem

Traditional AAC systems have been implemented successfully for individuals with severe motor deficits that impair verbal communication abilities (Garrett & Kimelman, 2000). However, displays currently available for AAC devices are not meeting the needs of individuals with aphasia. Functional use of AAC devices requires learning and retaining new methods of activating language on an external device. Although individuals with aphasia have demonstrated the capability to access symbolized messages on an AAC device, the amount of meaningful symbolic information that they can access and sequence is limited by their cognitive-linguistic deficits. Due to this restricted ability to access and sequence informational components that are intrinsic to a conversational message, individuals with aphasia are frequently unable to participate in specific and personal interactions using pictorial AAC systems.

This study attempts to prove that individuals with severe aphasia can successfully use SGDs when sufficient contextual (linguistic and non-linguistic) support is provided. In addition, the communicative success of individuals with aphasia can increase based on the familiarity with conversational topics, familiarity with the communication partners, task complexity and stimuli demands. Specifically, it is proposed that changing the organizational structure of displays on SGDs can potentially increase communicative success of individuals with aphasia regarding message access on an external device. Advancements in technology now allow the capacity of a device to contain *visual scene displays* as a means of symbolically representing information that is semantically rich enough to support specific small talk and extended conversations (Beukelman & Mirenda, 2005; Blackstone, 2005; Light & Drager; 2004). *Visual scene displays* are

comprised of multiple photographs that are specific to the conversational topic, familiar to the person with aphasia, available for mutual visual reference for both communication partners and supplemented with text. The components of the *visual scene displays* show promise for potentially supporting cognitive-linguistic processes for individuals with aphasia. However, no studies have been conducted to determine the effects of symbolically representing specific and personal messages in this manner for people with aphasia in the communicative context.

Therefore, the purposes of this investigation are to answer the following questions:

1) *What percentage of **messages are successfully conveyed** by a person with aphasia and a peer conversation partner during a conversational story telling task across three AAC conditions: no display, when messages are represented on visual scene displays, and when they are represented on traditional grid displays?*
2) *How do the **roles** of individuals with severe aphasia and their peer conversational partners change during conversations when they can tell personal stories across three AAC conditions: no display, when messages are represented on visual scene displays, and when they are represented on traditional grid displays?*
3) *What are the **communicative functions** of conversational acts generated by individuals with severe aphasia during a conversational story telling task across three AAC conditions: no display, when messages are represented on*

visual scene displays, and when they are represented on traditional grid displays?

Chapter 2

METHODS

In this multiple single-subject comparative condition design experiment, quantitative data were collected from three participants with severe expressive aphasia regarding the number of exchanges and acts, communicator roles, and act functions. They participated in a conversational story telling task with peer communication partners over *three conditions*: 1) no display (A),
2) Visual Scene Display (B), 3) Traditional Grid Display (C).

Participants

Primary Participants

Informed Consent

A Master's level speech-language pathologist (SLP) from the Duquesne University Speech-Language-Hearing Clinic who had experience with individuals with aphasia but who was not involved in this study informed current clients with severe aphasia (according to criteria in Appendix A) of the existence of the present research study and the opportunity to participate. Clients with aphasia then expressed their interest to the Master's level clinician. The clinician provided names of potential participants to the primary investigator. If the participants with aphasia passed this screening with a minimum score of 4 of 5 points, one of the experimenters then contacted the interested clients and provided them with more detailed information regarding the conditions and requirements of the study.

Potential participants were then invited them to show their willingness to participate by signing a modified consent form (see Appendix B.2), or assent form if their agent with power of attorney had also been informed about the study and consented to their participation (see Appendix B.3). Potential participants were informed that they might not be eligible for the study after additional testing had been completed, but that their willingness to participate was greatly appreciated regardless of enrollment outcomes. Caregivers, and participants with aphasia were encouraged to ask questions and/or to feel free to withdraw from the study at any time.

Subsequently, three adults with severe aphasia secondary to no more than two left hemisphere cerebral vascular accidents (CVAs) were the primary participants in this study. The participants each had a diagnosis of severe to profound expressive aphasia and moderate to severe receptive aphasia based on the judgment of two experienced clinicians who were familiar with the communication profiles of the participants. In addition, participants with aphasia had each taken the *Western Aphasia Battery* (*WAB;* Kertesz, 1982) within the last year and each received a score no greater than four out of ten on the *Fluency* subtest, a score no less than 20 out of 60 on the *Comprehension Yes/No* subtest, and a score no less than 15 out of 80 on the *Sequential Commands* subtest. An Aphasia Quotient (AQ) was also obtained for each participant with aphasia (see Table 2.1 for *WAB* subtest scores).

Table 2.1 *WAB* (Kertez, 1982) subtest scores for participants with aphasia.

Subtest	Cut-off Scores	Participant with Aphasia (Dyad 1)	Participant with Aphasia (Dyad 2)	Participant with Aphasia (Dyad 3)
Fluency	≤4/10	4/10	4/10	1/10
Comprehension Yes/No	≥20/60	54/60	60/60	33/60
Sequential Commands	≥15/80	37/80	20/80	25/80
Aphasia Quotient	**None: Severe Expressive Aphasia Profile**	**58.1/100**	**45.6/100**	**21.8/100**

With regard to sensory skills, potential participants passed a pure tone hearing screening at 1000 and 2000 Hertz (Hz) presented at 50 decibels (dB) in at least one ear. They each had an identifiable functional visual field for objects and text, and were able to match 4 of 5 words given a field of 3 choices typed in a 20 point font (See Appendix A). In addition, potential participants with severe aphasia and/or family members reported that they (participants) had a pre-morbid literacy level of no less than a 8th grade reading level after reviewing a reference sample of standardized material written at this grade level.

To screen for nonverbal cognitive abilities, potential participants with aphasia (and peer communication partners – see next section) demonstrated attention and memory skills that were within 1 standard deviation (SD) of the mean for individuals with left hemisphere lesions based on the Symbol Trails and Design Memory subtests from the Cognitive Linguistic Quick Test (CLQT, Helm-Estabrooks, 2001). Cut-off scores equivalent to one standard deviation below the mean for persons with left-hemisphere infarcts and subtest scores for participants with aphasia are listed in the table below:

Table 2.2 *CLQT* (Helm-Estabrooks, 2001) subtest scores for participants with aphasia.

Subtest	Cut-off scores for Left CVA	Participant with Aphasia (Dyad 1)	Participant with Aphasia (Dyad 2)	Participant with Aphasia (Dyad 3)
Symbol Trails	1.45 / 10	2/10	6/10	4/10
Design Memory	2.85 / 6	6/6	6/6	3/6

Participant with Aphasia Profiles

Participant with Aphasia 1. The participant with aphasia in this dyad was a 34 year old college-educated male who was three and a half years post onset of a single left hemisphere CVA at the time of the study. In addition to aphasia, this participant had vision loss in his right visual field and right hemiparesis as a result of his CVA. This participant with aphasia had fluctuations in medications at the approximate halfway point of the experimental sessions; he was taken off Cymbalta, had oral surgery that required pain medication (Vicodin), and he began hyperbaric treatment during the course of this study.

Participant with Aphasia 2. The participant with aphasia in this dyad was a 47 year old male with a high school education, who was three and a half years post onset of a single left hemisphere CVA at the time of the study This participant with aphasia frequently participated in conversation and augmented his communication with a variety of modalities (e.g. gestures, writing, drawing). This participant with aphasia was also the currently employed at Professional Pool Services.

Participant with Aphasia 3. This participant with aphasia was a 65 year old retired, college-educated male who was also three and a half years post onset of a single

left hemisphere CVA. In addition to aphasia, this participant with aphasia had vision loss in his right visual field and right hemiparesis secondary to his CVA.

Peer communication partners

A Master's level SLP who was not associated with the study informed spouses, friends, family members and caregivers about the opportunity to participate in the study. Interested individuals were then informed about the conditions of the study by one of the experimenters prior to signing a consent form (see Appendix B.1). Three adults between the ages of 21-65 were subsequently invited to participate in this investigation as peer communication partners (PCPs). Potential PCPs were informed that his/her participation would occur during a conversational story telling task. After signing the consent form, PCPs were screened to determine if they meet the following criteria. PCPs had functional visual acuity with or without glasses and pass the same vision screening that was administered to the participants with severe aphasia. PCPs were required to pass a pure tone hearing screening in at least one ear at 1000 Hz, 2000 Hz, and 4000 Hz presented at 40 dB. PCPs reported no complaints of hearing problems interfering with daily conversation. PCPs demonstrated speech, language, and cognition abilities within normal limits based on scores from the CLQT (Helm-Estabrooks, 2001*)*, which were administered in its entirety.

Table 2.3 Peer communication partner profiles.

PCP	Age	Gender	Aphasia Experience	Relationship to Participant with Aphasia
1	21	Female	Graduate Student in Duquesne University Speech-Language Pathology Program	Former Clinician
2	61	Male	Father of Participant with Aphasia (Dyad 1)	Acquaintances
3	59	Female	Minimal	Long-time family friend

They also demonstrated literacy based on the presence of no more than five incorrect word productions while orally reading *The Grandfather* passage which was a 4th grade reading difficulty level. Also, PCPs demonstrated the ability to correctly answer four of five content questions about the passage.

PCPs were not gender-matched to the participants with aphasia, but they were age-matched within 15 years of the participant with aphasia that they were partnered with to ensure some shared context regarding life experiences and world knowledge. Each PCP had moderate familiarity with the participants with aphasia in their dyad, due to mutual social and/or therapy activities.

Furthermore, all invited participants (primary and secondary) reported English as their primary language. Invited participants were excluded from this study if they demonstrate ongoing medical conditions that cause dramatic fluctuations in alertness. Potential primary participants were excluded on the basis of medical evidence (chart, physician report) of diffuse neurological damage, including a history of more than two focal left CVAs or TIAs with permanent neurological sequelae, history of disease related to substance abuse, dementia, or other neurological disorders.

Experimenters

The primary investigator and the primary investigator of a related study (Figley, 2007) conducted all experimental data collection sessions for Dyad1 and Dyad3. A second year graduate student in the speech language pathology program at Duquesne University conducted sessions for Dyad 2 in collaboration with the previously mentioned experimenters.

Procedures

Design

A multiple single-subject, comparative condition design was repeated across three participant dyads. Each dyad included a participant with severe aphasia and a peer communication partner (PCP). Differences in communicative roles, accuracy or *success* (measured in exchanges), and *communicative functions* (measured per act) were measured during a conversational story telling task across *three conditions* with a speech generating device (SGD) (no display, visual scene display, and traditional grid display). Each condition was replicated two times across three personal topics in conversational story telling tasks. Conditions were counterbalanced across the three participant dyads to control for possible order effects. Within participant dyads, stories were purposefully assigned to conditions in an attempt to control for a practice effect within stimuli.

Conditions. Each of the study conditions utilized an SGD to present three different kinds of displays. The SGD used in this study was a Dynavox Series 5, which had a computer-like screen that contained symbolically represented messages of

communicative value (e.g., line drawing symbols, photographs of eventful and personally relevant scenes). The SGD produced synthesized speech output when symbolically represented messages were activated. Activation consisted of pressing the symbol representing the message. The SGD used in this study provided the following options for organizing communicative information (see section on Experimental Stimuli and Figures 2.1 and 2.2 for additional description):

Condition A (NO SGD DISPLAY): The participants with aphasia participated in a conversational story telling task with the PCP (Task, discussed below) but the SGD was turned off (No display) and placed on the table in the visual field of the participants to maintain similarity between conditions.

Condition B (SGD--Visual Scene Display): The participants with aphasia participated in a conversational story telling task with the PCP (Task, discussed below) using a customized *visual scene display* (VSD; see Appendix C) on the SGD. Other materials (e.g., written augmentation from story review with experimenter) were removed from the table to minimize distraction.

Condition C (SGD--Traditional Grid Display): The participants with aphasia participated in a conversational story telling task with the PCP (Task, discussed below) using a customized *traditional grid display* (TGD; see Appendix D) on the SGD; other materials (e.g., written augmentation from story review with experimenter) were removed from the table to minimize distraction

Independent and dependent variables. The *independent variables* in this study were the type of display (visual scene or traditional grid) that represented messages symbolically on the SGD. The *dependent variables* measured in this study included: 1)

percentage of *successfully activated* conversational elements represented symbolically; 2) communicative *independence* during conversational story telling task; and 3) communicative *act functions* during a conversational story telling task. Success was measured for each exchange; a four point rating scale was used to determine degree of success (see below). Communicative act functions that were quantified in this study include: *joint attention*, *request for social interaction*, *request for information*, *provision of specific semantic information, request for clarification, emotional/confirmatory or filler*, and *no function*.

Success. Success was coded at the exchange level based on the following 4-point scale: 1) when information was determined to be adequate for conveying the intended message and no partner interpretation was required to obtain entire meaning of the message, the exchange was given a rating of "3"; 2) exchanges that required partial interpretation from a communication partner were given a rating of "2"; and 3) when information provided by communication partners was inadequate for conveying an intended message and/or the message was abandoned, the exchange was rated as a "1".For further analyses, a percentage of overall interaction success under each condition was calculated by dividing the number of exchanges rated "3", "2", or "1", respectively, by the total number of exchanges in each interaction; percentages were then averaged across conditions and stories.

Communicator roles. *Initiations, responses* and/or *equivocal responses* were the three communicator roles measured for this study. Each exchange began with an *initiation* by either the communication partner or the peer communication partner who attempted to convey a new idea by commenting, asking a question, or requesting. The

recipient of the initiation then provided a response containing new semantic information or an equivocal act that provided no new information (Garrett, 1993). Percentage of initiations and responses for both participants in each dyadic interaction was computed by dividing the individual's total number of initiations or responses by the total number of exchanges that occurred within the dyadic conversation.

Frequency of equivocal roles was summarized differently than initiation or responses. Equivocation, or use of neutral communication acts, occurred frequently as participants confirmed messages without supplying new semantic content in the form of a question, comment, or response. Therefore, equivocal communication behaviors were best represented at the level of the individual communication act, not the exchange; percentages were therefore calculated by dividing the frequency of equivocal acts by the participant's total acts within an experimental session. Communicative act functions reported for participants with aphasia include: joint attention, request for social interaction, provision of specific semantic information, and emotional/confirmatory responses and fillers (see Appendix E); functions reported for peer communication partners (PCPs) were requests for specific semantic information, request for clarification, provision of specific semantic information and emotion/confirmatory responses and fillers (see Appendix E).

Experimental task. Over six experimental sessions, one experimental task was implemented: 1) conversational story telling task (Beukelman & Mirenda, 2005; Garrett & Huth, 2000). For this task participants with aphasia shared personal stories with PCPs; personal stories were pre-selected so that they could be represented appropriately for each condition.

Prior to beginning the study, participants with severe aphasia and their primary caregivers identified three stories that were personally relevant to the participant with severe aphasia and could be supplemented with photographs representing the interactive context in which the story occurred. Personal events chosen for the narratives occurred within the past fifteen years but not sooner than six months prior to enrollment in the study.

In one of the pre-experimental session, participants with aphasia and their primary caregivers cooperatively told their stories to the experimenters. Each story included at least one stated main idea and one stated detail, as well as at least one inferred main idea and one inferred detail (Helm-Estabrooks & Albert, 1991). The experimenters then represented the elements of each story symbolically on the experimental displays by programming individual symbols and/or photos with the corresponding messages.

Vocabulary used to convey each message did not exceed the 8th grade reading comprehension level as determined by using *Flesch Reading Ease* and *Flesch Kincaid Grade Level* criteria from Microsoft Word™. The following story from the *Manual of Aphasia Therapy* had a 5th grade reading level (Helm-Estabrooks & Albert, 1991):

> "*My cousin was lost in the mountains when a blinding snowstorm hit while she was hiking. Her food supplies ran out in two days. Melted snow kept her alive until she was found five days later. She was rescued when a helicopter spotted her red scarf."* (Helm-Estabrooks & Albert, 1991).

It contained at least two main ideas: one that was stated, "*my cousin was hiking in the mountains*," and one that was inferred, "*she was lost because of a blinding snowstorm*"

(Helm-Estabrooks & Albert, 1991). It also contained two details, one that is stated, *"she ate melted snow to stay alive*" and one that was inferred, "*the helicopter found her"* (Helm-Estabrooks & Albert, 1991).

Prior to each conversational story telling task, the experimenter reviewed key story elements with each participant with aphasia. In the *no display* condition, the experimenter used augmented input (i.e., written key words, gestures) to ensure that the participants with aphasia understood the story. In the conditions involving displays (*VSD or TGD*), the experimenter reviewed key elements of the story by activating each symbolically represented message on the SGD. After the experimenter modeled how to communicate story elements by accessing them on the device, the participants with aphasia activated the messages and received corrective feedback, as needed. For example, when participants with aphasia accessed semantically similar symbols on the device, or did not activate symbols in story order; corrective feedback was provided to identify the differences in meaning for each symbol relative to the story being told, and to signify the importance of activating symbols in story order. This allowed for the participants with aphasia to correct errors prior to sharing their stories with PCPs. The participants with aphasia were then informed that they could practice activating specific messages independently.

Before leaving the room, the experimenter ensured that the participants with aphasia understood the task of conveying all of the elements of their story to the PCP. The participants with aphasia were given a 5-minute break between personal narrative reviews with the experimenter and the conversational story telling task with the PCP to avoid echolalic or methodical activation of messages on the SGD. Participants with

aphasia frequently took this time to practice activating symbols on the SGD to share their story with the PCPs.

When review and practice was complete, the conversational story telling task began when the PCPs entered the room, sat at the table, and initiated the conversation. Each PCP was given a printed list of three questions (e.g., "How long was your road trip?") that pertained to the primary participants' stories; he/she was instructed to request this information from the participant with aphasia at some point during the conversation (see Appendix F). The PCPs were also reminded to ask no more than 2 yes/no questions during the conversation via verbal and printed instructions on the same cue card. The list of questions provided to the PCP changed for each session to correspond with the conversational topic, but questions did not change within topics. The PCPs were encouraged to respond as naturally as possible to the participants with aphasia.

Experimental stimuli. The stimulus involving *no display* on the SGD (Condition A) served to identify the communicative effectiveness and efficiency of story telling by participants with aphasia in the absence of symbolically represented messages. Participants had access only to an index card with the printed topic name. The device was placed within visual field to match environmental setting with Conditions B (VSD) and C (TGD). Participants were encouraged to use any modality, including gestures and writing, to supplement their verbal output when sharing their story with the PCPs.

During Conditions B (VSD) and C (TGD), the pictorial stimuli described previously were made available to the participants with aphasia. The order of messages representing story elements symbolically on the VSD or TGD was systematically altered to avoid echolalic/methodical activation of the messages. Activation of the display on the

SGD surface occurred by direct selection and a message was produced via synthesized speech.

A *VSD* (Condition B) contained personalized photographs consisting of objects, individuals and events in the interactive context in which they occurred. Each story element was represented with a *visual scene* containing approximately 1-3 target story elements (e.g., people, objects, relational actions) with a background, foreground and supplemental text. To convey the story using VSD, messages were stored and represented as follows:

> "*My cousin was lost in the mountains* (Picture 1= participant's cousin in the mountains; supplemental text= lost cousin), ~~*when*~~ *a blinding snowstorm hit* (Picture 2= a snowstorm that created poor visibility; supplemental text= snowstorm) ~~*while*~~ *she was hiking* (Picture 3= participant's cousin hiking; supplemental text=hiking) . . . . ~~*when*~~ *a helicopter spotted her red scarf* (Picture 6= helicopter search; supplemental text=red scarf) (See Figure 2.1).

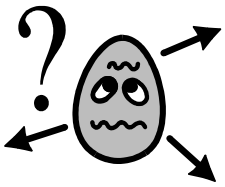
Figure 2.1 Sample VSD Symbols

	Photograph	Supplemental Text	Stored Message
Picture 1		Lost Cousin	"My cousin was lost in the mountains."
Picture 6		Rescue	"She was rescued when a helicopter spotted her red scarf."

In this manner, picture one contains five semantic concepts (e.g., my, cousin, in, mountains) that are represented by a picture of the participant's cousin who appears to be lost in the mountains, and the picture is supplemented with text containing key words in the message. The message stored would be the following seven words: "My cousin was lost in the mountains." The text label representing the spoken message would be: "cousin in mountains".

A *TGD* (Condition C) was the other display stimulus used to organize messages represented symbolically on the SGD. The TGD contained no more than approximately 10-12 Picture Communication Symbols (PCS; Mayer Johnson ^{TM}). Each PCS conveyed 1-2 concepts with a discrete line drawing and no background illustration or interactive context (see Figure 2.2). Symbols were selected from a large corpus of available symbols based on their relatedness to the theme, story, or communicative context. No more than 2-3 pictured semantic concepts pertaining to the story sequence associated with the story topics were identifiable by a jury of three investigators. Individually stored messages contained no less than two and no more than fifteen words. For example, to convey the first part of the sentence in the story above using TGD, messages would be stored and symbolically represented as follows:

Figure 2.2 – Sample TGD symbols

	Symbol	Supplemental Text	Stored Message
Symbol 1		Cousin	"My cousin"
Symbol 2		Lost	"was lost"

In the example depicted in Figure 2.2, symbol 1 represents 2 semantic concepts (e.g., My, cousin). Each symbol on the SGD with TGD contained no more than 7 words in the stored message. Each concept represented symbolically could be sequenced and combined in appropriate story order to re-tell the story.

Session sequence

Pre-experimental sessions. Prior to the experimental sessions, two pre-experimental sessions were conducted. In the first preliminary session, participants with aphasia and PCPs were screened and tested to obtain a complete and current communication profile. In the second preliminary session, participants were given an opportunity to familiarize themselves with both of the SGD display types to be used in this study. They also familiarized themselves with the SGD system's basic operation, given experimenter instruction and demonstration. This familiarization session lasted approximately one hour.

Experimental sessions. A total of six experimental sessions that lasted approximately 30 minutes each were conducted for three participant dyads. A minimum of one and no more than two sessions were conducted every seven days.

Table 2.4. Order of experimental sessions and tasks across participants.

	Session 1	**Session 2**	**Session 3**	**Session 4**	**Session 5**	**Session 6**
Participant Dyad 1	A Topic 1	B Topic 2	C***** Topic 3	A Topic 2	C Topic 1	B Topic 3
Participant Dyad 2	B Topic 2	C Topic 3	A Topic 1	B Topic 3	A Topic 2	C Topic 1
Participant Dyad 3	C Topic 3	B Topic 1	A Topic 2	C Topic 1	A Topic 3	B Topic 2
****Key****	Conditions: A=no display, B= Visual Scene Display, C= Traditional Grid Display					

Table 2.1 (above) graphically displays the order of experimental sessions and tasks. In the first session, both participants engaged in a conversational story telling task using one of the SGD display conditions. The order of the conversational tasks for Condition A (*no display*), Condition B (*VSD*), and Condition C (*TGD*) were counterbalanced to control for possible order and practice effects.

Materials and instrumentation

Testing, training and data collection sessions took in a quiet room on the 4th floor of Fisher Hall in the Duquesne University Speech-Language-Hearing Clinic for Dyads 1 and 2. However, all sessions for Dyad 3 were conducted in the participant with aphasia's home because of difficulty with travel to the clinic location. Testing environments were equipped with a table and chairs positioned adjacently at a 45 degree angle to one another, and minimal distracters. Each session was videotaped with a Sony camcorder

that was fixed and mounted in a position in which both participants could be seen, as well as the display of the device when was used. The video camcorder was triggered by an experimenter, and videotape data were collected until the conversational interaction was complete, the topic was exhausted, or for a maximum of 10 minutes.

The SGD used in this study was the *Dynavax V-Max,*from *DynaVox Systems*. The device had the capability of producing synthesized AT&T voices speech output upon icon activation. *Dynavox Series 5* software provided the capability of using a touch screen to activate communicatively significant messages, and could store icons or photographs. The system was capable of importing photographs for personalized message representation. The system was also capable of providing supplemental text to facilitate comprehension of the messages under a particular symbol.

Data summarization and analysis.

Data were collected, transcribed and analyzed for all three participants with severe aphasia and their PCPs for a total of 6 sessions for each dyad. The primary experimenter then segmented the transcription into dyadic *exchanges*, or units of communication that conveyed a single idea, according to segmentation rules defined in Appendix E. The two experimenters, JL and LF, then formed a jury to resolve any difficult segmentation decisions, with the primary advisor, KG, serving as a third jury member in cases of split decisions. The entire exchange then was coded for *accuracy* (see Appendix E), or the success with which the meaning of the exchange was conveyed to the intended partner.

Exchanges were further subdivided into *acts*, or communicative behaviors that conveyed a single communicator's message, confirmation, or supplemental information within a single exchange. At the level of individual *acts,* coders identified the *role* of the communicator (initiation, response, or equivocal act) and the communicative *function* of individual acts. A jury approach was also used to resolve disagreements or confusions regarding act, role, or function.

All codes were entered into a spreadsheet and tallied to obtain a total frequency count for each behavior. Descriptive data (means, standard deviations, ranges) were summarized for individual participants in tabular form. Descriptive data were compared within individual participants and across participants, topics, and conditions by graphing the information. Variable analyses are described in further detail below.

Data were averaged for the two replications of each story topic and condition within each of the three dyads, but were not collapsed across dyads due to inter-dyadic variability.

In addition, the percentage of functions within an interaction was calculated by dividing the total number of acts serving a specific function for each participant by the total number of participant acts attempted within an interaction. Mean percentage of functions then was averaged across conditions and stories.

Reliability

To ensure *procedural reliability* across experimental sessions, data collectors followed session protocol checklists for each session (see Appendix G).

To determine *inter-rater coding reliability*, the two primary data collectors (JS and LF) systematically segmented and re-coded 10% of the transcriptions for each dependent variable for each dyad. A third member of a coding jury, KH, was available to resolve discrepancies through discussion until consensus was achieved. To identify sessions for which reliability was calculated, the three conditions were randomly assigned to each dyad, and the session within the condition was selected with a coin flip (Dyad 1, Condition C, Session 2; Dyad 2, Condition B, Session 2; Dyad 3, Condition A, Session 2). Three minutes from each of the three, 10-minute sessions was resegmented and recoded for reliability calculation, for a total of 9 minutes, or 5%, of the data. The original coded data were compared to the second data coding and reliability was computed for each variable by dividing the number of agreements by the total number of agreements and disagreements, which was then multiplied by a 100.

Overall inter-rater reliability was 87% for segmentation. Interrater reliability for each variable was as follows: 90% for exchange initiations, 80% for participants with aphasia's communicative roles, 88% for peer communication partner's communicative role, 83% for communicative function (across participants), and 92% for communicative success.

Chapter 3

RESULTS

Conversations about personal stories pertaining to the person with aphasia were transcribed verbatim from video recordings. Six conversational interactions were transcribed for each of the three dyads, for a total of 18 transcribed conversations. Each transcription pertained to a single experimental story. The interactions between the person with aphasia and the PCP was segmented into *exchanges*, or the communication required to convey a single idea or concept. Communication *acts*, or all of the back and forth turns comprising each exchange, were identified for both dyad members. The number of exchanges, acts, and proportion of acts per exchange were calculated for each experimental conversation. Individual communication acts were then coded for *communication role*, *success,* and *communicative function*.

Dyadic Variables

Data describing the overall conversational performance of each dyad are described first. Dyadic interaction variables include: 1) mean number of *exchanges* across conditions and story topics (See Tables 3.1, 3.3, & 3.5); 2) mean number of *acts* across conditions and story topics (See Tables 3.1, 3.3, & 3.5); 3) mean number of *acts* per exchange across conditions and story topics (See Tables 3.1, 3.3, & 3.5); and 4) communicative *success* (See Tables 3.2, 3.4, & 3.6). Patterns seen within and across dyads also are discussed (See pages 37, 41, 45 & 46).

Dyad 1

Mean number of exchanges across conditions (See Table 3.1). For dyad 1, the mean number of exchanges was similar across conditions. However, large standard deviations interfered with definitive conclusions. In *Condition A (no display)*, Dyad 1 communicated a mean of 27 (+/-7.5) exchanges. For Condition B, Visual Scene Displays (VSD), Dyad 1 communicated a mean of 30 (+/- 9.5) exchanges. For Condition C, Traditional Grid Displays (TGD), Dyad 1 communicated a mean of 30 (+/- 11) exchanges.

Mean number of exchanges across story topics (See Table 3.1)**.** Again, mean data were similar across story topics, but large standard deviations existed. For the story topic "Cars," Dyad 1 communicated a mean of 31 (+/- 10.5) exchanges, across conditions B and C. For the story topic "Ranger Training," Dyad 1 communicated a mean of 29 (+/- 10) exchanges, across conditions A and B. For the story topic "Wedding Ceremony," Dyad 1 communicated a mean of 27 (SD: +/- 7.5) exchanges, across Conditions A and C.

Mean number of acts across conditions (See Table 3.1)**.** This measure of the number of turns required to co-construct and clarify communication of a single idea was also similar across conditions for Dyad 1. In the no display condition, Dyad 1 produced a mean of 140 (+/-50) total acts. For Condition B, Dyad 1 used a mean of 144 (+/- 49) total acts. For Condition C, a mean of 139 (+/- 42) total acts were generated.

Mean number of acts across story topics (See Table 3.1)**.** For the story topic "Wedding Ceremony," Dyad 1 used a mean of 144 (+/- 47) total acts to communicate across Conditions A and C. For the story topic "Ranger Training," Dyad 1 generated a mean of 141 (+/- 51) total acts to communicate across Conditions A and B. For the story

topic "Cars," Dyad 1 used a mean of 138 (+/- 43) total acts across conditions B and C. Overall, mean frequency of acts was comparable when computed across conditions versus story topics.

Mean number of acts per exchange across conditions (see Table 3.1). In Condition A, Dyad 1 used a mean of approximately 5 acts per exchange to communicate in each of the three display conditions.

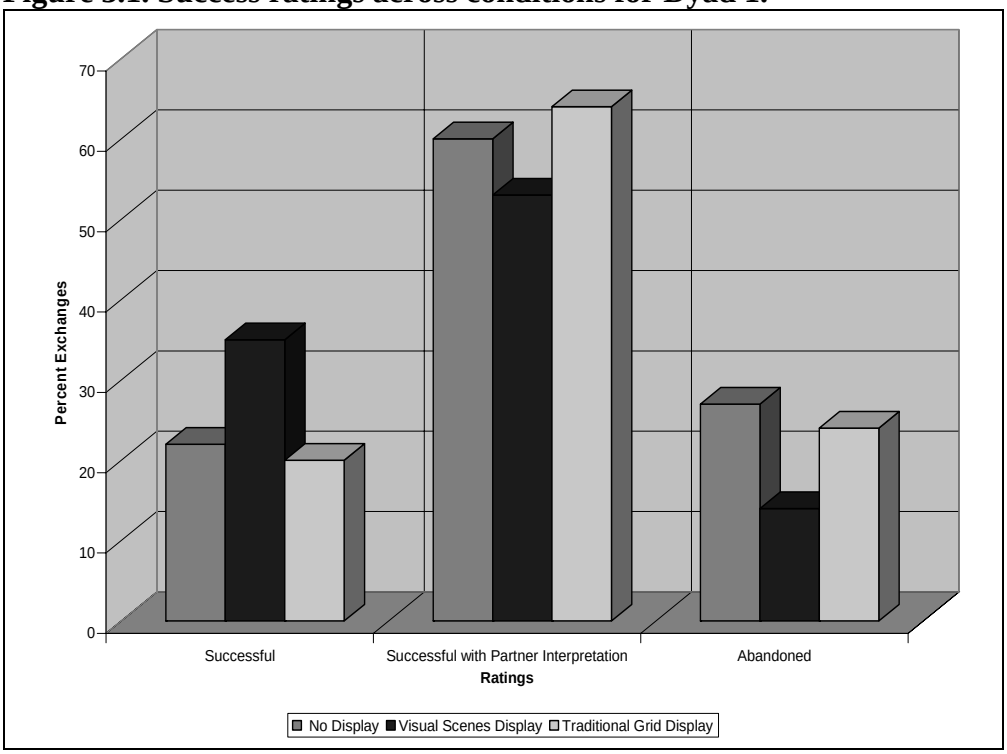
Table 3.1. Mean number of acts and exchanges for Dyad 1.

CONDITION	TOPIC AND STORY ORDER (#)	EXCHANGES	ACTS	
			Total per session	Mean per exchange
No display (A1+A2)	WEDDING (# 1)	34	190	5.6
	RANGER TRAINING (# 4)	19	90	4.7
MEAN PER CONDITION		**26 (+/- 7.5)**	**140 (+/- 50)**	**5 (+/- .55)**
VSD (B1 + B2)	RANGER TRAINING (# 2)	39	192	4.9
	CARS (# 6)	20	95	4.8
MEAN PER CONDITION		**29 (+/- 9.5)**	**143 (+/- 48.5)**	**4.85 (+/- .5)**
TGD (C1 +C2)	CARS (# 3)	41	180	4.4
	WEDDING (# 5)	19	97	5.1
MEAN PER CONDITION		**30 (+/- 11)**	**138 (+/- 41.5)**	**4.7 (+/- 3.5)**

Success ratings across conditions. As seen in Table 3.2, the highest percentage of successful exchanges (n = 3) for Dyad 1 occurred in Condition B (VSD), (35%; +/- 4.5%), followed by Condition A, the no display condition (22%; +/- 0) and Condition C (TGD) (20%; +/-10%). Messages requiring some partner interpretation (n = 2) occurred most frequently in Condition C (64%; +/- 2%), when individual icons were displayed. This was followed by Condition A (no display) (60%; +/-8%) and then by Condition B,

the visual scenes condition (53%; +/-2%). The highest mean percentage of inadequate messages (n = 1) (27%; +/-1.5%) for Dyad 1 occurred in Condition A when no display was available, followed by the TGD display (mean = 24%; +/- 3%). Condition B, the visual scenes display condition, had only 14% (+/- 9%) inadequate messages. Few instances of no communication attempts (n = 0) were observed in this dyad.

Figure 3.1. Success ratings across conditions for Dyad 1.



Success ratings across story topics (see Table 3.2). The highest mean percentage of successful messages (n = 3) occurred for the story topic "Ranger Training" (32%; +/-1%), across Conditions A (no display) and B (VSD). For the story topic "Cars," 30% (+/- 10%) of the exchanges were as successful, across Conditions B (VSD) and C (TGD). The "Wedding Ceremony" topic created fewer successful exchanges (16%, +/-4%) across Conditions A (no display) and C (TGD). The story topic, "Wedding Ceremony" yielded

the highest percentages of exchanges requiring partner interpretation (n = 2) (mean of 66%; +/- 3%), across Conditions A (no display) and C (TGD). Dyad 1 demonstrated 61% (+/- 6%) of exchanges requiring partner interpretation for the story topic of cars, across Conditions B (VSD) and C (TGD). The lowest mean percentage of exchanges requiring partner interpretation was 52% (+/- 1%) for the story topic "Ranger Training," across Conditions A (no display) and B (VSD). The highest mean percentage of abandoned messages for Dyad 1 occurred for the story topics "Wedding Ceremony" (mean = 25%; +/- 4%), across Conditions A (no display) and C (TGD) and "Ranger Training" (mean = 25%; +/- 1.5%) across Conditions A (no display) and B (VSD). The fewest number of inadequate messages (n = 1) occurred for the story topic "Cars," in which 16% (+/- 11%) of the messages were given a rating of "1", across Conditions B (VSD) and C (TGD).

Table 3.2. Success ratings for Dyad 1 across conditions and story topics.

Condition	Topic and Story order	3-ratings		2- ratings		1- ratings	
		Total per session	% of 3-rated exchanges per session	Total per session	% of 2-rated exchanges per session	Total per session	% of 1-rated exchanges per session
No Display (A1 + A2)	WEDDING (# 1)	4	12%	23	68%	10	29%
	RANGER TRAINING (# 4)	6	32%	10	53%	5	26%
MEAN PER CONDITION		**5.5 (+/- .5)**	**22% (+/- 10)**	**16 (+/- 6.5)**	**60% (+/- 7.5)**	**7.5 (+/- .5)**	**27% (+/- 1.5)**
VSD (B1 + B2)	RANGER TRAINING (# 2)	12	31%	20	51%	9	23%
	CARS (# 6)	8	40%	11	55%	1	5%
MEAN PER CONDITION		**10 (+/- 2)**	**35% (+/- 4.5)**	**15 (+/-4.5)**	**53% (+/- 2)**	**5 (+/-4)**	**14% (+/- 9)**
TGD (C1 + C2)	CARS (# 3)	8	20%	27	66%	11	27%
	WEDDING (# 5)	4	20%	12	63%	4	21%
MEAN PER CONDITION		**6 (+/- 2)**	**20% (+/- 0)**	**19 (+/- 7.5)**	**64% (+/- 1.5)**	**7.5 (+/- .5)**	**24% (+/- 3)**

Patterns within Dyad 1. A unique pattern related to topic interest emerged in Dyad 1. The participants reduced the number of communication exchanges and acts by approximately half during the second rendition of each story topic (see Table 3.1). For example, the "Wedding" topic was 34 exchanges during the first conversation about this topic but only 19 exchanges during the second telling. Another prominent pattern was that exchanges were communicated more successfully and with less partner co-construction in Condition B with the Visual Scenes Display; the number of co-constructed, as well as abandoned, exchanges also decreased in this condition (Figure 3.1).

Dyad 2

Mean number of exchanges across conditions (see Table 3.3). In Condition A (no display), Dyad 2 communicated a mean of 40 (+/-3.5) exchanges. For Condition B, Visual Scene Displays (VSD), Dyad 2 communicated a mean of 38 (+/- 3) exchanges. The most exchanges (mean = 50; +/- 2.5) occurred for Condition C, Traditional Grid Displays (TGD).

Mean number of exchanges across story topics (see Table 3.3)**.** For the story topic "Jamboree," Dyad 2 communicated a mean of 48 (+/- 4) exchanges across Conditions A (no display) and C (TGD). Dyad 2 communicated a mean of 41 (+/- 6) exchanges across Conditions B (VSD) and C (TGD) for the story topic "Road Trip". For the story topic "4-Wheeling," Dyad 2 communicated the least (mean = 39; +/- 2) number of exchanges across Conditions A (no display) and B (VSD).

Mean number of acts across conditions (see Table 3.3). In Condition A (no display), Dyad 2 generated a mean of 241 (+/- 4.5) total acts, and the mean number of total acts for Condition C (TGD) was similar (mean = 239, +/- 7.5) to Condition A. For Condition B (VSD), the mean number of acts decreased to 183 (+/- 13) total acts.

Mean number of acts across topics (see Table 3.3)**.** The story topic "Jamboree," resulted in the most (mean = 242; +/- 5) total acts across Conditions A (no display) and C (TGD). For the story topic "Road Trip," Dyad 2 used a mean of 215 (+/- 18) total acts across Conditions B (VSD) and C (TGD). For the story topic "4-Wheeling," Dyad 2 used a mean of 208 (+/- 38) total acts, across Conditions A (no display) and B (VSD).

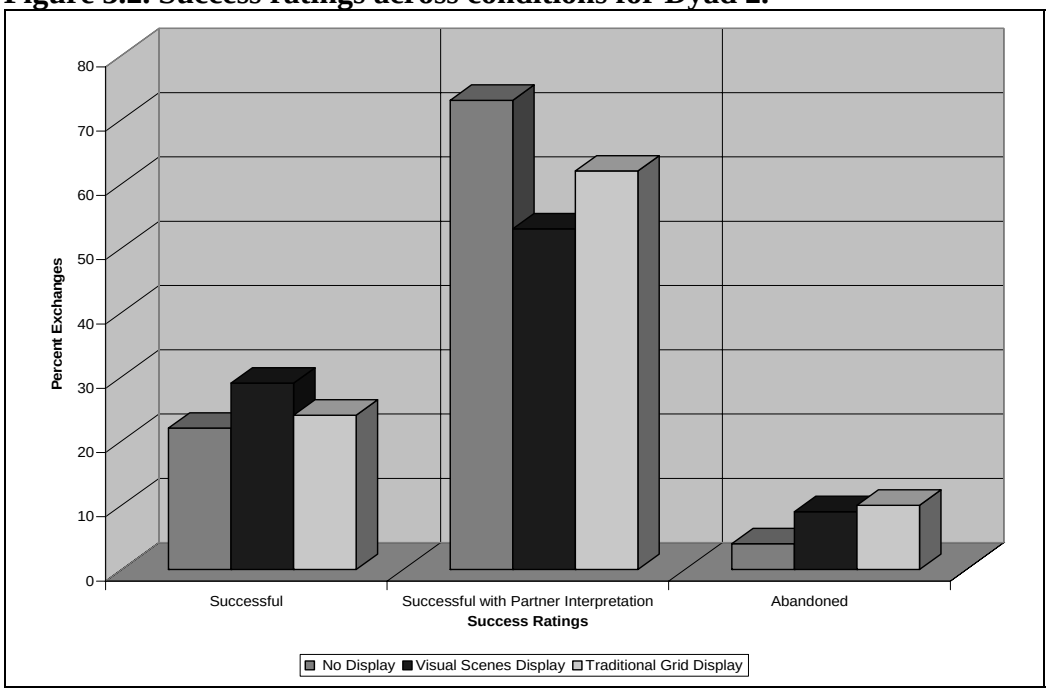
Mean number of acts per exchange (see Table 3.3). In Condition A (no display), Dyad 2 used a mean of 6 (+/-.65) acts per exchange to communicate a single idea, indicating more acts were required to conclude the exchange before participants continued to the next idea than in the AAC display conditions. For Conditions B (VSD) and C (TGD), Dyad 2 used a mean of slightly fewer than 5 acts per exchange to communicate a single idea.

Table 3.3. Mean number of acts and exchanges for Dyad 2.

CONDITION	TOPIC AND STORY ORDER (#)	EXCHANGES	ACTS	
			Total per session	Mean per exchange
No Display (A1+A2)	JAMBOREE (# 3)	44	237	5.4
	4-WHEELING (# 5)	37	246	6.7
MEAN PER CONDITION		**40 (+/- 3.5)**	**241 (+/- 4.5)**	**6 (+/- .65)**
VSD (B1 + B2)	4-WHEELING (# 1)	41	170	4.2
	ROAD TRIP (# 4)	35	197	5.6
MEAN PER CONDITION		**38 (+/- 3)**	**183 (+/- 13.5)**	**4.9 (+/- .7)**
TGD (C1 +C2)	ROAD TRIP (# 2)	47	232	4.9
	JAMBOREE (# 6)	52	242	4.8
MEAN PER CONDITION		**49 (+/- 2.5)**	**237 (+/- 5)**	**4.85 (+/- .05)**

Success ratings across conditions (see Table 3.4). As seen in Table 3.4, the highest percentage (29%; +/- 3%) of successful exchanges (n = 3) for Dyad 2 occurred in Condition B (VSD).Condition C yielded slightly fewer successful exchanges (mean = 24%; +/- 6%), while Condition A (no display) generated a mean of 22% (+/-6%) successful exchanges. The highest percentage of messages requiring partner interpretation (n = 2) was 73% (+/- 2%), which occurred in Condition A (no display). The degree of partner interpretation dropped to a mean of 62% (+/-9%) for Dyad 2 in Condition C (TGD). The lowest mean percentage (mean = 53%; +/-4%) occurred in Condition B (VSD). The most inadequate messages (n = 1) occurred in Condition C (TGD), in which a mean of 10% (+/- 2.5%) exchanges were inadequate. Similarly, in Condition B (VSD) a mean of 9% (+/-5%) of exchanges were inadequate. The lowest mean percentage (4%; +/- 1%) of inadequate exchanges for Dyad 2 occurred in Condition A (no display).

Figure 3.2. Success ratings across conditions for Dyad 2.



Success ratings across story topics (see Table 3.4). The highest percentage of messages that required no partner interpretation (n = 3) for Dyad 2 was a mean of 38% (+/- 3%) of exchanges for the story topic "4-Wheeling," across Conditions B (VSD) and C (TGD). For Dyad 2, the story topic "4-Wheeling" had a mean of 26% (+/-7%) successful exchanges, across Conditions A (no display) and B (VSD). The least successful exchanges (mean = 22% +/-3%) occurred for story topic "Jamboree," across Conditions A (no display) and C (TGD). The story topic that required the most partner interpretation per exchange (n = 2) was "Jamboree" with a mean of 71% (+/- 1%), across Conditions A and C. The story topic "4-Wheeling" required a mean of 63% (+/- 14%) exchanges that required partner interpretation, across Conditions A (no display) and B (VSD). The story topic "Road Trip," required the least amount of partner interpretation (mean = 55%; +/- 2%), across Conditions B (VSD) and C (TGD). The highest percentage (mean = 14%; +/- 1%) of inadequate exchanges (n = 1) occurred for the story topic

"Road Trip", across Conditions B (VSD) and C (TGD). Inadequate exchanges were halved for the story topic "Jamboree" with a mean of 7% (+/-2%), across Conditions A (no display) and C (TGD). Only 4% (+/-1%) of exchanges for the story topic "4-Wheeling" were inadequate, across Conditions A (no display) and B (VSD).

Table 3.4. Success ratings for Dyad 2 across conditions and story topics.

Condition	Topic and Story order	3-ratings		2- ratings		1- ratings	
		Total per session	% of 3-rated exchanges per session	Total per session	% of 2-rated exchanges per session	Total per session	% of 1-rated exchanges per session
No Display (A1 + A2)	JAMBOREE (# 3)	11	25%	31	70%	2	5%
	4-WHEELING (# 5)	7	19%	28	76%	1	3%
MEAN PER CONDITION		**9 (+/- 2)**	**22% (+/- 6)**	**29 (+/- 1.5)**	**73% (+/- 3)**	**1.5 (+/- .5)**	**4% (+/-1)**
VSD (B1 + B2)	4-WHEELING (# 1)	13	32%	24	49%	2	5%
	ROAD TRIP (# 4)	9	26%	20	57%	5	14%
MEAN PER CONDITION		**11 (+/- 2)**	**29% (+/- 3)**	**22 (+/-2)**	**53% (+/-4)**	**3 (+/- 1.5)**	**9% (+/- 4.5)**
TGD (C1 + C2)	ROAD TRIP (# 2)	15	30%	25	53%	6	13%
	JAMBOREE (#6)	10	19%	37	71%	4	8%
MEAN PER CONDITION		**12 (+/- 2.5)**	**24 (+/- 5.5)**	**31 (+/-6)**	**62% (+/-9)**	**5 (+/-1)**	**10% (+/-2.5)**

Patterns within Dyad 2. The first pattern for this dyad was that although more acts per exchange existed in condition A, this did not necessarily result in increased communicative success (Table 3.3). A higher incidence of successful exchanges occurred in Condition B with the Visual Scenes Display than in the other two conditions. However, sessions with VSD or TGD displays also had slightly more abandoned exchanges (see Figure 3.2). Additional data for individual participants also suggest that

this dyad differed from others in that the PCP was the dominant exchange initiator regardless of condition; this finding is discussed in more detail in *Participant with Aphasia* (Dyad 2) and *PCP* (Dyad 2) sections.

Dyad 3

Mean number of exchanges across conditions (see Table 3.5). In Condition A (no display), Dyad 3 communicated a mean of 38 (+/- 5.5) exchanges. A mean of 26 (+/- 3.5) exchanges were communicated in Condition B (VSD). For Condition C (TGD), Dyad 3 communicated a mean of 31 (+/- 14.5) exchanges.

Mean number of exchanges across story topics (see Table 3.5)**.** The most number of exchanges (mean = 44; +/- 1.5) for occurred for story topic "Son's Graduation," across Conditions A (no display) and C (TGD). For the story topic "Hobbies," a communicated a mean of 31 (+/- 1) exchanges, across Conditions A (no display) and B (VSD). The Dyad 3 communicated a mean of only 20 (+/- 3) exchanges for story topic "Family Vacation," across Conditions B (VSD) and C (TGD).

Mean number of acts across conditions (see Table 3.5)**.** In Condition A (no display), Dyad 3 demonstrated a mean of 158 (SD: +/- 30) total acts. A mean of 130 (+/- 61.5) acts were demonstrated in Condition C (TGD). Dyad 3 demonstrated a mean of only 123 (+/- 34) total acts for Condition B (VSD).

Mean number of acts across story topics (see Table 3.5)**.** Dyad 3 demonstrated the most mean number of acts (mean = 190; +/- 2) for the story topic "Son's Graduation," across Conditions A (no display) and C (TGD). For the story topic of "Hobbies", Dyad 3 demonstrated a mean of 142 (+/- 14.5) total acts, across Conditions A (no display) and B

(VSD). A mean of only 79 (+/- 10) acts occurred for the story topic "Family Vacation across Conditions B (VSD) and C (TGD).

Mean number of acts per exchange (see Table 3.5). In Conditions A (no display), B (VSD) and C (TGD), Dyad 3 used a mean of approximately 4 acts per exchange across story topics.

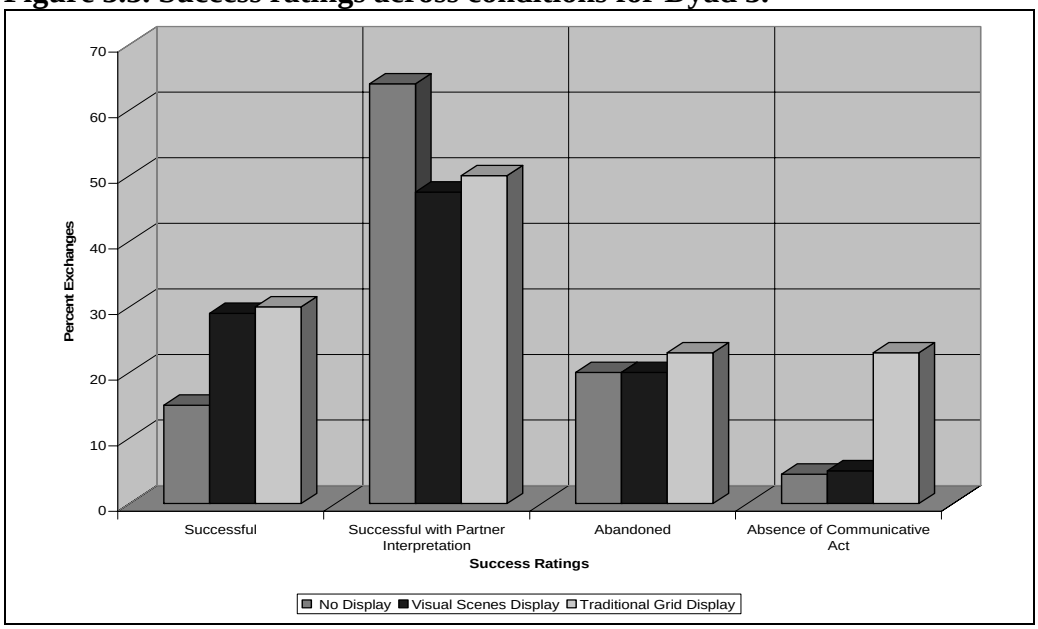
Table 3.5. Mean number of acts and exchanges for Dyad 3.

Condition	TOPIC AND STORY ORDER (#)	EXCHANGES	ACTS	
			Total per session	Mean per exchange
No Display (A1+A2)	HOBBIES (# 3)	32	128	4
	SON'S GRADUATION (# 5)	43	188	4.4
MEAN PER CONDITION		**37 (+/- 5.5)**	**158 (+/- 30)**	**4.2 (+/- .2)**
VSD (B1 + B2)	FAMILY VACATION (# 2)	23	89	3.9
	HOBBIES (# 6)	30	157	5.2
MEAN PER CONDITION		**26 (+/- 3.5)**	**123 (+/- 34)**	**4.6 (+/- 6.5)**
TGD (C1 +C2)	FAMILY VACATION (# 4)	17	69	4.1
	SON'S GRADUATION (# 1	46	192	4.2
MEAN PER CONDITION		**31 (+/- 14.5)**	**130 (+/- 61.5)**	**4.15 (+/- .05)**

Success ratings across conditions (see Table 3.6). The highest percentage (mean = 30%; +/-11%) of messages that required no partner interpretation (n = 3) for Dyad 3 occurred in Condition C (TGD). Similarly, for Condition B (VSD) a mean of 29% (+/- 6%) of the exchanges were successful for Dyad 3. Dyad 3 demonstrated the lowest percentage (mean = 15%; +/- 2%) of successful exchanges in Condition A (no display). The most partner interpretation (n = 2) needed per exchange (64%; +/-6%) occurred in Condition A (no display). Dyad 3 demonstrated a mean of 50% (+/-4%) exchanges that

needed partner interpretation in Condition C (TGD). The fewest number of partner interpreted exchanges (47%; +/-5%) occurred in Condition B. Dyad had the highest mean percentage (23%; +/-1%) of inadequate messages (n = 1) in Condition C (TGD). Similarly, a mean of 20% (+/- 2; +/-7%) of inadequate exchanges occurred in Conditions A (no display) and B (VSD).

Figure 3.3. Success ratings across conditions for Dyad 3.



Success ratings across story topics (see Table 3.6). The highest percentage (mean = 38%; +/-3%) of successful exchanges (n = 3) for Dyad 3 was demonstrated for the story topic "Family Vacation," across Conditions B (VSD) and C (TGD). The story topic "Hobbies" drops to a mean of 20% (+/-3%) successful exchanges, across Conditions A (no display) and B (VSD). The story topic "Son's Graduation" had the least successful (mean = 17%; +/-3%) exchanges, across Conditions A (no display) and B (VSD). The most partner interpretation needed per exchange (n = 2) occurred for story topic "Son's

Graduation" with a mean of 65% (+/-6%), across Conditions A (no display) and C (TGD). For the story topic "Hobbies," the percentage of exchanges requiring partner interpretation was a mean of 53% (+/- 6%), across Condition A (no display) and B (VSD). For Dyad 3, the story topic "Family Vacation" created the lowest mean percentage (45%; +/-4%) occurred with story topic "Family Vacation," across Conditions B (VSD) and C (TGD). The highest mean percentage of inadequate (n = 1) for occurred for the story topic "Hobbies", which was a mean of 23% (+/- 4%) across Conditions A (no display) and B (VSD). A similar percentage (22%; +/- 0%) occurred for the story topic "Son's Graduation", across Conditions A (no display) and C (TGD). The lowest mean percentage of inadequate exchanges for Dyad 3 was 19% (+/-6%), in which the story topic "Family Vacation" was communicated across Conditions B (VSD) and C (TGD).

Table 3.6. Success ratings for Dyad 3.

Condition	Topic and Story order	3-ratings		2- ratings		1- ratings	
		Total per session	**% of exchanges per session**	**Total per session**	**% of 2-rated exchanges per session**	**Total per session**	**% of 1-rated exchanges per session**
No Display (A1 + A2)	HOBBIES (# 3)	5	17%	19	59%	6	19%
	SON'S GRADUATION (# 5)	6	14%	30	70%	7	22%
MEAN PER CONDITION		**5.5 (+/- .5)**	**15% (+/- 1.5)**	**24 (+/-5.5)**	**64% (+/- 6)**	**6.5 (+/-5)**	**20% (+/-1.5)**
VSD (B1 + B2)	FAMILY VACATION (# 2)	8	35%	11	48%	3	13%
	HOBBIES (#6)	7	23%	14	47%	8	27%
MEAN PER CONDITION		**7.5 (+/- .5)**	**29% (+/- 6)**	**12 (+/-1.5)**	**47.5% (+/- .5)**	**5.5 (+/-.5)**	**20% (+/- 7)**
TGD (C1 + C2)	FAMILY VACATION (# 4)	7	41%	7	41%	4	24%
	SON'S GRADUATION (#1-MAKE-UP)	9	20%	27	59%	10	22%
MEAN PER CONDITION		**8 (+/-1)**	**30% (+/-10.5)**	**17 (+/-10)**	**50% (+/-9)**	**7 (+/-3)**	**23% (+/-1)**

Patterns within Dyad 3. A topic interest effect is reflected in the number of exchanges and acts across conditions. For example, the story topic "Son's Graduation" had a consistently high number of acts and exchanges across Conditions A (no display) and C (TGD) (see Table 3.5). Another pattern was that for Condition B, Visual Scenes Display and Condition C, Traditional Grid Display, exchange success nearly doubled for Dyad 3, and the number of co-constructed exchanges also decreased in these conditions.

Patterns across dyads.

All three dyads used between 4-6 acts to convey a single, topically-related idea across conditions, suggesting consistent levels of partner co-construction as well as frequency of breakdowns across dyads and conditions. Dyads 1 and 3 communicated approximately 30 exchanges per topic whereas Dyad 2 communicated approximately 40 per topic. Dyads 1 and 2 consistently showed a decrease in the number of acts and exchanges during the second retelling of each story topic, but this did not occur during Dyad 2's conversations. With regard to success, all dyads showed an increase in the number of successful exchanges within the VSD condition in comparison with the no display condition. However, the increase was least noticeable for Dyad 2. In addition, VSD exchanges required less co-construction and interpretation than the no display condition and the TGD conditions (see Figures 3.1-3.3), as revealed in the reduced percentage of number of exchanges needing co-construction.

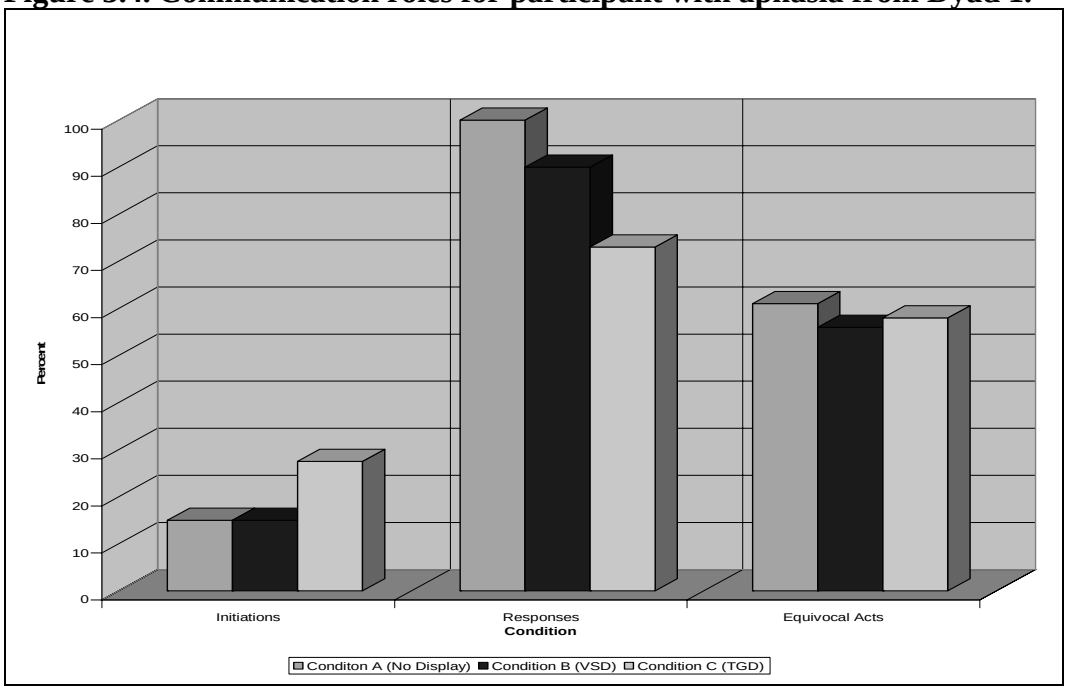
Individual Participant Variables

Individual participant variables include: 1) communicative *role* (See Table 3.7, 3.9 and 3.11); and 2) *function* (See Tables 3.8, 3.10 & 3.12) across conditions and story topics. Individual and group patterns in these data were described for participants with aphasia and their PCPs (see pages 51, 57, & 63).

Participant with Aphasia (Dyad 1)

Initiations per conversation across conditions and story topics (see Table 3.7). This participant initiated a mean of 13% (+/-2%) of the exchanges in Condition A (no display). For Condition B (VSD), this participant with aphasia initiated a mean of 15% (+/- 5%) of the exchanges. Condition C (TGD) elicited the most initiations from this participant with aphasia (27%; +/- 1.5%). The percentage of his initiative attempts when calculated across story topics was different from across conditions. The most attempted initiations occurred for "Wedding Ceremony," (mean = 20.5%; +/- 5.5%), closely followed by the "Ranger Training" story topic (mean = 15.5%; +/- 4).

Figure 3.4. Communication roles for participant with aphasia from Dyad 1.



Initiations, Reesponse and Equivocal Reponses do not add up to 100% because Response and Equivocal responses can occur greater than one time in an exchange, while initiations cannot. In addition, some initiations were abandoned across condition.

Responses per exchange across conditions and story topics (see Table 3.7). This participant with aphasia provided responses during 100% (+/- 5%) of all exchanges in Condition A (no display). Under Condition B (VSD), the mean percentage dropped to 90% (+/-0%). The lowest percentage of responses (74%; +/- 6%) for this participant occurred in Condition C (TGD). Similar percentages were calculated for story topics.

Equivocal acts across conditions and story topics (see Table 3.7). This participant did not demonstrate a high variance in the percentage of equivocal acts across conditions or stories. Under Condition A (no display), this participant demonstrated a mean of 55 % (+/- 6%) equivocal acts, 56% (+/- 1%) equivocal acts occurred in Condition B (VSD) and 58% (+/- 2) occurred in Condition C (TGD). Percentages calculated for equivocal acts across story topics were generally similar to the percentages across conditions. Equivocal

acts were relatively constant across dyads and conditions and therefore are discarded from this point forward; to maintain a complete representation of data collected, equivocal acts have not been removed from tables or graphs.

Table 3.7. Frequency and mean percentage of communication roles across sessions and across stories for participant with aphasia (Dyad 1).

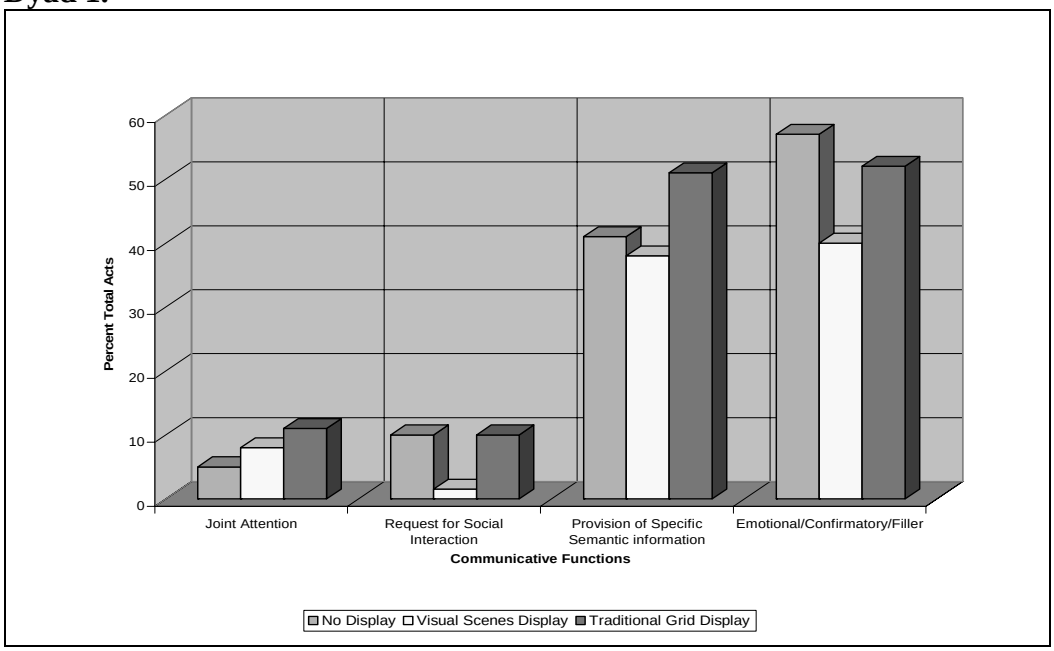
Conditions	TOPIC AND STORY ORDER (#)	INITIATIONS		RESPONSES		EQUIVOCAL	
		Frequency per session	Mean % per session	Frequency per session	Mean % per session	Frequency per session	Mean % of acts
No Display (A1 +A2)	WEDDING (# 1)	5	15%	34	100%	60	61%
	RANGER TRAINING (# 4)	2	11%	20	100%	21	49%
MEAN PER CONDITON		**3 (+/-.5)**	**13% (+/- 2)**	**27 (+/- 7)**	**100% (+/- 0)**	**40 (+/- 19.5)**	**55% (+/- 6)**
VSD (B1 + B2)	RANGER TRAINING (# 2)	7	20%	35	90%	53	55%
	CARS (# 6)	2	10%	18	90%	26	57%
MEAN PER CONDITION		**4 (+/- 2.5)**	**15% (+/-5)**	**26 (+/- 8.5)**	**90% (+/- 0)**	**39 (+/- 13.5)**	**56% (+/- 1)**
TGD (C1 + C2)	CARS (# 3)	12	29%	28	68%	51	56%
	WEDDING (# 5)	5	26%	15	79%	30	60%
MEAN PER CONDITION		**8 (+/- 3.5)**	**27.5% (+/- 1.5)**	**21 (+/- 6.5)**	**73% (+/- 5.5)**	**40 (+/- 10.5)**	**58% (+/-2)**

Mean percentage of joint attention functions across conditions (see Table 3.8). This participant created joint attention in 5.5% (+/- 5.5%) acts for Condition A (no display). A mean of 8.5% (+/-5.5%) of this participant's acts functioned to create joint attention in Condition B (VSD), and a mean of 11% (+/-3%) of his acts established joint attention for Condition C (TGD).

Mean percentage of join attention functions across story topics (see Table 3.8). The greatest mean percentage of acts (mean = 8.5%; +/- 4.5%) serving joint attention occurred for story topic "Cars," across Conditions B (VSD) and C (TGD). A mean of 7.5% (+/- 4.5%) of acts created joint attention for the story topic "Wedding Ceremony",

across Conditions A (no display) and C (TGD). Similarly, a mean of 7% (+/-7%) of this participant's acts established joint attention during the story topic "Ranger Training," across Conditions A (no display) and B (VSD).

Figure 3.5. Function of communicative acts for participant with aphasia from Dyad 1.



Communicative Act Functions may not add up to 100% because one act was capable of serving more than one communicative function.

Mean percentage of requests for social interaction across conditions and topics. Few requests for social interaction occurred in this study. The mean percentage of requests for social interaction was 1% (+/-1%) in Conditions A (no display) and C (TGD). Similarly, this participant demonstrated a mean of 1.5% (+/- 1.5%) requests for social interaction in Condition B (VSD).

Mean percentage of specific semantic information acts across conditions. Under Condition A (no display), the mean percentage of specific semantic information provided was 41% (+/-1%). This mean was similar (38%; +/- 14%) in Condition B (VSD). The

highest percentage of acts providing specific semantic information (mean = 51%; +/- 1%) occurred in Condition C (TGD).

Mean percentage of specific semantic information acts across story topics. The most number of acts providing specific semantic information was 47% (+/-5%) and occurred for the story topic "Ranger Training," across Conditions A (no display) and B (VSD). A slightly lower mean of 45% (+/-5%) of acts providing specific information occurred for the story topic "Wedding Ceremony" , across Conditions A (no display) and C (TGD). The lowest mean percentage of specific semantic information provided (mean = 38%; +/-14%) occurred for the story topic "Cars," across Conditions B and C.

Mean percentage of Emotional/Confirmatory/Filler (ECF) acts across conditions. The mean percentage of emotional/confirmatory/filler acts was 57% (+/-1%) in Condition A (no display). He produced the fewest ECF acts under Condition B (41%; +/- 18.5%). However, the number of ECF acts increased by approximately ten percent to 52% (+/-4%) in Condition C.

Mean percentage of ECF acts across story topics. This participant with aphasia demonstrated the lowest percentage of ECF acts for the story topic "Cars" (35%) across Conditions B and C. This participant's ECF acts increased approximately twenty percent to 57% (+/- 1) in the story topic "Wedding Ceremony", across Conditions A and C. Similarly, for story topic "Ranger Training", he demonstrated a mean of 57.5% ECF acts across Conditions A and B.

Table 3.8 Frequency and mean percentage of communication functions across conditions and across stories for participant with aphasia (Dyad 1).

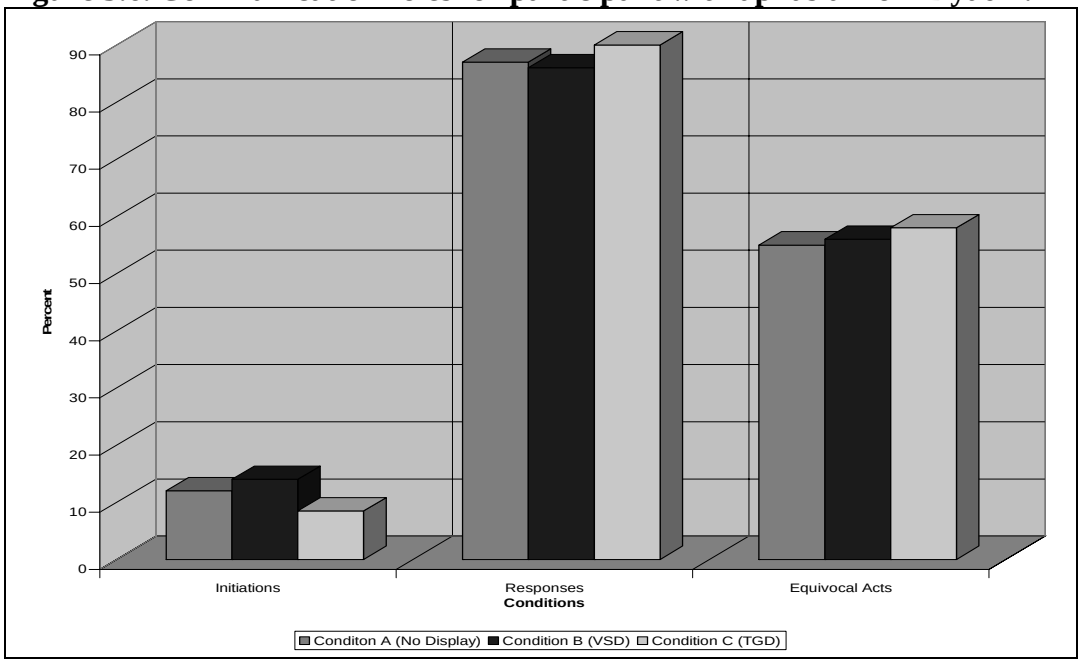
Condition	Topics and Story Order (#)	Joint Attention		Request for Social Interaction		Provision of Specific Semantic Information		Emotional/ Confirmatory Responses/ Fillers	
		Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts
No Display (A1 + A2)	Wedding (# 1)	11	11%	0	0%	40	40%	57	58%
	Ranger Training (# 4)	0	0%	1	20%	18	42%	24	56%
MEAN PER CONDITION		**5 (+/- 5.5)**	**5% (+/- 5.5)**	**.5 (+/- .5)**	**10% (+/- 10)**	**29 (+/- 11)**	**41% (+/- 1)**	**40 (+/- 16.5)**	**57% (+/-1)**
VSD (B1 + B2)	Ranger Training (# 2)	14	14%	3	3%	50	52%	57	59%
	Cars (# 6)	3	3%	0	0	23	24%	21	22%
MEAN PER CONDITION		**8 (+/- 5.5)**	**8% (+/- 5.5)**	**1.5 (+/-1.5)**	**1.5% (+/- .5)**	**36 (+/- 13.5)**	**38% (+/- 14)**	**39 (+/- 18)**	**40% (+/- 18.5)**
TGD (C1 + C2)	Cars (# 3)	13	14%	2	20%	47	52%	44	48%
	Wedding (# 5)	4	8%	0	0	25	50%	28	56%
MEAN PER CONDITION		**8 (+/- 5.5)**	**11% (+/-3)**	**1 (+/- 1)**	**10% (+/- 10)**	**36 (+/- 11)**	**51% (+/- 1)**	**36 (+/- 8)**	**52% (+/-4)**

Patterns within participant with aphasia (Dyad 1). This participant *initiated* the most exchanges in Condition C (TGD), which indicated that he had relatively more control regarding when to comment or share story information in this condition than in the other two conditions. He also demonstrated a decrease in the amount of *responsive* acts within interactions when an SGD display was available to convey the story. The greatest reduction of responses occurred in Condition C (TGD), in which the roles were most equally shared between the participant with aphasia and the PCP. The most attempts at establishing *joint attention* occurred in Condition C (TGD), and the fewest in Condition A (no display). The most acts *providing specific semantic information* occurred in Condition C (TGD) and the fewest occurred in Condition B (VSD).

Participant with Aphasia (Dyad 2)

Initiations per conversation across conditions and story topics (see Table 3.9). This participant with aphasia initiated a mean of 13% (SD: +/- 1.5%) of the exchanges in *Condition A (no display)*, For Condition B, this participant with aphasia initiated a mean 14% (+/- 3%) of the exchanges. Condition C produced the lowest percentage of initiations per exchange from this participant with aphasia who initiated a mean of 8.5% (+/- .5%) of the exchanges. The exchanges initiated by this participant with aphasia when compared across stories did not vary greatly from percentages obtained across conditions.

Figure 3.6. Communication roles for participant with aphasia from Dyad 2.



Initiations, Reesponse and Equivocal Reponses do not add up to 100% because Response and Equivocal responses can occur greater than one time in an exchange, while initiations cannot. In addition, some initiations were abandoned across conditions.

Responses per exchange across conditions and story topics. This participant with aphasia provided a mean of 87% (+/- 1.5%) of acts per exchange judged to be responses in Condition A (no display). Under Condition B, this participant with aphasia's number of responses per exchange dropped slightly to 86% (+/- 9%). This participant provided

the lowest percentage of responses was 91% (+/- 4%) which occurred in Condition C. Percentages calculated for responsive roles across story topics were slightly higher than percentages across conditions, but roughly similar.

Table 3.9. Frequency & mean percentage of communication roles across sessions and across stories for participant with aphasia (Dyad 2).

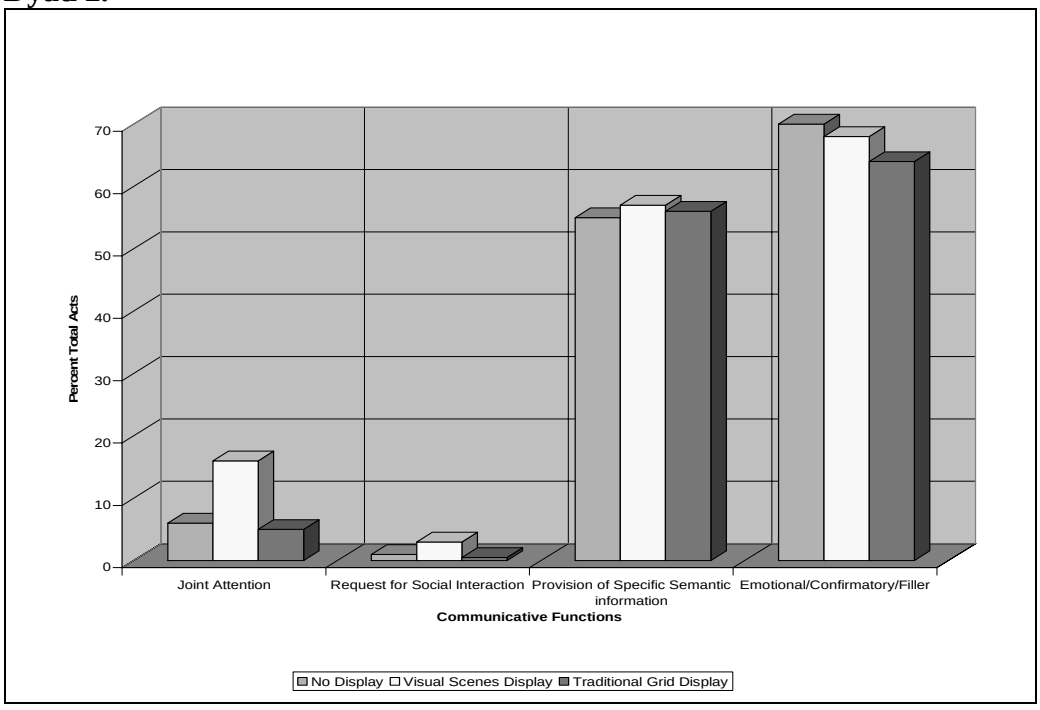
Condition	Topic and Story Order (#)	INITIATIONS		RESPONSES		EQUIVOCAL	
		Frequency per session	Mean % per exchange	Frequency per session	Mean % per exchange	Frequency per session	Mean % of acts
No Display (A1 +A2)	JAMBOREE (# 3)	5	11%	38	86%	60	61%
	4-WHEELING (# 5)	5	14%	33	89%	21	49%
MEAN PER CONDITON		**5 (+/- 0)**	**12% (+/- 1.5)**	**35 (+/- 2.5)**	**87 (+/- 1.5)**	**40 (+/- 19.5)**	**55% (+/- 6)**
VSD (B1 + B2)	4-WHEELING (# 1)	4	11%	39	95%	53	55%
	ROAD TRIP (# 4)	6	17%	27	77%	26	57%
MEAN PER CONDITION		**5 (+/-1)**	**14% (+/-3)**	**33 (+/- 6)**	**86% (+/- 9)**	**39 (+/- 13.5)**	**56% (+/-1)**
TGD (C1 + C2)	ROAD TRIP (# 2)	4	9%	41	87%	51	56%
	JAMBOREE (# 6)	4	8%	49	94%	30	60%
MEAN PER CONDITION		**4 (+/- 0)**	**8.5% (+/- .5)**	**45 (+/- 4)**	**90% (+/- 3.5)**	**40 (+/- 10.5)**	**58% (+/-2)**

Mean percentage of joint attention functions across conditions and story topics. For Condition B, the mean percentage of acts creating joint attention by this participant with aphasia was 16% (+/- 2%) of his total acts. This participant with aphasia demonstrated a mean of 6.5% (+/- 3.5%) of his acts serving joint attention for Condition A. Similarly, acts serving the function of joint attention for Condition C occurred in 5% (+/- 1%) of this person with aphasia's total acts. Percentages calculated for joint

attention functions across story topics are different than those across conditions, which may be an indication of topic preference.

Mean percentage of requests for social interaction across conditions and story topics. This participant with aphasia demonstrated a mean 3% (+/- 1%) of acts judged to be requests for social interaction for Condition B. In Condition A (no display), the mean percentage of this participant with aphasia's acts judged to be requests for social interaction was 2% (+/-0%). For Condition C this participant with aphasia demonstrated a mean .5% (+/- .5%) of acts requesting social interaction. When requests were calculated across story topics this participant with aphasia again failed to demonstrate the ability to think to interact with the PCP, which is indicated by similar low percentages.

Figure 3.7. Communication act functions for participant with aphasia from Dyad 2.



Communicative Act Functions may not add up to 100% because one act was capable of serving more than one communicative function.

Mean percentage of specific semantic information acts across conditions and story topics. The highest percentage of acts providing specific semantic information that was carried out by this participant with aphasia occurred in two conditions. First, under Condition B this participant with aphasia demonstrated a mean 57% (+/- 0%) acts providing specific semantic information. Similarly, for Condition C this participant with aphasia carried out a mean of 57% (+/- 4.5%) acts that provided specific semantic information. In Condition A (no display), this participant with aphasia provided slightly less specific semantic information with 55% (+/- 2%) of his acts judged to be novel information within the exchanges. Provision of specific semantic information again occurred for approximately 50% of the acts when calculated across story topics.

Mean percentage of ECF acts across conditions and story topics. This participant with aphasia carried out the lowest percentage of ECF acts under Condition C at 64% (+/- 3%).The number of ECF acts by this participant with aphasia increased by slightly to 68% (+/- 8%) under Condition B. This participant further increased the percentage of ECF acts with a mean of 70% (+/- 0%) in Condition A (no display). Percentages of ECF acts across story topics were in the same 60%-to-70% range when calculated across story topics.

Table 3.10. Frequency & mean percentage of communication functions across conditions and across stories for participant with aphasia (Dyad 2).

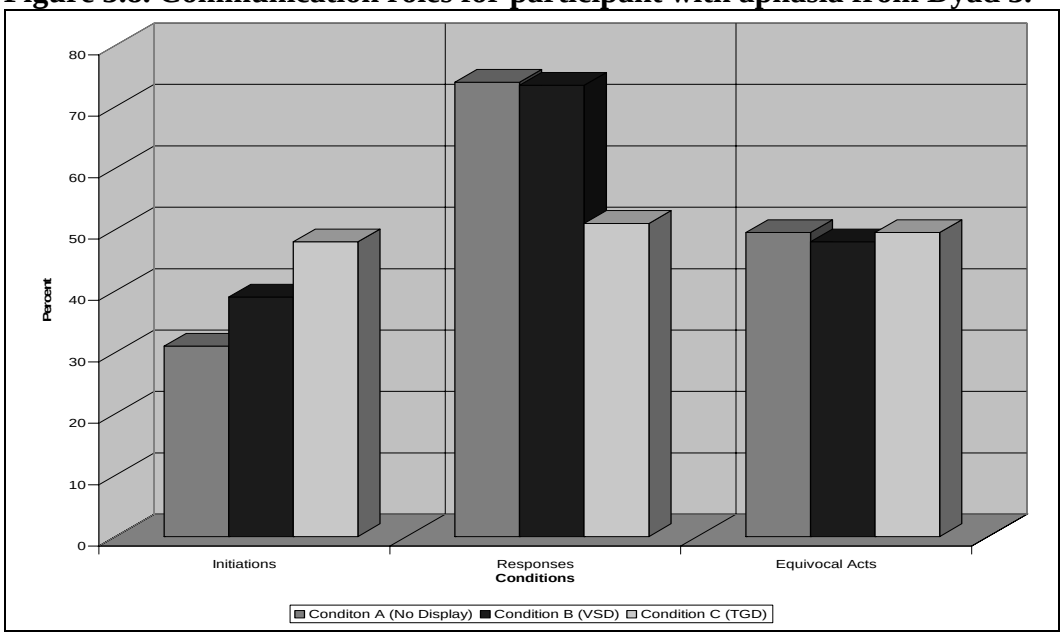
Condition	TOPICS AND STORY ORDER (#)	Joint Attention		Request for Social Interaction		Provision of Specific Semantic Information		Emotional/ Confirmatory Responses/ Fillers	
		Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts
No Display (A1 + A2)	Jamboree (# 3)	11	10%	0	0	66	57%	80	70%
	4-Wheeling (# 5)	4	3%	1	2%	62	53%	81	70%
MEAN PER CONDITION		**7 (+/- 3.5)**	**6% (+/-3.5)**	**.5 (+/- .5)**	**1% (+/- 1)**	**64 (+/- 2)**	**55% (+/- 2)**	**80.5 (+/- .5)**	**70%**
VSD (B1 + B2)	4-Wheeling (# 1)	16	18%	2	2%	48	57%	51	60%
	Road Trip (# 4)	13	14%	3	4%	55	57%	73	76%
MEAN PER CONDITION		**14 (+/- 1.5)**	**16% (+/-2)**	**2.5 (+/- .5)**	**3% (+/- 1)**	**51 (+/- 3.5)**	**57% (+/- 0)**	**62 (+/- 11)**	**68% (+/- 8)**
TGD (C1 + C2)	Road Trip (# 2)	7	6%	1	1%	61	51%	80	67%
	Jamboree (# 6)	5	4%	0	0	74	62%	73	61%
MEAN PER CONDITION		**6 (+/-1)**	**5% (+/- 1)**	**.5 (+/- .5)**	**.5% (+/- .5)**	**67 (+/- 6.5)**	**56% (+/- 5.5)**	**76 (+/-3.5)**	**64% (+/- 3)**

Patterns within participant with aphasia (Dyad 2). This participant had a slight decrease in *responsive* roles for Conditions A (no display) and B (VSD), and slightly more initiator roles in these conditions. A partner effect appears to be present in this Dyad, which may have prevented this participant from taking on different communicator roles in all interactions (see Patterns within PCP, Dyad 2). The most acts creating *joint attention* occurred in Condition B (VSD), and the least in Condition C (TGD). This participant requested the most social interaction in Condition B (VSD) and the fewest in Condition C (TGD).

Participant with Aphasia (Dyad 3)

Initiations per conversation across conditions and story topics (see Table 3.12). This participant with aphasia initiated a mean of 31% (SD: +/- 12.5%) of the exchanges in Condition A (no display), For Condition B (VSD), he initiated the fewest exchanges (mean = 39%; +/- 12.5%). Under Condition C (TGD display), the participant with aphasia initiated a mean of 48% (+/- 5%) of the exchanges, or almost half of the exchanges. The percentage of exchanges initiated when calculated across story topics is different than when calculated across conditions. This participant with aphasia initiated the greatest number of exchanges for the story topic "Family Vacation" (52.5%; +/- .5%), followed by "Son's Graduation" (43.5%; +/- .5%) and lastly the story topic "Hobbies" had just 23% (+/- 4%) attempted initiations.

Figure 3.8. Communication roles for participant with aphasia from Dyad 3.



Initiations, Reesponse and Equivocal Reponses do not add up to 100% because Response and Equivocal responses can occur greater than one time in an exchange, while initiations cannot. In addition, some initiations were abandoned across conditions.

Responses across conditions and story topics. This participant with aphasia responded for 74% (+/- 7%) of the exchanges in Condition A (no display) condition. Similarly, this participant with aphasia's percentage of responses per exchange was 73.5% (+/-.5%) under Condition B. This participant provided the lowest percentage of responses for Condition C, in which only 51% (+/- 10%) acts were responses. Again, different percentages were calculated for responsive roles across story topics.

Table 3.11. Frequency & mean percentage of communication roles across sessions and across stories for participant with aphasia (Dyad 3).

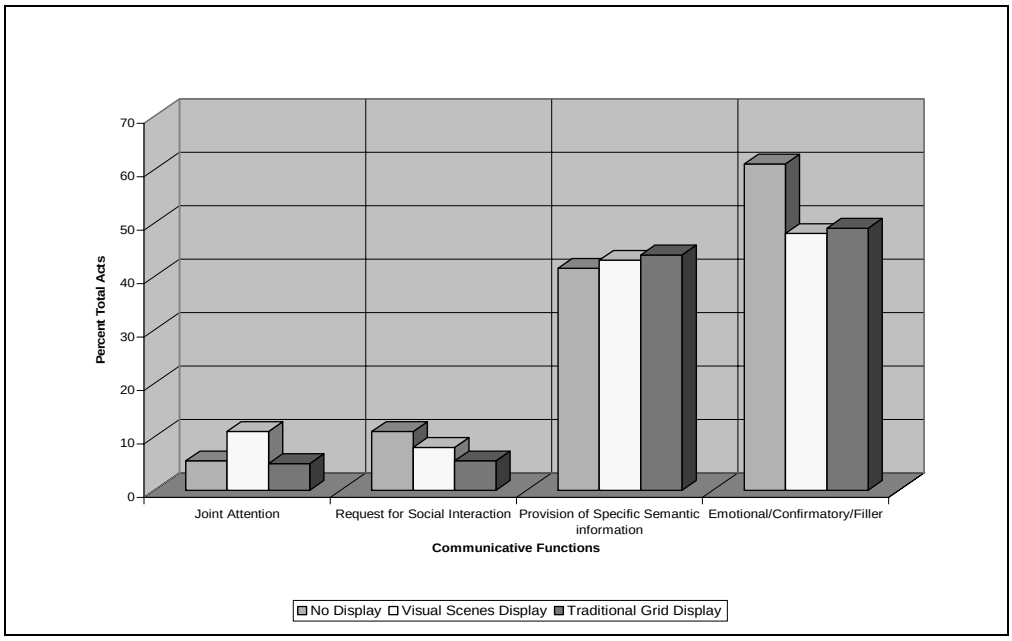
Condition	Topic and Story Order (#)	INITIATIONS		RESPONSES		EQUIVOCAL	
		Frequency per session	Mean % per exchange	Frequency per session	Mean % per exchange	Frequency per session	Mean % of acts
No Display (A1 +A2)	Hobbies (# 3)	6	19%	26	81%	32	50%
	Son's Graduation (# 5)	19	44%	29	67%	46	49%
MEAN PER CONDITON		**12 (+/- 6.5)**	**31% (+/- 12.5)**	**27 (+/- 1.5)**	**74% (+/- 7)**	**39 (+/- 7)**	**49.5% (+/- .5)**
VSD (B1 + B2)	Family Vacation (# 2)	12	52%	17	73%	18	38%
	Hobbies (# 6)	8	27%	22	74%	44	59%
MEAN PER CONDITION		**10 (+/-2)**	**39% (+/- 12.5)**	**19 (+/- 2.5)**	**73.5% (+/- .5)**	**31 (+/- 13)**	**48% (+/- 10.5)**
TGD (C1 + C2)	Family Vacation (# 4)	9	53%	7	41%	16	49%
	Son's Graduation (# 1)	20	43%	28	61%	46	50%
MEAN PER CONDITION		**14 (+/- 5.5)**	**48% (+/- 5)**	**17 (+/- 10.5)**	**51% (+/- 10)**	**31 (+/- 15)**	**49.5% (+/- .5)**

Mean percentage of joint attention functions across conditions and story topics. For Condition B, the mean percentage of acts creating joint attention by this participant with aphasia was 10.5% (+/- 2.5%) of his total acts. This participant with aphasia

demonstrated a mean 5.5% (+/- .5%) of his acts serving joint attention in Condition A (no display). Similarly, acts serving the function of joint attention for Condition C occurred in 5% (+/- 2%) of this person with aphasia's total acts. When joint attention functions were averaged across story topics similar percentages were calculated.

Mean percentage of requests for social interaction across conditions and story topics. A mean of 11% (+/- 2%) of this participant's acts were requests for social interaction in Condition A (no display), a much higher percentage than was seen for the participants with aphasia in Dyads 1 and 2. For Condition B, the mean percentage was 8.5% (+/- 4.5%). For Condition C, this decreased to 5.5% (+/- 5.5%) of his acts; the standard deviation is high for this variable because the participant with aphasia requested social interaction 11 times in one experimental session for Condition C and made no requests for a second Condition C experimental session. This may have been impacted by topic interest. Similar percentages were calculated across story topics.

Figure 3.9. Communication act functions for participant with aphasia from Dyad 3.



Communicative Act Functions may not add up to 100% because one act was capable of serving more than one communicative function.

story topics. The most acts providing specific semantic information occurred under Condition C with an average of 44% (+/- 4%). Similarly, for Condition B this participant with aphasia produced a mean of 43% (+/- 8%) of semantically specific acts. In Condition A (no display), he provided slightly less specific semantic information with 41.5% (+/- .5%) of his acts that contained novel information. The percentage of acts providing specific semantic information is different when calculated across story topics. The most semantic information he provided occurred for the "Family Vacation" (50.5%; +/- .5%) story topic, for which he had an SGD in both renditions of the story. The remaining story topics had similar percentages to those that were calculated across conditions.

Mean percentage of Emotional/Confirmatory/Filler (ECF) acts across conditions and story topics. This participant with aphasia had the fewest ECF acts under Condition B at 48% (+/- 1%) and 50% (+/- 8%) under Condition C. However, his mean percentage of ECF acts increased to a mean of 61% (+/- 2%) in Condition A (no display). When the percentage of ECF acts were calculated across story topics a difference occurred as in previously reported variables; the least number of ECF acts (51.5%; +/-11.5%) occurred for the "Son's Graduation" story topic, followed by "Hobbies" (53%; +/-6%) and slightly more EFC acts occurred for the story topic "Family Vacation" (54%; +/-5%) the most EC

Table 3.12. Frequency and mean percentage of communication functions across conditions and across stories for participant with aphasia (Dyad 3).

Condition	TOPICS AND STORY ORDER (#)	Joint Attention		Request for Social Interaction		Provision of Specific Semantic Information		Emotional/ Confirmatory Responses/ Fillers	
		Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts
No Display (A1 + A2)	Hobbies (# 3)	4	6%	8	13%	27	42%	38	59%
	Son's Graduation (# 5)	5	5%	8	9%	39	41%	59	63%
MEAN PER CONDITION		**4.5 (+/- .5)**	**5.5% (+/- .5)**	**8 (+/- 0)**	**11% (+/- 2)**	**33 (+/- 6)**	**41.5 % (+/- .5)**	**48 (+/- 10.5)**	**61% (+/- 2)**
VSD (B1 + B2)	Family Vacation (# 2)	6	13%	6	13%	24	51%	23	49%
	Hobbies (# 6)	6	8%	13	4%	26	35%	35	47%
MEAN PER CONDITION		**6 (+/- 0)**	**11% (+/-2.5)**	**9 (+/- 3.5)**	**8% (+/- 4.5)**	**25 (+/- 1)**	**43% (+/- 8)**	**29 (+/- 6)**	**48% (+/- 1)**
TGD (C1 + C2)	Family Vacation (# 4)	1	3%	0	0%	16	50%	19	59%
	Son's Graduation	7	7%	10	11%	36	38%	38	40%
MEAN PER CONDITION		**4 (+/- 3)**	**5% (+/- 2)**	**5 (+/- 5)**	**5.5 % (+/- 5.5)**	**26 (+/- 10)**	**44% (+/- 6)**	**28 (+/- 9.5)**	**49% (+/- 9.5)**

Patterns within Participant with Aphasia (Dyad 3). This participant demonstrated the most *initiations* and the least *responsive* roles in Condition C (TGD). Furthermore, interactions in Condition C (TGD) had the most equally distributed roles between PCP and this participant; again, this condition created a more natural "back and forth" exchange of information. This participant also demonstrated an increase in initiations for Condition B (VSD), but responsive roles remained high. The most acts creating *joint attention* occurred in Condition B (VSD), and the least in Condition C (TGD). This participant requested the most social interaction in Condition A (no display) and the least in Condition C (TGD).

Common Patterns across Participants with Aphasia.

Participants with aphasia from Dyads 1 and 3 both demonstrated an increase in *initiations* for Conditions B (VSD) and C (TGD), with the greatest increase occurring in Condition C (TGD). These participants also demonstrated the greatest decrease in *responsive* roles in Condition C (TGD). All participants demonstrated a relatively constant number of *equivocal* acts across all conditions. Participants with aphasia from Dyads 1 and 3 demonstrated the greatest acts creating *joint attention* in Condition B (VSD).

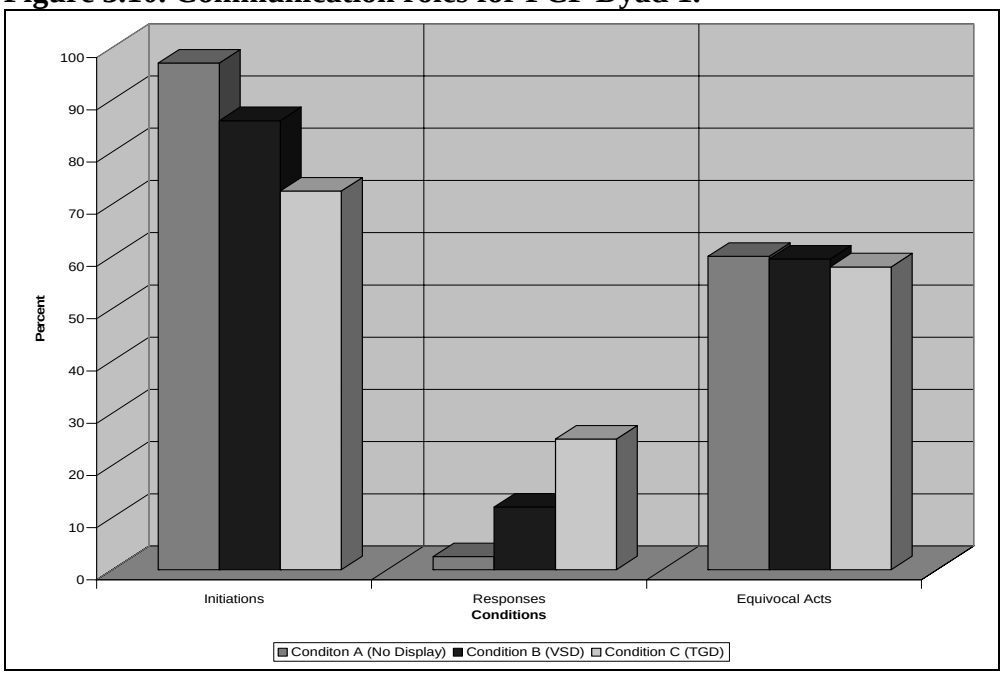
Individual PCP Variables

PCP (Dyad 1)

Initiations per conversation across conditions and story topics. This PCP initiated a mean 97% (+/-3%) of the exchanges in Condition A (no display) .For Condition B, this PCP initiated a mean 86% (+/- 6%) of exchanges. The PCP, under Condition C, produced

the fewest initiations with a mean72.5% (+/- 1.5%) of the exchanges. The percentage of PCP initiated exchanges is different when calculated across story topics. Specifically, the "Ranger Training" story topic yielded the highest percentage (91%; +/-9%) of PCP initiated exchanges, followed by the "Wedding Ceremony" (84%; +/- 10%) and "Cars" (80.5%; +/-9.5%) story topics.

Figure 3.10. Communication roles for PCP Dyad 1.



Initiations, Reesponse and Equivocal Reponses do not add up to 100% because Response and Equivocal responses can occur greater than one time in an exchange, while initiations cannot. In addition, some initiations were abandoned across conditions.

Responses per exchange across conditions and story topics. This PCP provided a mean of 25% (+/- 25%) of responses per exchange in Condition A (no display). Similarly, but more consistently, this participant provided the lowest percentage of responses for Condition C, in which only 25% (+/- 1%) responses were given per exchange. Under Condition B, this PCP's number of responses per exchange again was more consistent than in Condition A (no display), but dropped to 12% (+/-1%). The

percentage PCP responsive roles did not greatly change when calculated across story topics.

Table 3.13. Frequency & mean percentage of communication roles across sessions and across stories for PCP (Dyad 1).

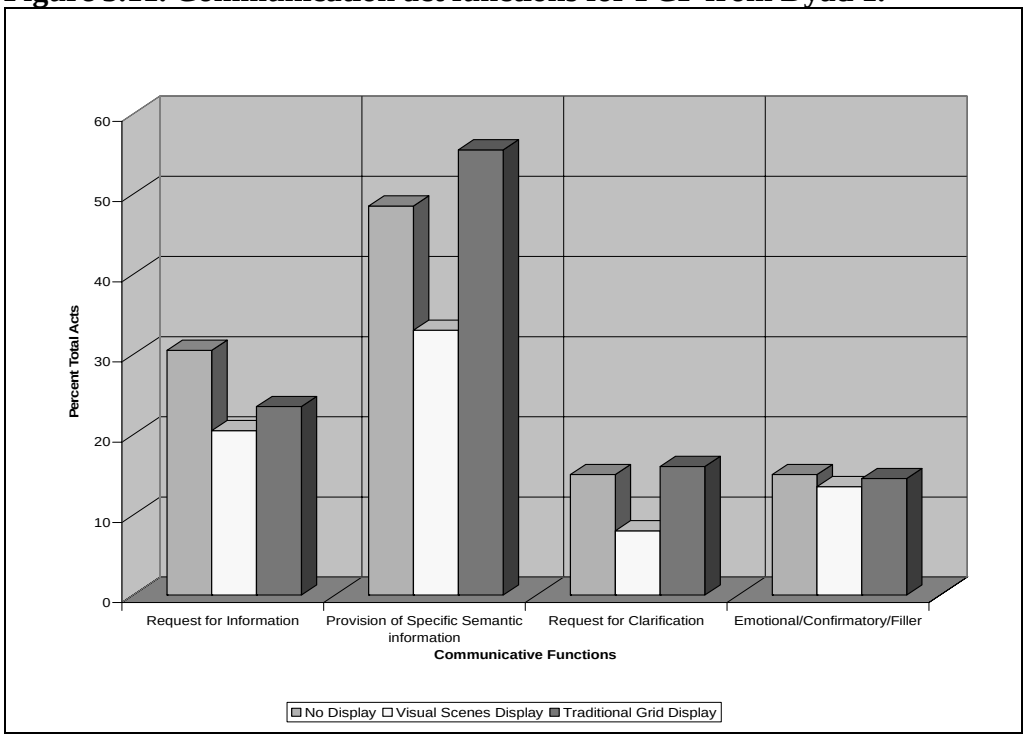
Condition	TOPIC AND STORY ORDER (#)	INITIATIONS		RESPONSES		EQUIVOCAL	
		Frequency per session	Mean % per exchange	Frequency per session	Mean % per exchange	Frequency per session	Mean % of acts
No Display (A1 +A2)	WEDDING (# 1)	32	94%	0	0	59	65%
	RANGER TRAINING (# 4)	20	100%	1	5%	26	55%
MEAN PER CONDITON		**26 (+/-6)**	**97% (+/- 3)**	**.5 (+/- .5)**	**2.5% (+/- 2.5)**	**43 (+/- 17.5)**	**60% (+/-5)**
VSD (B1 + B2)	RANGER TRAINING (# 2)	32	82%	5	13%	57	60%
	CARS (# 6)	18	90%	2	11%	29	59%
MEAN PER CONDITION		**25 (+/- 7)**	**86% (+/- 4)**	**3.5 (+/- 1.5)**	**12% (+/- 1)**	**43 (+/- 14)**	**59.5% (+/- .5)**
TGD (C1 + C2)	CARS (# 3)	29	71%	10	24%	50	56%
	WEDDING (# 5)	14	74%	5	26%	28	60%
MEAN PER CONDITION		**22 (+/- 7.5)**	**72.5% (+/- 1.5)**	**7.5 (+/- 2.5)**	**25% (+/- 1)**	**39 (+/- 11)**	**58% (+/- 2)**

Requests for information across conditions and story topics. This PCP demonstrated the most acts requesting information in Condition A (no display) with a mean of 30.5% (+/- 1.5%). For Condition C, this PCP demonstrated a mean of 23.5% (+/- 5%) acts requesting information. A ten percent decrease from Condition A (no display) measure occurred for Condition B, in which 20.5% (+/- 7.5%) of this PCP's acts included requesting information. When calculated across story topics the percentage of requested information did not vary greatly.

Acts providing specific semantic information across conditions and story topics. This PCP provided specific semantic information under Condition C with a mean of 16% (+/- 1%) novel messages provided". Similarly, in Condition A (no display) this PCP

demonstrated a mean 15% of acts providing specific information. Under Condition B, this PCP carried out the highest percentage of acts that provided specific semantic information with a mean of 8.5% (+/- 3.5%). Again, these percentages did not change greatly when calculated across story topics.

Figure 3.11. Communication act functions for PCP from Dyad 1.



Communicative Act Functions may not add up to 100% because one act was capable of serving more than one communicative function.

Requests for clarification across conditions and story topics. This PCP requested the most clarification under Condition C with a mean of 55.5% (+/- 4.5%). In Condition A (no display), this PCP requested clarification in almost ten percent less acts with a mean of 46.5% (+/- .5%). Condition B elicited more than a twenty percent decrease in the number of peer communication acts requesting clarification with a mean of 33% (+/-

13%). The percentage of requested clarifications did not differ when calculated across story topics.

Table 3.14. Frequency and mean percentage of communication functions across conditions and across stories for PCP (Dyad 1).

Condition	TOPICS AND STORY ORDER (#)	Requests for Information		Requests for Clarification		Provision of Specific Semantic Information		Emotional/ Confirmatory Responses/ Fillers	
		Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts
NO DISPLAY (A1 + A2)	Wedding (# 1)	26	29%	46	50%	14	15%	10	11%
	Ranger Training (# 4)	15	32%	22	47%	7	15%	9	19%
MEAN PER CONDITION		**20.5 (+/- 5.5)**	**30.5% (+/-2.5)**	**34 (+/- 12)**	**48.5% (+/- 1.5)**	**10.5 (+/- 3.5)**	**15% (+/- 0)**	**9.5 (+/- .5)**	**15% (+/- 4)**
VSD (B1 + B2)	Ranger Training (# 2)	26	27%	44	46%	10	11%	15	16%
	Cars (# 6)	14	14%	20	20%	5	5%	11	11%
MEAN PER CONDITION		**20 (+/- 6)**	**20.5**	**27 (+/-7)**	**33% (+/- 13)**	**7.5 (+/- 2.5)**	**8% (+/- 3)**	**13% (+/-2)**	**13.5 (+/- 2.5)**
TGD (C1 + C2)	Cars (# 3)	21	24%	45	51%	13	15%	18	20%
	Wedding (# 5)	11	23%	28	60%	8	17%	4	9%
MEAN PER CONDITION		**16 (+/- 5)**	**23.5% (+/- .5)**	**36.5 (+/- 8.5)**	**55.5% (+/- 4.5)**	**10.5 (+/- 2.5)**	**16% (+/- 1)**	**11 (+/- 7)**	**14.5 % (+/- 5.5)**

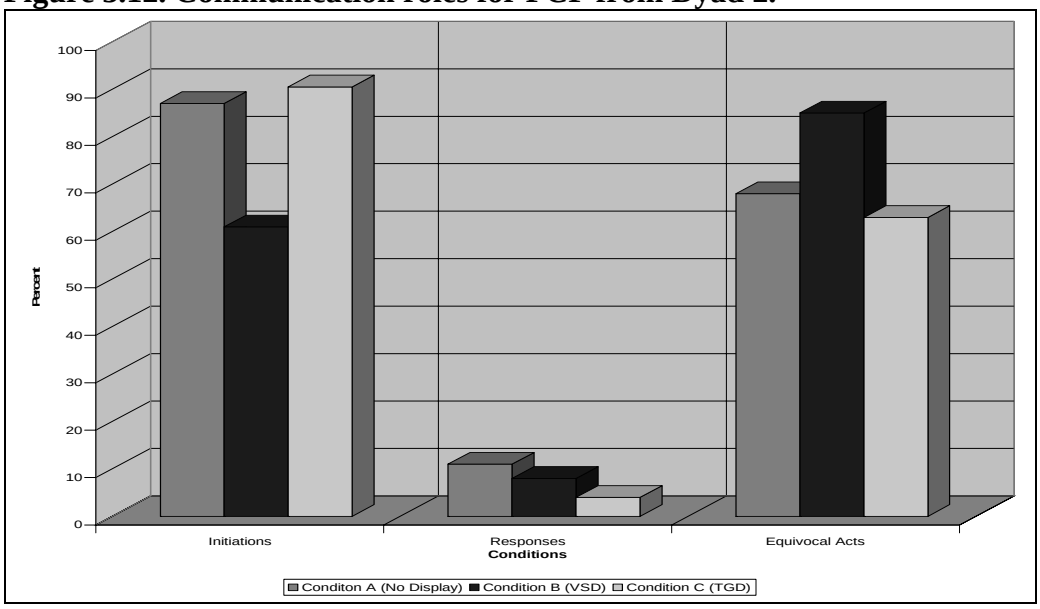
Patterns within PCP (Dyad 1). This participant *initiated* the most exchanges and showed an inverse reduction in responsive communication acts in Condition A (no display). For Condition B (VSD) the *responsive* roles increased to approximately six times the number demonstrated the previous condition. However, the number of initiations did not decrease greatly in Condition B (VSD). The fewest number of exchanges initiated by this participant occurred in Condition C (TGD), and the amount of responsive roles taken on doubled from Condition B (VSD). This participant

demonstrated the most acts *requesting information* in Condition A (no display), and the least in Condition B (VSD). The greatest amount of *specific semantic information* provided by this participant occurred in Condition A (no display), and the least in Condition B (VSD). The participant demonstrated the greatest number of acts *requesting clarification* in Condition A (no display), and the least in Condition C (TGD).

PCP (Dyad 2)

Initiations per conversation across conditions and story topics. This PCP initiated a mean 86.5% (+/- 2.5%) of the exchanges in *Condition A (no display)*. For Condition B, this PCP initiated a mean of 85% (+/- 5%) of the exchanges,. Condition C produced the greatest percentage of initiations per exchange from this PCP who initiated a mean of 90.5% (+/- 1.5%) of the exchanges. Percentages for PCP initiated exchanges did not differ when calculated across story topics.

Figure 3.12. Communication roles for PCP from Dyad 2.



Initiations, Reesponse and Equivocal Reponses do not add up to 100% because Response and Equivocal responses can occur greater than one time in an exchange, while initiations cannot. In addition, some initiations were abandoned across conditions.

Responses per exchange across conditions and story topics. This PCP provided a mean of 11% (+/- 0%) responses out of total acts in Condition A (no display) condition. Under Condition B, this PCP's number of responses per exchange dropped slightly to a mean of 8% (+/- 1%). This participant provided the lowest percentage of responses for Condition C, in which only a mean of 4% (+/- 4%) acts were judged to be responses. The percentage responses provided by this PCP did not change when calculated across story topics.

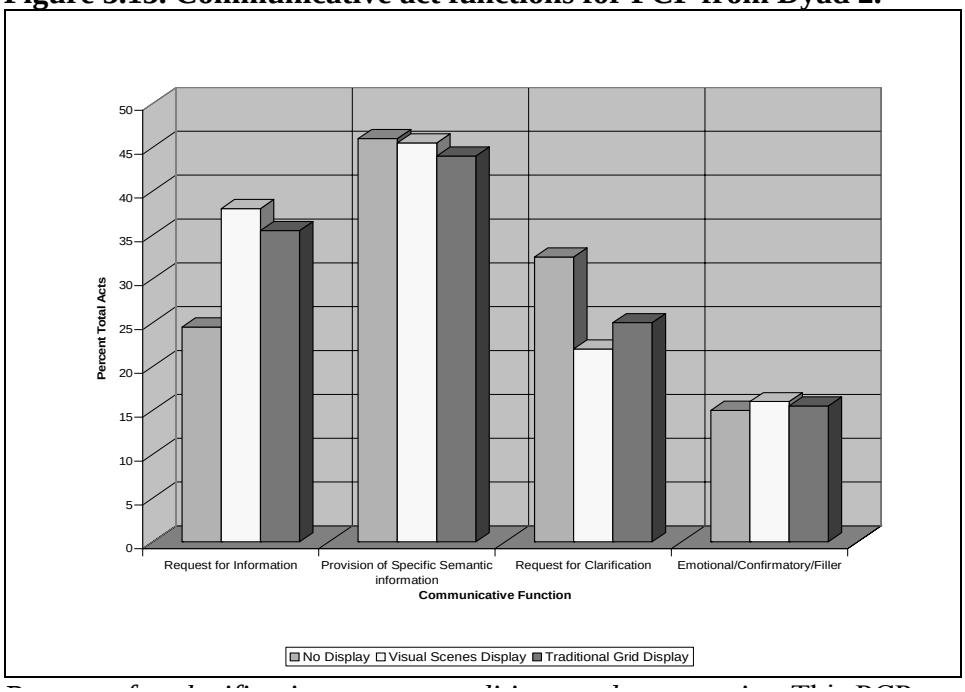
Table 3.15. Frequency and mean percentage of communication roles across sessions and across stories for PCP (Dyad 2).

Condition	TOPIC AND STORY ORDER (#)	INITIATIONS		RESPONSES		EQUIVOCAL	
		Frequency per session	Mean % per exchange	Frequency per session	Mean % per exchange	Frequency per session	Mean % of acts
No Display (A1 +A2)	JAMBOREE (# 3)	39	89%	5	11%	78	64%
	4-WHEELING (# 5)	31	84%	4	11%	93	71%
MEAN PER CONDITON		**35 (+/- 5)**	**87% (+/- 2.5)**	**4.5 (+/- .5)**	**11% (+/- 0)**	**86 (+/- 7.5)**	**68% (+/- 3.5)**
VSD (B1 + B2)	4-WHEELING (# 1)	37	90%	3	7%	45	53%
	ROAD TRIP (# 4)	28	80%	3	9%	68	69%
MEAN PER CONDITION		**33 (+/- 4.5)**	**85% (+/- 5)**	**3 (+/- 0)**	**8% (+/- 1)**	**57 (+/- 11.5)**	**61% (+/- 8)**
TGD (C1 + C2)	ROAD TRIP (# 2)	42	89%	0	0%	71	62%
	JAMBOREE (# 6)	48	92%	4	8%	76	64%
MEAN PER CONDITION		**45 (+/- 3)**	**90.5% (+/- 1.5)**	**2 (+/- 2)**	**4% (+/- 4)**	**74 (+/- 2.5)**	**63% (+/- 1)**

Mean percentage of requests for information across conditions, and story topics. This PCP demonstrated the most acts requesting information in Condition C with a mean of 35.5% (+/- .5%), In Condition A (no display), this PCP demonstrated a mean of 24.5% (+/- .5) acts requesting information. A near ten percent decrease from Condition A (no display) occurred for Condition B, in which a mean of 22% (+/- 4%) of this PCP's acts included requesting information. When requests for information were calculated across story topics there was a noticeable change in these percentages. The most information requested (48%; +/-9%) occurred for the "Road Trip" story topic, followed by "4-Wheeling" (34%; +/- 5%) and "Jamboree" (30%; +/- 5%).

Mean percentage of specific semantic information acts across conditions and story topics. This PCP provided specific semantic information in Condition A (no display) with a mean of 32.5% (+/- 1.5%) novel messages provided. Condition C decreased the number of this PCP's acts to a mean of 25% (+/-5%). Under Condition B, this PCP had the lowest percentage of acts that provided specific semantic information with a mean of 22% (+/- 4%). These percentages were similar when calculated across story topics.

Figure 3.13. Communicative act functions for PCP from Dyad 2.



Communicative Act Functions may not add up to 100% because one act was capable of serving more than one communicative function.

the most clarification under Condition B with a mean of 45.5% (+/- 11.5%). Similarly, in Condition A (no display) this PCP requested clarification in a mean 46% (+/- 2%) of acts. Condition C elicited the fewest number of peer communication acts requesting clarification with 44% (+/- 5%). When calculated across story topics there was a change in the percent of requests for clarification.

Table 3.16. Frequency and mean percentage of communication functions across conditions and stories for PCP (Dyad 2).

Condition	Topics and Story Order (#)	Requests for Information		Requests for Clarification		Provision of Specific Semantic Information		Emotional/ Confirmatory Responses/ Fillers	
		Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts
No Display (A1 + A2)	Jamboree (# 3)	31	25%	58	48%	41	34%	10	11%
	4-Wheeling (# 5)	32	24%	57	44%	41	31%	9	19%
AVERAGE PER CONDITION		**31.5 (+/- .5)**	**24.5% (+/-.5)**	**57.5 (+/- .5)**	**46% (+/- 2)**	**41 (+/- 0)**	**32.5 % (+/- 1.5)**	**9.5 (+/- .5)**	**15% (+/- 4)**

VSD (B1 + B2)	4-Wheeling (# 1)	37	44%	29	34%	15	18%	8	9%
	Road Trip (# 4)	32	32%	56	57%	26	26%	23	23%
AVERAGE PER CONDITION		**34.5 (+/- 2.5)**	**38% (+/- 6)**	**42.5 (+/- 13.5)**	**45.5% (+/- 11.5)**	**20.5 (+/- 5.5)**	**22% (+/- 4)**	**15.5 (+/- 7.5)**	**16% (+/- 7)**
TGD (C1 + C2)	Road Trip (# 2)	41	36%	45	39%	30	26%	21	18%
	Jamboree (# 6)	45	35%	63	49%	31	24%	16	13%
AVERAGE PER CONDITION		**43 (+/-2)**	**35.5% (+/-.5)**	**54 (+/- 9)**	**44% (+/- 5)**	**30.5 (+/- .5)**	**25% (+/- 1)**	**18.5 (+/- 2.5)**	**15.5 % (+/- 2.5)**

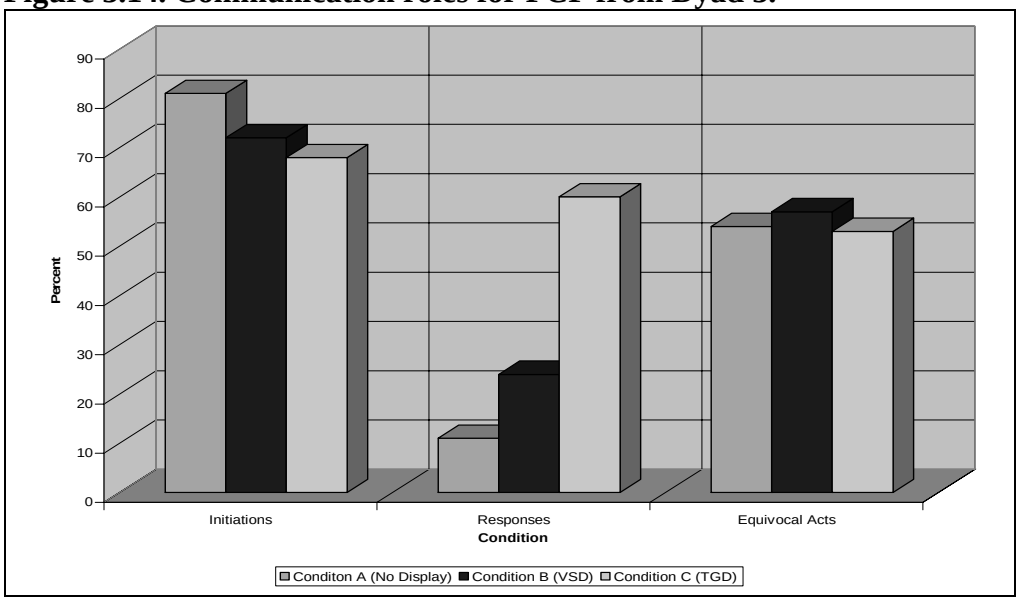
Patterns within PCP (Dyad 2). This participant *initiated* greater than sixty percent of the exchanges, and took on a *responsive* role for less than fifteen percent, across all conditions. This participant with aphasia initiated the fewest number of exchanges in Condition B (VSD), and demonstrated the most responsive roles in Condition A (no display). *Equivocal* acts occurred most in Condition B (VSD) and least in Condition C (TGD) for this participant. In general, PCP data analysis revealed a decrease in partner responsiveness when messages were delivered via an SGD and an increase when they were conveyed via natural modalities in Condition A (See Table 3.4).

PCP from Dyad 2 requested the most information in Condition B (VSD) and the least in Condition A (no display). The greatest amount of *specific semantic information* provided by this participant occurred in Condition A (no display), and the least in Condition C (TGD). The participant demonstrated the greatest number of acts *requesting clarification* in Condition A (no display), and the least in Condition B (VSD).

PCP (Dyad 3)

Initiations per conversation across conditions and story topics. In Condition A, when no symbol display was available, this PCP initiated an average of 81% (+/- 12.5%) of the exchanges. In the VSDs (Condition B), he initiated an average of 72% of the exchanges, and when TGDs (Condition C) were available, he initiated a mean of 67.5% (+/- 8.5%) of the exchanges. When calculated across story topics a change in the percentage of PCP initiated exchanges occurred. Specifically, the "Hobbies" story topic required the most PCP initiations (mean = 85.5%; +/- 1.5%), followed by "Son's Graduation," (77%; +/- 1%) and "Family Vacation" (mean = 58%; +/- 1%).

Figure 3.14. Communication roles for PCP from Dyad 3.



Initiations, Reesponse and Equivocal Reponses do not add up to 100% because Response and Equivocal responses can occur greater than one time in an exchange, while initiations cannot. In addition, some initiations were abandoned across conditions.

Responses per exchange across conditions and story topics. The participant with aphasia provided 61% (+/- 35%) of total responses per exchange for Condition C; the PCP's number of responses per exchange was 24% (+/- 11%) under Condition B. This PCP provided an average of 12% (+/- 6%) acts per exchange judged to be responses in

Condition A (no display) condition. When calculated across story topics these percentages did not vary greatly.

Table 3.17 Frequency and mean percentage of communication roles across sessions and across stories for PCP (Dyad 3).

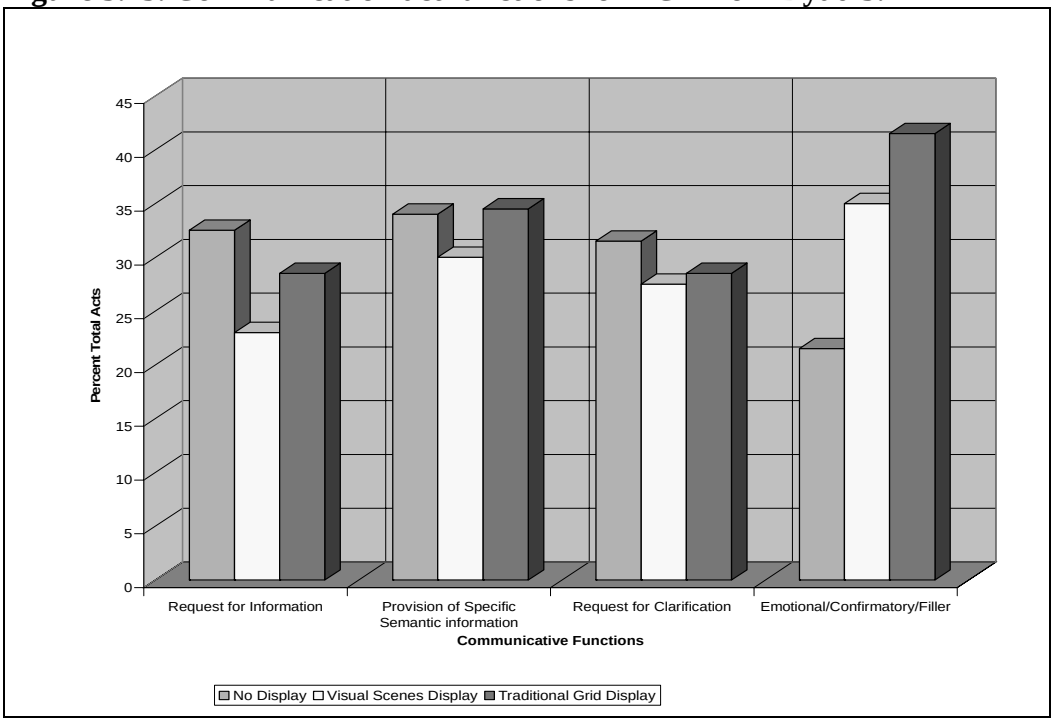
Condition	TOPIC AND STORY ORDER (#)	INITIATIONS		RESPONSES		EQUIVOCAL	
		Frequency per session	Mean % per session	Frequency per session	Mean % per session	Frequency per session	Mean % of acts
No Display (A1 +A2)	Hobbies (# 3)	27	84%	2	6%	31	51%
	Son's Graduation (# 5)	33	78%	7	16%	54	57%
MEAN PER CONDITON		**30 (+/-3)**	**81% (+/- 3)**	**4.5 (+/- 4.5)**	**11% (+/- 5)**	**43 (+/- 11.5)**	**54% (+/- 3)**
VSD (B1 + B2)	Family Vacation (# 2)	13	57%	8	35%	21	50%
	Hobbies (# 6)	26	87%	4	13%	53	63%
MEAN PER CONDITION		**20 (+/- 5.5)**	**72% (+/- 15)**	**6 (+/- 2)**	**24% (+/- 11)**	**37 (+/- 16)**	**57% (+/- 6.5)**
TGD (C1 + C2)	Family Vacation (# 4)	10	59%	16	94%	19	54%
	Son's Graduation (# 1 Make-up)	35	76%	12	26%	51	52%
MEAN PER CONDITION		**23 (+/- 12.5)**	**68% (+/- 8.5)**	**14 (+/- 2)**	**60% (+/-34)**	**35 (+/- 16)**	**53% (+/-1)**

Mean percentage of requests for information across conditions, and story topics. This PCP demonstrated the most acts requesting information in Condition A (no display) with an average 38% (+/- 4%), Under Condition C, this PCP decreased acts requesting information by approximately ten percent to 28.5% (+/- 2.5%). Even further a decrease occurred for this PCP under Condition B, in which 23% (+/- 6%) acts requested

information. When calculated across story topics these percentages were relatively similar.

Mean percentage of specific semantic information acts across conditions and story topics. This PCP provided specific semantic information in Condition A (no display) with an average of 34% (+/- 4%) novel messages provided, which decreased to 30% (+/-1%) in Condition B. Under Condition C, this PCP had the lowest average percentage of acts that provided specific semantic information with an average of 28.5% (+/- 2.5%). Again, these percentages were roughly equal when PCP specific information acts were calculated across story topics.

Figure 3.15. Communication act functions for PCP from Dyad 3.



Communicative Act Functions may not add up to 100% because one act was capable of serving more than one communicative function.

Mean percentage of requests for clarification across conditions and story topics. This PCP requested the most clarification in Condition A (no display) at 34% (+/- 4%).

Under Condition B, this participant with aphasia requested clarification in 30% (+/- 1%) of her acts. Similarly, under Condition C this PCP requested clarification in 28.5% (+/- 2.5%) of her acts. The percentages calculated for requested clarification across story topics yielded similar figures.

Mean percentage of ECF acts across conditions and story topics. This PCP had the lowest percentage of ECF acts in Condition A (no display) with 21.5% (+/- .5%). The number of ECF acts by this PCP increased by more than ten percent to 35% (+/- 15%) under Condition B. This PCP doubled the percentage of ECF acts to 42% (+/- 7%) under Condition C. The percentage of ECF acts calculated across story topics were roughly similar to those calculated across conditions.

Table 3.18 Frequency and mean percentage of communication functions across conditions and stories for PCP (Dyad 3).

Condition	Topics and Story Order (#)	Requests for Information		Requests for Clarification		Provision of Specific Semantic Information		Emotional/ Confirmatory Responses/ Fillers	
		Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts	Frequency per Session	Mean % of Acts
NO DISPLAY (A1 + A2)	Hobbies (# 3)	25	41%	23	38%	20	33%	13	21%
	Son's Graduat-ion (# 5)	32	24%	28	30%	28	30%	21	22%
MEAN PER CONDITION		**28.5 (+/- 3.5)**	**32.5% (+/- 8.5)**	**25.5 (+/- 5.5)**	**34% (+/- 4)**	**24 (+/- 4)**	**31.5% (+/- 1.5)**	**17 (+/- 4)**	**21.5 % (+/- .5)**
VSD (B1 + B2)	Family Vacation (# 2)	7	17%	13	31%	10	24%	21	50%
	Hobbies (# 6)	24	29%	24	29%	26	31%	17	20%
MEAN PER CONDITION		**15.5 (+/- 8.5)**	**23% (+/- 6)**	**18.5 (+/- 5.5)**	**30% (+/- 1)**	**18 (+/- 8)**	**27.5% (+/- 3.5)**	**19 (+/- 2)**	**35% (+/- 15)**
TGD (C1 + C2)	Family Vacation (# 4)	9	26%	7	20%	11	31%	17	49%
	Son's Graduat-ion	30	31%	17	49%	25	26%	33	34%
MEAN PER CONDITION		**19.5 (+/- 10.5)**	**28.5 (+/- 2.5)**	**12 (+/-5)**	**34.5% (+/- 14.5)**	**18 (+/-7)**	**28.5% (+/- 2.5)**	**25 (+/- 8)**	**41.5 % (+/- 7.5)**

Patterns within PCP (Dyad 3). The most initiations and the fewest number of *responsive* roles occurred in Condition A (no display). The number of exchanges initiated by the PCP decreased by nearly ten percent in Condition B (VSD), and responsive roles almost doubled those in Condition A (no display). Responsive roles were greatest, and the exchanges initiated were fewest for this participant in Condition C (TGD). This participant made the most requests *for information* and *clarification* in Condition A (no display), and the least in Condition B (VSD). *Emotional/confirmatory/filler* acts were greatest in Condition C (TGD).

Patterns across PCPs

PCPs maintained primarily a dominant role in all communicative interactions, in which they initiated approximately 60% or greater of the exchanges across conditions and story topics. All PCPs provided the most *specific semantic information*, and requested the most clarification in Condition A (no display). PCPs from Dyads 1 and 2 responded most frequently in conditions with SGDs.

Chapter 4

DISCUSSION

The purpose of this multiple single-subject, comparative condition study was to compare communicative interactions between individuals with moderate-to-severe expressive aphasia and peer communication partners (PCPs) when using one of three types of displays (no display, visual scenes display, or traditional grid display) on a speech generating device (SGD). Participants with aphasia shared personal stories with PCPs using one of three types of displays across six experimental sessions. The three types of SGD displays were implemented within three dyads to obtain data regarding communicative exchanges, communicative acts, communicative roles and communicative success per exchange to answer the following questions:

1) What percentage of messages are successfully conveyed by a person with aphasia and a peer communication partner during a conversational story telling task across three AAC conditions: no display, when messages are represented on visual scene displays, and when they are represented on traditional grid displays?
2) How do the roles of individuals with severe aphasia and their peer conversational partners change during conversations when they can tell personal stories across three AAC conditions: no display, when messages are represented on visual scene displays, and when they are represented on traditional grid displays?

3) What are the communicative functions of conversational acts generated by individuals with severe aphasia during a conversational story telling task across three AAC conditions: no display, when messages are represented on visual scene displays, and when they are represented on traditional grid displays?

Summary of Selected Findings

All dyads had an increase in the number of successful exchanges when one of the AAC conditions was compared with the no display condition. Dyads 1 and 2 both had the greatest increase in exchange success with VSDs, whereas Dyad 3 had almost equal increases in both the VSD and TGD conditions. This provided some support for the theory that an external means of message representation, coupled with the speech-generating capabilities of an AAC device, allows people with aphasia to convey topically-related messages in a more intelligible manner than when no display is available Garrett & Huth, 2002;Garrett, K., Beukelman & Low-Morrow, 1989; Garrod, 1986).In addition, the decrease in the number of exchanges that required partner interpretation in the VSD condition. That is, the visual and conceptual salience of the photographs appeared to decrease the peers' need to ask clarifying questions to enhance their understanding of the story.

Another common finding across two of the three dyads was that more messages were abandoned when people with aphasia told stories with the TGD than the VSD. However, these results were not remarkable for Dyad 2. This may suggest that fragmentation of the story occurred when separate messages were stored under individual

icons in Dyads 1 and 3. PCP 1 and PCP 3 may have been less able to discern the gestalt of the story in the TGD condition than when events were represented with a photograph in the visual scenes condition.

Individual data revealed that participants with aphasia were predominantly responders. They participated primarily in exchanges by confirming the peer communication partner's statements or answering specific questions regardless of condition. Participants with aphasia also demonstrated a relatively constant number of equivocal responses, which accounted for approximately fifty percent of their communication roles. However, with regard to the experimental questions, participants with aphasia from Dyads 1 and 3 both had greater than 10% increases in exchange initiations as well as a reduction in the proportion of responses with at least one of the AAC displays when compared with the no display condition. Interestingly, this increase in initiations was not evident for the VSD condition for Dyads 1 and 2. Although VSD initiations did increase for Dyad 3, they were not as substantial as the increases seen for the TGD condition when compared with the no display condition. Although the experimenter had originally speculated that access to an easily comprehended, photographic message representation would give the participants with aphasia more conversational control (i.e., initiations), partners actually took advantage of the saliency of the photographs and asked questions or commented first.

Only two common patterns could be identified for PCPs across all dyads. Although all PCPs were primarily initiators across conditions, the number of exchanges initiated by PCPs decreased in sessions with VSDs compared to sessions with no display. In addition, PCPs requested the least amount of clarification with VSDs. Although the

peer communication partner from Dyad 2 was an outlier for the remaining communicative roles and other communicative functions, PCPs from Dyads 1 and 3 shared other similarities. Specifically, PCPs from Dyads 1 and 3 initiated the least number of exchanges, and responded most in sessions with TGDs. These PCPs also requested and provided the least amount of information in sessions with VSDs.

Theoretical Implications

The results of this investigation validated previous studies regarding the dominant role of PCPs in conversations with people who have aphasia (Light, et al., 1992;Yorkston, Beukelman & Flowers, 1980). . The fact that all PCPs initiated greater than fifty percent of the exchanges across all conditions reflects the restricted ability of people with moderate-to-severe aphasia to initiate, regardless of the presence of AAC devices or strategies.

Story preferences drove much of the interactional behavior seen in this study, particularly for Dyads 2 and 3. Research on narrative, reminiscing, and topic preferences (Garrett & Huth, 2002; Fox, Sohlber, & Fried-Oken, 2001; Hux et al., 2001;) corroborates that interest in topics and particular story narratives can significantly influence conversational behavior. Although this type of "story interest" effect clouds the investigation of experimental questions, it is integral to all naturalistic conversational interactions. In addition, the visible differences in conversational variables that occurred despite the topic effect may be the most important variables influencing conversational interactions.

Similarly, the present research also found that partner preferences, styles, and attitudes shaped the degree to which the participant with aphasia could participate in topical conversations despite the availability of AAC. For example, the second peer conversational partner demonstrated both a dominant communication style and a strong bias against AAC. He almost always initiated each exchange, although he did reduce his initiations and increase his equivocal (confirmatory) communication acts during the VSD condition.

The increase in the number of successful exchanges without partner interpretation in the VSD condition occurred most likely because of the increased ability of participants with aphasia to comprehend and access AAC-stored messages given increased contextual support from the photographs. Photographs are perhaps the most transparent method of representing messages symbolically on an SGD, but this transparency is equally if not more beneficial for PCPs. That is, the expected change in roles, from responder to initiator, for people with aphasia who used visual scenes displays to tell stories was not a significant outcome of this study. Perhaps the reduction in cognitive processing when searching for messages on a photograph-based display was beneficial to both people with aphasia and peer conversation partners. Therefore, any reduction in processing time or cognitive load for participants with aphasia was counteracted by the tendency of PCPs to jump in and initiate exchanges based on the context of photographs. This may have permitted PCPs to maintain the dominant role in communication and continued to restrict individuals with aphasia from initiating the exchange of ideas.

Two of three participants with aphasia in this study attempted more initiations during the TGD condition. Although the number of participant with aphasia initiated

attempts increased in this condition, the number of abandoned messages also increased indicating that their PCPs generally did not increase responses for these attempts. Shared reference increased during the TGD condition for Dyad 3, indicating that the peer communication partner may have been attempting to decipher the messages represented symbolically with abstract, decontextualized line drawings. For two of three PCPs the number of initiations also decreased from the no display condition as well as the VSD condition. This indicates that PCPs may dominate less of a conversation when symbolically represented messages are present, but not so transparent that they can deduce the content of the story. In addition, PCPs are more dependent upon individuals with aphasia to activate and initiate the information exchange, and the context they are able to glean from the TGD facilitates and encourages individuals with aphasia to initiate. Hence, poor initiation may not be a cognitive deficit associated with reduced frontal lobe function as has been proposed by others, but in fact may be the results of an inability to recruit adequate physiologic resources to convey meaning (McNeil, 1983; Murray & Chapey, 2001).

Furthermore, this study supports preceding investigations that have indicated a necessary collaboration between PCPs and participants with aphasia to achieve successful communication, in that at least forty percent of the exchanges required partner interpretation to be successful across conditions and dyads (Damico, Oelschlaeger, Simmons-Mackie, 1999; Beukelman & Garrett, 1995). In addition to this finding, this study revealed that the most successful exchanges occurred when dyad participants had the greatest level of shared context and reference, which occurred in VSD. The fact that people with aphasia could convey more messages successfully, with partner support, in

the VSD condition provides some support for this theory. However, caution must be applied to this conclusion because exchanges in which the participant with aphasia independently and successfully participated in just thirty percent of the exchanges across all interactions and dyads. Furthermore, the within group variability for all participants has impacted the results of this study. For example, communication styles, interest in conversational topics and severity of aphasia all affected the data collected.

Clinical Implications

Preliminary findings from this study indicate that participants with aphasia are more capable of regaining some communicative control and success when SGDs are present. The increase in communicative control was indicated by the increase in initiations when an SGD was present for all participants with aphasia. This study has also indicated that the presence of SGDs (VSD or TGD) created an opportunity for participants with aphasia to initiate exchanges, which indicates that an external symbolic representation of message allows individuals with aphasia to become more proactive and less reactive in communicative interactions. However, exchange success continued to remain primarily dependent upon communication partners. This is supported by the fact that PCPs maintained the dominant role in all interactions across dyads, and the participants with aphasia were able to initiate the most exchanges when the PCPs were given enough relevant contextual information to request or prompt participants with aphasia to provide specific information via TGDs, or confirm their speculations regarding the story in VSD conditions.

Findings from this study indicate that when PCPs are provided an abundance of contextual support (e.g., photographs) they are able to deduce the direction and content of story topics. This may be the reason communicative exchange success increased across all three dyads in this study during the VSD condition in that PCPs gathered enough contextual information to initiate appropriate message exchanges much more efficiently than their counterparts. This is supported by the absence of communicator role shifts between the no display condition and the VSD condition. In contrast, communicator roles shifted slightly in the TGD condition indicating that individual with aphasia can regain some conversational control when symbols provide their communication partners enough contextual information to facilitate message exchanging instead of dominating the process. This suggests the initiating capacity of individuals with aphasia may be partially restored with TGDs and the communicative success can be increased with VSDs. This notion is supported by the fact that dyads demonstrated more of a shift in communicator roles during the TGD condition and increased communicative exchange success during the VSD condition.

A topic interest effect was an experimental confound in this study in that the second story-telling of each topic for all participants did not generally last as long as the initial story-telling. This finding indicates that individuals with aphasia have not lost the ability to choose preferred topics of discussion (see Figley, 2007). In addition to individuals demonstrating topic preference, PCPs did not ask as many clarification questions in the second telling of story topics. Specifically, Dyad 1 halved the number of exchanges and acts in the sessions which story topics were retold, and Dyads 1 and 2 generally talked more about some story topics than others across conditions; this is

indicated by a greater number of acts and exchanges across conditions. When participants with aphasia preferred to talk about a story topic they requested more social interaction, and PCPs were driven to ask questions that elaborated on the given topic.

Limitations of this study and suggestions

A major limitation of this study was that only two data points were collected for each condition from dyads. It is suspected that with more data points the variability of participant behaviors could be mathematically canceled out, and patterns could be seen more readily within and across participants. Another limitation of this study was the story topics selected had varying degrees of interest for the participants with aphasia, which affected their desire to share the story and interact with their peer communication partner. For example, the participant with aphasia from Dyad 3 particularly enjoyed talking about his son's graduation, but did not prefer to talk about his hobbies, which was indicated in the number of exchanges and acts that occurred in the sessions these stories were told (see Table 3.5). In addition to original topic interest, when stories were retold to the same PCPs, some participants demonstrated reduced interactive communication (see Tables 3.1 & 3.3). For example, the participant with aphasia from Dyad 1 reduced the number of acts to share a story for the second time with his peer communication partner by nearly half for all retold story topics. Ideally, these topical limitations could be resolved by having different story topics that are interesting to the participant with aphasia for each experimental session.

An additional limitation of this study was found in PCPs familiarity both with the participants with aphasia, and the impairments of aphasia itself. This study sought to

identify PCPs who had moderate familiarity with the condition of aphasia, but the peer communication partner (Dyad 3) who was least familiar with the condition demonstrated the most natural communication behaviors across conditions. This may have been a product of partner familiarity within the dyad, as these participants were family friends. However, the PCPs in the remaining dyads had significantly more knowledge about aphasia and therefore demonstrated less natural communication behaviors across conditions; also these PCPs were not as familiar with the participants with aphasia. This finding suggests that more valid and practical communication analyses could be obtained if communication dyads are moderately familiar with each other and less familiar with the impairments of aphasia.

A final limitation of this study was created by investigator presence during dyad conversations. The naturalness of interactions was affected by recording the interaction as well, but it is suspected that removing the investigators from the room during interactions would allow participants to overlook the presence of the camera recording, which in turn would allow them to more naturally participate in the conversation.

Directions for future research

In addition to the suggestions listed above to resolve the limitations of this study, it would be interesting to investigate modalities that were used to convey information across conditions. For the purposes of this study, the condition itself was presumed to be the modality; meaning that in conditions with SGD displays participants with aphasia naturally used the SGD to convey information. However, it would be interesting to investigate modalities to identify shifts in modalities used for both participants with

aphasia and PCPs. Also, it would be interesting to investigate the ability of participants with aphasia to recall the message represented symbolically for TGDs and VSDs. Furthermore, breakdowns are inherent to communication with aphasia and it would be interesting to investigate the breakdowns and repair strategies that occur across conditions. To increase the validity of communicative success claims, it is suggested the future research ask the peer communication partner to retell the story back to investigators at the end of each experimental session to indicate a measure of how much of the story the participant with aphasia was able to convey adequately so that the peer communication partner could understand the story.

Conclusion

The original theory that prompted this study was that people with aphasia would be more active participants in conversations when using VSDs than TGDs because of symbol saliency. An unexpected finding in this study was that PCPs were able to maintain their dominant conversational role when given contextual information in the VSD condition. Although more contextual information is known can to enhance comprehension for people with aphasia, too much contextual information may actually continue to lock them into a reactive conversational role. Another unexpected finding was that people with aphasia are able to take on a more proactive communicative role during the TGD condition. These two findings suggest that a combination display containing both decontextualized symbols as well as photographs may be most beneficial for people with aphasia.

The challenge for researchers and clinicians currently is to find a balance for representing messages symbolically on an external AAC device in which a degree of

"message-secrecy" can be maintained, but enough contextual information is provided to people with aphasia as well as their communication partners. Without this balance people with aphasia will remain locked into the reactive communicator role. However, it is proposed that a combination display could provide just enough contextual information to create a level of shared knowledge between partners without revealing the entire story visually; thereby, partially restoring proactive participation in interactions for people with aphasia by increasing support from communication partners for initiating and creating more successful exchanges.

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APPENDICES

Appendix A

Participant Screening Criteria

Peer Communication Partner Selection Criteria

Potential Participant's Name: _____
Address: _____
Phone Number: _____

The participant must:	Referral Check	Investigator Check
1. Be within 15 years of partners age	_____	_____
2. Have provided direct care to an individual with aphasia for a minimum average of 8 hours per day for 3 days a week for at least one year	_____	_____
3. English as a primary language.	_____	_____
4. Literate at the 4th grade reading level based on an oral reading of the Grandfather Passage with no more than 5 incorrect word productions	_____	_____
5. Correctly answer 4 of 5 content questions about the Grandfather Passage	_____	_____
6. Have no dramatic fluctuations in alertness due to medical conditions	_____	_____
7. Demonstrate functional visual acuity (aided or unaided) as determined by the ability to match 4 of 5 words given a field of three printed words in 20pt font	_____	_____
8. Demonstrate functional hearing (aided or unaided) by demonstrating a pure tone average of 40dbHL in at least one ear at 1000, 2000, and 4000 Hz	_____	_____
9. Have no complaints of hearing interfering with daily conversation	_____	_____
10. Demonstrate normal attention and memory skills within 1 standard deviation of the mean on the CLQT	_____	_____
11. Show no evidence or reported history of disease processes associated with dementia or chronic substance abuse	_____	_____
11. Have interacted with at least one of the primary participants through mutual social or therapy activities	_____	_____

Person with Aphasia
Selection Criteria

Potential Participant's Name: _____
Address: _____
Phone Number: _____

The participant must:	Referral Check	Investigator Check
12. Be between the ages of 30-90	_____	_____
13. One year post onset of no more than two Left hemisphere CVA's	_____	_____
14. English as a primary language.	_____	_____
15. Have a diagnosis of moderate to severe expressive aphasia and moderate to severe receptive aphasia as reported by a licensed SLP and confirmed by subtest scores on The Western Aphasia Battery: Fluency and Comprehension	_____	_____
16. Have been able to read and comprehend at the 4th grade level premorbidly.	_____	_____
17. Have no dramatic fluctuations in alertness due to medical conditions	_____	_____
18. Demonstrate functional visual acuity (aided or unaided) as determined by the ability to match 4 of 5 words given a field of three printed words in 20pt font	_____	_____
19. Demonstrate functional hearing (aided or unaided) by the ability to look at a speaker calling his or her name, and by demonstrating a pure tone average of 50 dB HL in at least one ear (aided or unaided) at frequencies of 1000 and 2000 Hz	_____	_____
20. Demonstrate attention and memory skills Within 1 standard deviation below the mean For persons with left hemisphere infarcts on Two subtests of the CLQT.		
Symbol Trails: 1.45/10	_____	_____
Design Memory: 2.85/6	_____	_____
10. Show no evidence or reported history of disease processes associated with dementia or chronic substance abuse	_____	_____

VISION: WORD MATCHING

The participant will be presented with a card containing four single words in 20 pt. font listed vertically. The investigator will then present a small card containing a single target word and will instruct the subject to, "Find this word on your card." She will also demonstrate the task with two pre-screening items by saying "watch me" and then matching the small card to the correct word on the large card.

#1 (target label = client's name):	**successful**	**unsuccessful**
#2 (target label = bird):	**successful**	**unsuccessful**
#3 (target label = funny):	**successful**	**unsuccessful**
#4 (target label = Sunday):	**successful**	**unsuccessful**
#5 (target label = basketball):	**successful**	**unsuccessful**

Total # pairs matched correctly: _____

Criterion 4 out of 5 correct **Subject Accepted?_____**

Subject Identifier:_____
Pass / Fail
Date:_____
Examiner_____

Grandfather Passage Content Questions

1. How old is my grandfather? (Answer: 93)

   Correct/Incorrect

2. How does his voice sound when he speaks? (Answer: a bit cracked and/or quivers)

   Correct/Incorrect

3. What does he play twice each day with zest? (Answer: a small organ)

   Correct/Incorrect

4. What does grandfather say when we urge him to walk more and smoke less? (Answer: Banana)

   Correct/Incorrect

5. What is his black frock coat usually missing? (Answer: a few buttons)

   Correct/Incorrect

Appendix B.1

Peer Communication Partner Consent Form

INFORMED CONSENT FORM FOR AN ADULT CONVERSATIONAL PARTNER WITH NO APHASIA

TITLE: **Quantitative and Qualitative Differences in Conversational Performance of People with Aphasia Using Three Types of Visual Screen Displays on Speech Generating Devices.**

PRIMARY INVESTIGATOR/ FACULTY ADVISOR: **Kathryn L. Garrett, Ph.D., CCC-SLP**
Assoc. Professor, Dept. of Speech-Language Pathology

Duquesne University
403 Fisher Hall
Pittsburgh, PA 15282-2231
(412) 396-4219
garrettk@duq.edu

CO-INVESTIGATORS: **Laura C. Figley (412) 973-8884**
Figley243@duq.edu

Jennifer M. Seale (412)-638-6862
Seale716@duq.edu

Resource Room Mailbox
403 Fisher Hall
Pittsburgh, PA 15282-2231

SOURCE OF SUPPORT: **Duquesne University**
Dept. of Speech-Language Pathology

INVITATION TO PARTICIPATE: You, _____ _____, are invited to participate in our Master's thesis research study. In this study, we will ask you to interact with someone who attends therapy at the Duquesne University Speech-Language Hearing Clinic who has a severe language impairment known as aphasia. The following information is provided to help you to make an informed decision regarding whether or not you should participate. If you have any questions please do not hesitate to ask.

You are a candidate for the study because you have no difficulty speaking, have no known neurological deficits, have normal speech, language, reading, and hearing skills, and because you are **between the ages of 30 and 90.** You are also a candidate because you have cared for or spent a significant amount of time with a person with severe aphasia since before his/her stroke.

PURPOSE OF THE STUDY

In this research project, I will ask you to converse with a person with aphasia who is currently receiving therapy at the Duquesne University Speech-Language Hearing Clinic. You may or may not be familiar with this person from your own experience of bringing your family member/spouse to therapy.

You will be asked to participate in testing to better understand your language and thinking abilities. We need you to complete a vision screening test, and a hearing screening test, and the Cognitive Linguistic Quick Test. This should take approximately 1 hour, but no more than 2 hours, at a location of your choice (clinic, your home, friend's home).

During the 7 experimental sessions that follow, you will converse with your communication partner for a maximum of 10 minutes within each ½ hour session. Your partner with aphasia will be using a computer to tell a story that is familiar to him/her. You will be given three items of information that you will need to obtain from the person with aphasia by asking them questions, at some point during the conversation. After each conversation, you will be asked to take part in a brief (5 to 10 minute interview) in which you will be asked questions regarding your perceptions about your partner's performance in the conversation and the computer display used in the session. Each session will be video recorded. After all 7 of the experimental sessions have been conducted, you will be asked to watch 6 two-minute excerpts of your conversations. You will be asked to rank the sessions in order from "best" to "worst", "best " being the being the interaction that you felt was the most successful, most comfortable, and most natural, and "worst" being the opposite. Your total time requirement for this study will be no more than 10 hours.

The conversations will be conducted at a mutually agreeable time, at the Duquesne University Speech-Language-Hearing Clinic. All sessions will be video recorded and analyzed at a later time by the primary investigator or a trained research assistant.

Total Number of Sessions/Time Requirements for Peer Communication Partner

	Testing/ Informed Consent/ -Secondary Screening	**Experimental Sessions**	**Perceptual Data Collection/ Condition Ranking**
Peer	-Verify selection criteria	-conversation (data collection)	**-**watch 6 two-minute video excerpts of

Communication Partner (PCP) **Total PCP Time: 10 Hrs. Max**	-Informed Consent -Administer CLQT -Secondary screening _____ **One 1-2 hour meeting to obtain informed consent at Duquesne Univ. and conduct testing.**	-Brief 5-10 min. interview _____ **Seven 10-minute conversations at the Duquesne University Speech-Language Hearing Clinic / max session length = 1/2 hour.**	conversations -rank excerpts -Interview _____ **1 session, 45 min. max**

RISKS AND BENEFITS
There are minimal risks associated with this study. You should be in no physical discomfort during the experiment. The sessions will be held during a time of day that you and the person with aphasia judge to be most convenient. We will protect your privacy throughout the study. This research may benefit the field of speech-language pathology, individuals with aphasia, and their families

COMPENSATION AND COSTS
There is no cost to you for participating in this study. If you complete the study, you will not receive any monetary compensation. However, information we gain from this study may add to our understanding of aphasia and potentially benefit others with this disability.

ASSURANCE OF CONFIDENTIALITY
Any information obtained during this study that could identify you will be kept strictly confidential. All videotapes and written information will be kept in a locked file cabinet in the investigator's locked office. You will only be identified by a code on the interview forms, test forms, videotapes, and other research data. We will not use any of your own health information in this project.

The information obtained in this study may be published in scientific journals or presented at scientific meetings, but your identity will be kept strictly confidential. If you wish to do so, you may sign a video release form that will enable us to use the videotaped interviews for teaching purposes and/or for presentations at scientific conferences. This is optional, and you may cancel this agreement at any time. Videotapes will be destroyed after data have been summarized, or after 3 years, whichever comes first. Paper data will be shredded and computer files will be erased after 5 years unless you have signed additional consent forms.

RIGHT TO WITHDRAW
You are free to withdraw from this investigation at any time without adversely affecting your relationship with the investigators, Duquesne University, or the Duquesne University Speech-Language Hearing Clinic.

SUMMARY OF RESULTS
No information will be withheld from you. The results of the study will be reviewed with you if you express an interest in this information. A written summary of this research will be supplied to you, at no cost, upon request.

VOLUNTARY CONSENT
Your rights as a research participant have been explained to you. If you have any additional questions you may contact the primary investigator (see page 1) or the Chairman of the Duquesne University Institutional Review Board (IRB):

Dr. Paul Richer
403 Administration Bldg.
Duquesne University
(412) 396-6326 richer@duq.edu

YOU ARE VOLUNTARILY MAKING A DECISION REGARDING YOUR PARTICIPATION IN THIS RESEARCH STUDY. YOUR SIGNATURE CERTIFIES THAT YOU HAVE DECIDED TO PARTICIPATE HAVING READ AND UNDERSTOOD THE INFORMATION PRESENTED. YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

X _____ _____
Signature of Adult Participant **Date**

IN MY JUDGMENT THE ABOVE INDIVIDUAL IS VOLUNTARILY AND KNOWINGLY GIVING INFORMED CONSENT AND POSSESSES THE LEGAL CAPACITY TO GIVE INFORMED CONSENT TO PARTICIPATE IN THIS RESEARCH STUDY.

_____ _____
Signature of Primary Investigator/Faculty Advisor **Date**
Kathryn L. Garrett, Ph.D., CCC-SLP
(W) 412-396-4219 (H) 412-422-0376

_____ _____
Signature of Co-Investigator **Date**
Laura C. Figley, B.S.
(412) 973-8884

_____ _____
Signature of Co-Investigator **Date**
Jennifer M. Seale
(412)-638-6862

Appendix B.2

Participant with Aphasia Consent Form

ADULT PARTICIPANT WITH APHASIA: MODIFIED INFORMED CONSENT/ASSENT FORM

TITLE: Quantitative and Qualitative Differences in Conversational Performance of People with Aphasia Using Three Types of Visual Screen Displays on Speech Generating Devices

FACULTY ADVISOR/PRIMARY INVESTIGATOR: Kathryn L. Garrett, Ph.D., CCC-SLP
Assoc. Professor, Dept. of Speech-Language Pathology
Duquesne University
403 Fisher Hall
Pittsburgh, PA 15282-2231
(412) 396-4219
garrettk@duq.edu

SECONDARY INVESTIGATORS: Laura C. Figley, B.S. (412) 973-8884 figley243@duq.edu
Jennifer M. Seale, B.S. (412) 638-6862 seale716@duq.edu
Resource Room Mailbox
403 Fisher Hall
Pittsburgh, PA 15282-2231

SOURCE OF SUPPORT: Duquesne University
Dept. of Speech-Language Pathology

* *

INVITATION TO PARTICIPATE:

You, _____, are invited to participate in my Master's thesis research study. I want to help you decide whether to participate or not. You can ask me questions at any time.

You are able to participate because you had a stroke more than 1 year ago, causing you to have difficulty speaking. This condition is called aphasia. You are also between the ages of 30 and 90 years.

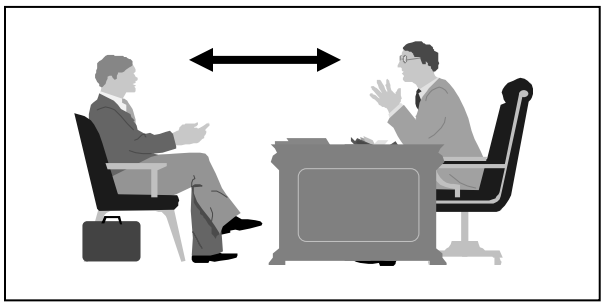
*APHASIA: 1+ years ago

* **Between ages 30 and 90**

WHAT HAPPENS IN THIS STUDY?

In this study, an adult (who understands aphasia) will ask you to tell three of your favorite stories. We will encourage both of you to have a conversation about the story (meaning -- ask questions back and forth). On some days, you will use speech and gestures to

tell the story. Other times, you will a computer to tell your story. On some days, the computer will show your own photos and printed sentences to tell your story. On other days, the computer will show symbols instead of photos. We will videotape you during each session. You will also be asked to give your opinion about each session on a rating scale.



HOW LONG DOES THE STUDY LAST?

We need to meet for approximately **10 hours total**.

• The first two sessions would involve testing, informed consent, and secondary screening.

• The next 7 sessions would be 1/2 hour long. You would have to answer some questions and tell a story to someone you might know from the clinic.

• During the 8th and last session, you will be asked to watch some short video clips of your conversations. You will also be asked to answer questions and talk about the experiment.

- Meet for a MAXIMUM of **10 hours**
- Informed consent/secondary screening — 1- 2 hours
- Testing during regular therapy sessions — 2.5 hours – but no extra sessions

* Week 1	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Tell us a story, Questions	1/2 hr
* Week 2	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Tell us a story, Questions	1/2 hr
* Week 3	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Tell us a story, Questions	1/2 hr
* Week 4	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Watch a video, Questions	1/2 hr

WHERE DOES THE STUDY TAKE PLACE?

We will meet here at the clinic at DUQUESNE just before you come in for your regular therapy. We can reschedule any session if you are sick or too tired to participate.

RISKS AND BENEFITS:

There are minimal risks associated with this research. You should not feel tired or be uncomfortable because of this study.

This study will not help you get better – BUT we hope to understand more about aphasia after this study is over.

You will **not** have to pay $$$ to be a part of this study. You will not receive money because you completed participation in this study.

CONFIDENTIALITY:

#1a.

PWA 7

We will use some of your health information (age, description of stroke) but we will protect your privacy at all times. We will not reveal your name to anyone else. Research assistants who gather information from the videotape will see only a **code**, not your name. We will keep the film and data in a **locked file** in the research lab at Duquesne.

We will destroy the videotapes 3 years after we are done with the study. We will destroy the raw data (numbers), and written or computer-stored health data 5 years after completion of the study.

We may publish the results of this study and use limited health information (date of stroke, age, severity of aphasia), however your name will not be used. Any identifying information will be removed.

RIGHT TO WITHDRAW:

I appreciate your participation in this study. However, you can stop at any time. This will not hurt your relationship with the investigators or Duquesne University.

"I QUIT" – OK to say this any time!

SUMMARY OF RESULTS:

You can get a copy of the RESULTS of this study if you want it – and it will **NOT** cost you any $$$$!

VOLUNTARY CONSENT:

I have read the above. I understand what is being requested. I am participating voluntarily. I can QUIT anytime, for any reason. I will get a copy of this consent form to keep. **If I have any questions about participating in this study, I should call the investigators (see page 1) or contact:**

Dr. Paul Richer, Director of the IRB at Duquesne University.
403 Administration Bldg. (412) 396-6326
richer@duq.edu

I signed below to show that I am willing to participate in this research.

X_____ _____
Signature of Participant Date

In my judgment the participant is voluntarily and knowingly providing:
__ informed consent to participate in this research study
__ informed assent to participate in this study (must also attach agent consent)

X_____ _____
Signature of Primary Investigator/ Date
Faculty Advisor
Kathryn L. Garrett, Ph.D.
Dept. of Speech-Language Pathology
Duquesne University
Phone: 412-396-4219 email: garrettk@duq.edu

X_____ _____
Signature of Secondary Investigator Date
Laura C. Figley, B.S.
Phone: 412-973-8884 email: figley243@duq.edu

X_____ _____
Signature of Secondary Investigator Date
Jennifer M. Seale
Phone: 412-638-6862 email: seale716@duq.edu

Appendix B.3

Agent Consent Form

AGENT'S INFORMED CONSENT FORM FOR AN ADULT RESEARCH PARTICIPANT WITH APHASIA

TITLE: **Quantitative and Qualitative Differences in Conversational Performance of People with Aphasia Using Three Types of Visual Screen Displays on Speech Generating Devices.**

PRIMARY INVESTIGATOR/ FACULTY ADVISOR: **Kathryn L. Garrett, Ph.D., CCC-SLP**
Assoc. Professor, Dept. of Speech-Language Pathology
Duquesne University
403 Fisher Hall
Pittsburgh, PA 15282-2231
(412) 396-4219
garrettk@duq.edu

SECONDARY INVESTIGATORS: **Laura C. Figley, B.S. (412) 973-8884 figley243@duq.edu**
Jennifer M. Seale, B.S. (412) 638-6862
seale716@duq.edu
Mailbox
Resource Room
403 Fisher Hall
Pittsburgh, PA 15282-2231

SOURCE OF SUPPORT: **Duquesne University**
Dept. of Speech-Language Pathology

INVITATION TO PARTICIPATE: Your family member, _____ _____, is invited to participate in our Master's thesis research study. In this study, I will ask your family member to converse with another spouse/family member of another person with aphasia who receives therapy here at Duquesne. The following information should help you make an informed decision regarding whether or not the person with aphasia (your family member) should

participate. You have been asked to review this information because you have power as agent under a power of attorney that gives you authority to act for your family member in this matter. If you have any questions please do not hesitate to ask.

Your family member is a candidate for the study because he/she has difficulty speaking following a stroke. This condition is also known as aphasia. He or she is also a candidate because the stroke was more than 1 year ago, and because he or she is between the ages of 30 and 90. Your family member was invited through recommendation from a speech-language pathologist at the Duquesne University Speech-Language-Hearing Clinic.

PURPOSE OF THE STUDY/STUDY REQUIREMENTS

In this research project, your family member will tell three of his/her favorite stories while conversing with a communication partner who is familiar with the condition of aphasia, typically because he/she is a family member/spouse of another person with aphasia attending the Duquesne University Clinic. During some sessions, the person with aphasia will tell stories without any support, using just residual speech or gestures. During other sessions, the person with aphasia will use a computer with artificial speech output to tell stories and to ask questions during the conversation. The display on the computer will use symbols for some sessions, and personal photos for others. We will ask you to bring in some of your own photos and help us construct three stories that we can program into the computer. Before we use the stories in experimental sessions, we will ask you to review each story for accuracy and your approval.

Your family member will need to meet with the primary investigator for approximately 10 hours total. First, he/she will be asked to participate in testing so we can better understand their skills and challenges. He/she needs to complete an aphasia test, a vision screening test, and a hearing screening.. This testing should take approximately 4 hours, and can be completed across more than one session if your family member tires. Most of the testing may be completed at the Duquesne Speech-Language-Hearing Clinic during regular therapy times.

During the first experimental session, we will allow your family member to view and experiment with each computer display to gain familiarity with the technology. Then, your family member will engage in the conversation about the favorite story. Starting with the second session, the experimenter will ask your family member to recall where messages from the previous story were stored in the computer. Then, he/she will learn to tell a new story using a different computer screen (display). During the 7th session, your family member will pick his/her favorite computer display type and story, and have an additional conversation. During all 7 experimental sessions, your family member will converse with a peer for 10 minutes during each session. The experimenter also will ask your family member a few questions at the end of each session to learn how he/she felt about the interaction and the computer display. Each 1/2 hour session will be video recorded for later analysis.

After all 7 experimental sessions have been conducted, a final (8th) session will take place in which your family member will watch 6, two-minute video clips extracted from each of their prior conversations. He/she will be asked to rank the conversations in order from "best" to "worst", with "best" being the interaction he/she felt was the most successful, most comfortable, and most natural, and "worst" being the opposite. The experimenter also will talk to your family member for approximately ten minutes about his/her perceived performance across the sessions, as well as the computer displays.

The conversations will be conducted at the Duquesne University Speech-Language Hearing Clinic at a mutually agreeable time. The experimental sessions will be scheduled around any other treatment sessions or appointments. The experiment will not interfere with any treatment your family member is already receiving.

Summary of Time requirements

- Meet for a MAXIMUM of **10 hours**
- Informed consent/secondary screening 1- 2 hours
- Testing during regular therapy sessions 2.5 hours – but no extra sessions

* Week 1	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Tell us a story, Questions	1/2 hr
* Week 2	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Tell us a story, Questions	1/2 hr
* Week 3	Tuesday	Tell us a story, Questions	1/2 hr
	Friday	Tell us a story, Questions	1/2 hr
* Week 4	Tuesday	Tell us a story, Questions	1/2 hr

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protect your family member's privacy throughout the study.

COMPENSATION AND COSTS
There is no cost to you and your family member for participating in this study. If your family member completes the study, you will not receive any monetary compensation. However, information we gather may add to our understanding of aphasia and potentially benefit others with this disability.

ASSURANCE OF CONFIDENTIALITY
Any information obtained during this study that could identify your family member will be kept strictly confidential. All videotapes and written information will be kept in a locked file cabinet in the investigator's locked office. Your family member will only be identified by a code on the test forms, videotapes, and other research data. We will use some limited health information obtained from your family member's health records in the Duquesne University Speech-Language-Hearing Clinic. Examples include: date of stroke, age, medical description of the stroke, test scores, and therapy history. No identifiers will be used, such as phone number, initials or address. You must sign the additional HIPPA form entitled "Authorization to Release Patient Health Information" so that we can legally access this information.

The information obtained in this study may be published in scientific journals or presented at scientific meetings, but your family member's identify will be kept strictly confidential. If you and your family member wish to do so, you may sign a video release form that will enable us to use the video-film data for teaching purposes and/or for presentations at scientific conferences. This is optional, and you may cancel this agreement at any time. Videotapes will be destroyed after data have been summarized, or after 3 years, whichever comes first. Paper data will be shredded and computer files will be erased after 5 years unless you have signed additional consent forms.

RIGHT TO WITHDRAW
You are free to decide not to allow your family member to participate in this study. You can also withdraw your family member at any time without adversely affecting your relationship with the investigators, Duquesne University, or the Duquesne University Speech-Language Hearing Clinic. Your family member will continue to receive any therapy or other services to which he/she is entitled even if he/she stops participating in this research.

SUMMARY OF RESULTS
No information will be withheld from you or your family member. The results of the study will be reviewed with you if you express an interest in this information. A written summary of this research will be supplied to you and your family member, at no cost, upon request.

VOLUNTARY CONSENT
Your family member's rights as a research participant have been explained to you. If you have any additional questions you may contact the primary investigator (see page 1) or the Chairman of the Duquesne University Institutional Review Board (IRB):

Dr. Paul Richer

Room 403 Administration Bldg.
Duquesne University
(412) 396-6326 richer@duq.edu

YOU ARE VOLUNTARILY MAKING A DECISION REGARDING THE PARTICIPATION OF YOUR FAMILY MEMBER IN THIS RESEARCH STUDY. YOUR SIGNATURE CERTIFIES THAT YOU HAVE DECIDED TO CONSENT TO YOUR FAMILY MEMBER'S PARTICIPATION, HAVING READ AND UNDERSTOOD THE INFORMATION PRESENTED. YOU WILL BE GIVEN A COPY OF THIS CONSENT/ASSENT FORM TO KEEP.

_____

_____ _____

Signature of AGENT **Date**

Thank you for providing a copy of the "Durable Power of Attorney document for our records.

IN MY JUDGMENT THE AGENT IS VOLUNTARILY AND KNOWINGLY GIVING INFORMED CONSENT AND POSSESSES THE LEGAL CAPACITY TO GIVE INFORMED CONSENT FOR _____ _____ TO PARTICIPATE IN THIS RESEARCH STUDY.

_____ _____

Signature of Primary Investigator/Faculty Advisor **Date**

Kathryn L. Garrett, Ph.D., CCC-SLP
(W) 412-396-4219 (H) 412-422-0376

_____

_____ _____

Signature of Co-Investigator **Date**

Laura C. Figley, B.S.
(412) 973-8884

Signature of Co-Investigator **Date**

Jennifer M. Seale
(412)-638-6862

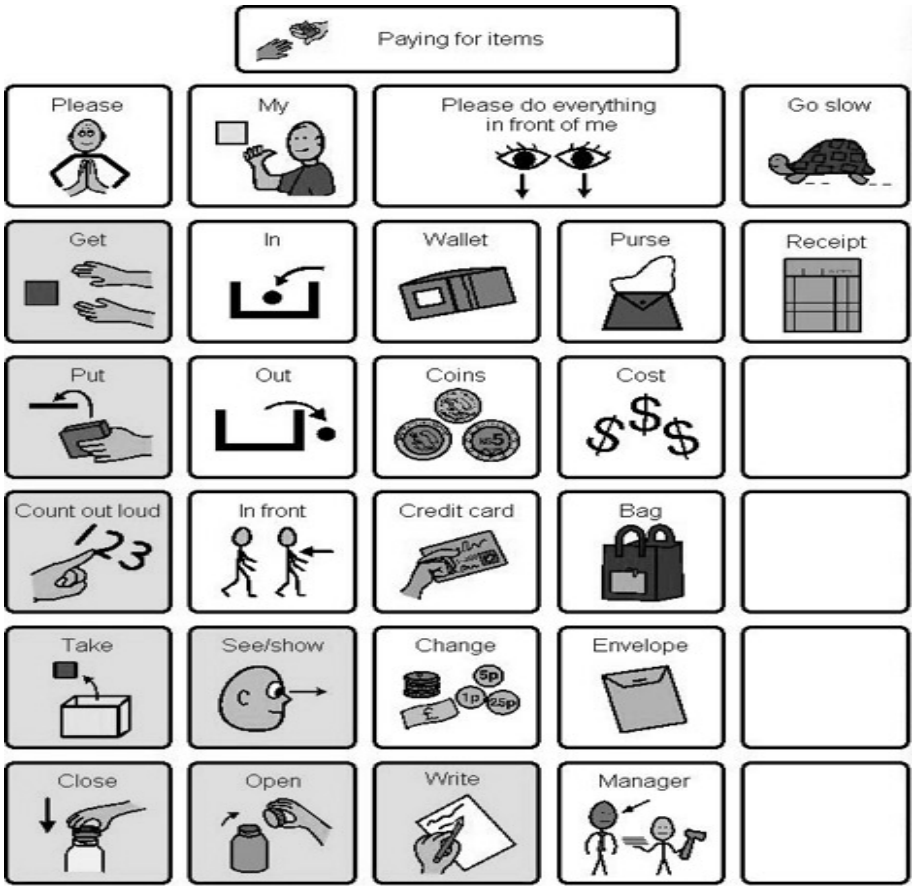
Appendix C

Visual Scene Display Sample

Sample taken from publicly available AAC-RERC website.

Appendix D

Traditional Grid Display Sample



Sample taken from publicly available PCS website.

Appendix E

Transcription, Segmentation and Coding Criteria

Coding Categories and Criteria
(Modified from Garrett & Hanna, 2004)

Coding Categories and Criteria – Partner Training Study

A. SEGMENTATION and TRANSRIPTION RULES

1) <u>Identify and Transcribe: Primary</u> <u>Communication Acts</u> (Garrett, 1993).

- *Divide individual communication acts with a colored line on the coding sheet.*
- *Use the following criteria to determine whether acts should be separated (i.e., communication act boundaries). :*

a. <u>Phonological</u>: Act is separated by stress, intonation, pause; not associated with word retrieval breakdown or visual search time to locate a referent.
   - "The weather's been hot lately." = **1 act**
   - "The weather's been hot lately. Don't you think?" = **2 acts**

b. <u>Communicative</u>: A cohesive unit of meaning or idea (complete or attempted). Has a different semantic and syntactic structure than preceding or subsequent acts.
   1) **Verbal Acts:** include the *independent clause* plus any corresponding *dependent clauses.* This comprises a **C-unit.** Clauses are divided as follows:
   *If connected by [**and (then), so (then), but, or**] link *Independent Clauses* = **2 acts**
   *If connected by [**because, when, that, who, after, before, so (that) which, although, despite, if, unless, while, as, how, until, as, like, where**] link *dependent clauses* = **1 act**
   ****Enclose in quotation marks ("Is this you?")**
   2) **Non-verbal Acts:** include gestures, head-nods, head turns, pointing, written choices; any behavior not involving vocalizations
   ****Enclose in brackets [gives 'thumbs-up' gesture]**

   - Code 1 C-unit per act + accompanying non-verbal sub-acts
   - Code Yes + head nod as 1 sub-act, No + head shake as 1 sub-act
   - Code "And…." In same verbal/non-verbal subact if it is a filler
   - If there is a change in the person or the role (from initiation to response) of communication act, code as a different act

***2)* <u>Identify and Transcribe: Secondary Communication Acts (Subacts)</u> :**

a. <u>Verbal Communication Sub-Acts</u> – *code in quotations marks.* Includes:
   1. Crucial acts – anything with semantic content or meaning
   2. Non crucial acts e.g., confirmatory -- uh huh.
   3. Vocalizations with communicative intonation (e.g., muh, muh?)
      - *However, do not code coughing, etc.*

b. <u>Nonverbal Communication Sub-Acts (Gestures, Head nods, Pointing, Written Choice) – *code in brackets*</u>:
   1. <u>*Beats*</u>,, or nonlinguistic gestures that do not convey supplemental meaning, that accompany the spoken language of the communicator.

- *Do NOT code as a separate subact (they always accompany speech but have no meaning on their own). In this case, transcribe them in brackets, but put them in the same coding line as the verbal act.*

2. <u>*Pointing*</u>: any gestural signal used to purposefully convey the importance of attending to a referent or to regulate the social interaction e.g., pointing.
   - *indicate, in brackets, what the individual is pointing to [point to book]*
   - *code as separate subact on a different line*
3. <u>*Symbolic gestures*</u> -- communicate minimal units of meaningful, discriminatory information about a specific referent in the reminiscing conversation. Referents can be: visual (location, size, existence), descriptive (gender, hair color), actions (e.g, fishing), temporal (when an event occurred), spelling (spell out words), emotive (conveying emotion) Examples:

   Visual: [point to here], [point to location in picture]
   Descriptive: [gesture long hair, gesture big fish)
   Actions: [gesture 'fishing' by holding onto a pole]
   Temporal: [gesture with hand over back to indicate past]
   Spelling: Also includes "air writing", whereby communicator writes in the air to spell a word.
   Emotive: shoulder shrug, 'thumbs-up', rolling eyes
4. <u>*Head Nods*</u>— nodding head 'yes' or shaking head 'no' in response to yes/no questions
5. <u>*Written Choice*</u>— answering a question by pointing to written information (words, numbers, pictures) that a partner has put on paper

3) Identify Exchange Boundaries (Separate with Yellow line)

Exchange: A series of at least 2 shared conversational **turns** between a sender and receiver that attempt to achieve a joint communication goal. It conveys a new **idea** or concept even if this concept is related to the same **topic.** Breakdown acts/sub-acts and **repair sequences** that relate to this **idea** are included in the same exchange.

***Conversational turn*:** a unit of behavior bound by a pause that conveys a message between a sender and a receiver (Garrett, 1993, unpublished). It may be followed by another turn from the same sender or by a response from the receiver.

***Topic:* (Code once for entire exchange)** A clause or noun phrase that identifies the central issue of a discussion and provides a global description of a sequence of utterances (Keenan & Schieffelin, 1976).

*** Can be multiple exchanges per topic**
*** Only 1 topic per exchange**

***Repair Sequence*:** A sequence of turns initiated with the sole purpose of repairing a communication breakdown (e.g. asking for clarification, repeating)

- **Is included in the same exchange**

- **Exchanges DO NOT have to involve an INITIATION and a RESPONSE, but can include an INITIATION and EQUIVOCAL**

Example: Partner: "Did you go to the movies this weekend?"
PWA: [Nods head 'yes']
Partner: "You did?"

1 Topic
2 Exchanges
6 Acts

PWA: "Mama" [nods head 'yes'] **2 Sub-Acts**
Partner: "What did you see?"
[Writes 3 choices on paper]
PWA: "Mama"
[Points to 3rd written choice]

B. WHO INITIATED THE EXCHANGE (Code once for entire exchange)

The individual who is responsible for beginning the communication exchange.

1) Can be the communicator who is the enrolled subject of the investigation (with aphasia or without)
2) Or the person who is assigned to be the communication partner for this investigation.

C. ROLE OF THE TARGET COMMUNICATOR (code for each communication act)

The relative degree of conversational control demonstrated by the communicator (Garrett, 1993). Subtypes include:

1. **Initiation**: participant is participating but has not been obligated to do so. Note: A Communication Act is Not counted as an initiation unless it *contains specific semantic content* (e.g., "where did you go?)
   *** May include jargon or gestures**
2. **Response**: participant is obligated to take a turn by other participant's preceding communicative act.
   *** Yes/no responses count to wh-questions count here.**
   *** May include Jargon, Head nod/shake, gestures, written choice**
   *** Is not confirming previous initiation or response but is communicating novel semantic information**
3. **Equivocal:** degree of initiation or responsiveness is ambiguous and/or shared equally by both participants. * May include jargon, gestures Can also include: -
   • *confirmation/acknowledgement*. mutual laughing, 'uh huh' to maintain conversational flow (not "uh huh" as a "yes" answer), confirmatory question ("You feel either way?")
   ***No new information or question provided**
   • *Request for Elaboration*: -- one participant states an incomplete understanding of the communication act/message generated by another and asks for additional information. Example: "Huh?"
   *** Can also be a nonverbal act, such as a quizzical look.**
   ***Can include a reiteration of the question**

D. REFERENTIAL FUNCTION (code for each Act)

1. **Joint Attention**: A signal to the communication partner to indicate or request attention to referent under discussion. Is *intentional/illocutionary* (e.g., catching partner's gaze then looking/gesturing purposefully at a visual referent). Observable behaviors can include:
   - Pointing to an item or person (not a beat)
   - Pointing to paper with key words (not when answering a question)

- Pointing to a location in the room
- Looking at a person while attempting to communicate to engage them in the discussion

2. **Greeting/Small Talk:** (Beukelman & Mirenda, 1998)
   Greeting: questions/comments used to signal awareness of someone's presence, communicative intention, does NOT convey specific semantic info
   Small Talk: questions/comments following greeting that refer to **specific** shared information
   * **For the purposes of this study these are combined due to the partner's desire for a** specific response **when asking small talk questions**
   * **Response to Small Talk questions is coded as Small Talk, not provision of specific information**

3. **Requests for social interaction:** point to others to indicate a turn

4. **Request for Information (Question):** a statement with the sole purpose of obtaining information from the communication partner using question words (who, what, when, where, why, how) or asked in a yes/no format
   *May also include provision of specific information with rising intonation or jargon spoken with rising intonation
   *Is NOT related to previous utterances (request for clarification) therefore is part of a NEW EXCHANGE

5. **Provision of Specific Semantic Information**: Provision of specific semantic content to inform, share ideas, elaborate, or otherwise convey novel meaning. Typically associated with:
   a) Verbal-symbolic spoken language
      - words, sentences
      - verbal "yes" and "no" or standard variations (e.g., "yeah")
      - jargon or stereotypies, as long as intonational patterns and context reflect an attempt to convey meaning.
      - *Note: Verbal-symbolic communication subacts do NOT have to be intelligible or successful to be coded as provision of specific semantic info (e.g., intentional jargon)*

   b) Symbolic gestures/pantomime
      - Example:
      - [point in a circle by side to indicate "past"]
      - [nod "yes" and "no" to answer a specific yes/no question]
      - [lift hand up to indicate "oldest child"]
      - [point to specific person in picture to answer a wh-question e.g., "Which one's your daughter?"]
      - thumbs-up gesture
      - should shrug
      - *Note: if pointing is in response to wh-question, then it is coded as provision of specific semantic information*
      - *Note: Symbolic gesture subacts do NOT have to be intelligible or successful to be coded as provision of specific semantic info*

- *Note: is a new idea, therefore a NEW EXCHANGE*

6. **Request for Clarification** conversational repair strategy used when the conversational partner did not comprehend the message from the sender, may be in one of the following forms:
   a) repetition of the sender's message with rising intonation (i.e. "You like the snow?"
   b) partner's interpretation of the message with/without rising intonation or non-specific tag (i.e. "Not a big deal?" or "Like that, huh?"
   c) statement of confusion (i.e. "I'm not following you.")
   *MUST be related to the previous utterance, therefore is within the same EXCHANGE
   *ALWAYS coded as EQUIVOCAL because no new info is exchanged, participants are engaging in clarification of same idea

7. **Emotional/ Confirmatory Response:**
   - verbal or gestural emotional response to preceding communication acts (e.g., "Wow!", [laughing], "No way!", [shrugs shoulders to indicate I don't know", head-nod [not in answer to yes/no question], thumbs-up gesture)
   - Answer to confirmatory questions that does not contain specific semantic information describing referents, provide new details, or answer a specific wh-question. E.g., 'uh huh' or "yes" if communicator is attempting to confirm partner's interpretation of prior message (not answer a "yes/no"question.
   *MUST be related to the previous utterance, therefore is within the same EXCHANGE
   *ALWAYS coded as EQUIVOCAL because no new info is exchanged, participants are engaging in clarification of same idea

8. **No function/Regulatory/Absence of Behavior** behavior that does not serve a communicative function (i.e. looking up/down from notecards or paper)
   *When this is coded, DO NOT code anything else

E. MODE OF COMMUNICATION (code only for PWA for each sub-act)
***May have multiple for each sub-act**

1. **Verbal language** – question/comment made using recognizable words (i.e. "How are you?"
2. **Meaningful vocalization with intonation/jargon-** question/comment made using incomprehensible paraphasic speech containing little or no meaning (i.e. "Mamama")
3. **Deictic Point – See pointing above.**
   Purposeful, *nonverbal* acts that guide the partner's attention to a specific referent (visual, descriptive, or temporal) (e.g., point to room in house to indicate location)
4. **Symbolic Gesture- See symbolic gesture above**
5. **Yes/No head-nod-See Head nods above**
6. **Written Choices-See Written Choices above**
7. **Other** – movement, look, or facial expression that cannot be classified by one of the above (i.e. look of frustration, moving hands in a way that is not a gesture)

F. TYPE OF PARTNER SUPPORT (code only for PARTNER for each ACT)

1) General Aphasia Communication Skills: general parameters for conversing with an individual with aphasia by augmenting their comprehension and expression.
   a. Responding to all communication attempts
   b. Reducing number of comments
   c. Pausing briefly after asking a question or making a comment
   d. Reiterating person with aphasia's statement

2) Strategies to Enhance Expression. Strategies designed to support the person with aphasia's spoken expression. Usually are *naturally occurring strategies* such as:
   a. Pointing/Symbolic gestures See gestures above
   b. Tagged Yes/No questions- a yes/no question where person is asked to respond with a head nod (yes) or head shake (no) [i.e. "Do you like chocolate ice-cream?" Give me a yes or no.] *Person asking question accompanies yes/no with appropriate head movement
   c. Auditory choice: variation of tagged yes/no question without head mmt
   d. Written Choice- See Below

3) Strategies to Enhance Comprehension. Strategies designed to support the comprehension of the person with severe aphasia in order to improve the understanding and/or processing of the partner's message.
   a. Joint Referencing: pointing to what you are talking about
   b. Gestures: See gestures above
   c. Written key words/maps/drawings: partner writes key words, draws maps to indicate location, or draws pictures to help person with aphasia understand topic of conversation
   d. Intonation changes: Compensate for comprehension deficits by emphasizing key words in the conversation with changes in the pitch of your voice or the stress you place on specific words.
   e. Breakdown Resolution: partner and person with aphasia work mutually agree on a course of action for resolving the communication breakdown
      •Keep trying to fix the breakdown
      •Use another modality
      •Provide more choices
      •Keep guessing
      •Move on

4) Negative Behaviors (code for each EXCHANGE) actions/lack of action on the part of the partner that negatively impact the overall nature of the interaction with the person with aphasia
   a. Not asking for PWA's opinion: partner did not **directly** ask for person with aphasia's opinion/feelings during the exchange (i.e. partner monologues)
   b. Communicating in a confusing way: method of questioning/commenting confusing to the person with aphasia (i.e. using a lot of words, speaking quickly)

F. SUCCESSFULNESS (code for each EXCHANGE)

3 – Message conveyed with adequate partner response indicating complete comprehension. Entire intended message was conveyed without interpretation.

2 – Message partially conveyed. Requires some partner interpretation to obtain full meaning.

1 - Message attempted but not conveyed/abandoned

Appendix F

Sample Peer Communication Partner Cue Card

PCP CUE CARD

Dyad #___
Condition___
Session #____
Date_____

You **must** ask the following questions **at some point** during the conversation.

1.

2.

3.

Please feel free to ask additional questions as they would occur naturally in the conversation.

Do not ask more than two YES/NO questions (questions that can only be answered by a "yes" or a "no".)

This should feel like a natural conversation. Please let your partner know if you do not understand. Attempt to clarify their intended message as needed.

Allow your partner extra time to respond to your questions.

Appendix G

Session Checklist Protocols

CONDITION A PROTOCOL

Session #: ____
Participant Dyad #: ____
Date: ____

Check each box upon completion of *every* instruction, environment modification, and potential investigator dyad intervention during the session. Make sure codes and session numbers on materials match code on display and code on session sheet.

Materials needed: Blank sheets of white paper, black marker, peer communication partner cue card, speech generating device, digital video camera, and cassette tapes.

Testing Environment

- ☐ A table with two chairs place at 45 degree angles facing each other.
- ☐ Place speech generating device (in the off position) on the table within the visual field of the participant with aphasia and his peer communication partner.
- ☐ Place blank sheets of white paper (included in session packet) and marker on table.
- ☐ Place research in progress sign on the door to eliminate potential outside distraction.
- ☐ Place cassette in digital video camera.
- ☐ Turn on digital video camera (ensure both conversation partners, as well as device display, will be in the camera lens) and press record when ready.

Instructions to Investigator (participant with aphasia story telling preparation)

- ☐ Bring participant with aphasia into room (seated at the table with reference to his visual field).
- ☐ Remind participant with aphasia that this is part of a research study (not for therapy). (Refer to script as needed)
- ☐ Scaffold participant with aphasia's story beginning with main idea and following sequential order of the story (included in session packet).
- ☐ Use written augmentation to facilitate participant with aphasia's task understanding.
- ☐ Use written augmentation to facilitate participant with aphasia's story-telling.
- ☐ Encourage participant with aphasia to use gestures to help him tell the story.

- ☐ Allow participant with aphasia to practice telling the story.
- ☐ Provide corrective feedback, as needed.
- ☐ Remind participant with aphasia that his job is to be sure to tell his personal story using as much verbal and nonverbal (e.g. gestures, pantomime) output as he can to his peer communication partner when he/she comes into the room. (Refer to script as needed)
- ☐ Allow five-minute break.

Instructions to Investigator (Peer communication partner cue card directions)

- ☐ Prior to entering the room peer communication partner reviewed the question cue card (included in packet). (See script as needed for PCP instructions)
- ☐ Remind peer communication partner to refrain from asking more than two yes/no questions.
- ☐ Ensure they understand they must ask at least two of three questions given on the cue card during the conversation.
- ☐ Monitor conversation
- ☐ Investigator cues? If so please document on reverse side of checklist.

CONDITION B

Session #: ____
Participant Dyad #: ____
Date: ____

Check each box upon completion of *every* instruction, environment modification, and potential investigator dyad intervention during the session. Make sure codes and session numbers on materials match code on display and code on session sheet.

Materials needed: Blank sheets of white paper, black marker, peer communication partner cue card, speech generating device (Traditional Grid Display), digital video camera, and cassette tapes.

Testing Environment

- ☐ A table with two chairs place at 45 degree angles facing each other.
- ☐ Place speech generating device (in the on position) on the table within the visual field of the participant with aphasia and his peer communication partner.
- ☐ Place blank sheets of white paper (included in session packet) and marker on table.
- ☐ Place research in progress sign on the door to eliminate potential outside distraction.
- ☐ Place cassette in digital video camera.
- ☐ Turn on digital video camera and press record when ready.
    - For participant with aphasia story telling preparation portion of the session the camera lens should be zoomed in on the display.
    - Upon completion of story telling preparation, the camera angle should be widened ensure both participants are visible, as well as the speech generating device.

Instructions to Investigator (participant with aphasia story telling preparation)

- ☐ Bring participant with aphasia into room (seated at the table with reference to his visual field).
- ☐ Remind participant with aphasia that this is part of a research study (not for therapy). (Refer to script as needed)
- ☐ Scaffold participant with aphasia's story beginning with main idea and following sequential order of the story (included in session packet).

- ☐ Use written augmentation to facilitate participant with aphasia's task understanding.
- ☐ Demonstrate how the participant's story can be told using the display.
    - Allow the participant to activate the device following each time you demonstrate symbol activation. (They don't have to but they can)
- ☐ Use written augmentation to facilitate participant with aphasia's story-telling.
- ☐ Encourage participant with aphasia to use gestures (*in addition to the display*) to help him tell the story.
- ☐ Allow participant with aphasia to practice telling the story.
- ☐ Provide corrective feedback, as needed.
- ☐ Remind participant with aphasia that his job is to be sure to tell his personal story using as much verbal and nonverbal (e.g. gestures, pantomime) output as he can to his peer communication partner when he/she comes into the room. (Refer to script as needed)
- ☐ Allow five-minute break.

Instructions to Investigator (Peer communication partner cue card directions)

- ☐ Prior to entering the room peer communication partner reviewed the question cue card (included in packet). (See script as needed for PCP instructions)
- ☐ Remind peer communication partner to refrain from asking more than two yes/no questions.
- ☐ Ensure they understand they must ask at least two of three questions given on the cue card during the conversation.
- ☐ Ensure they understand that shared reference regarding display is allowed/encouraged.
- ☐ Monitor conversation
- ☐ Investigator cues? If so please document on reverse side of checklist.

CONDITION C

Session #: ____
Participant Dyad #: ____
Date: ____

Check each box upon completion of *every* instruction, environment modification, and potential investigator dyad intervention during the session. Make sure codes and session numbers on materials match code on display and code on session sheet.

Materials needed: Blank sheets of white paper, black marker, peer communication partner cue card, speech generating device (Traditional Grid Display), digital video camera, and cassette tapes.

Testing Environment

- ☐ A table with two chairs place at 45 degree angles facing each other.
- ☐ Place speech generating device (in the on position) on the table within the visual field of the participant with aphasia and his peer communication partner.
- ☐ Place blank sheets of white paper (included in session packet) and marker on table.
- ☐ Place research in progress sign on the door to eliminate potential outside distraction.
- ☐ Place cassette in digital video camera.
- ☐ Turn on digital video camera and press record when ready.
    - For participant with aphasia story telling preparation portion of the session the camera lens should be zoomed in on the display.
    - Upon completion of story telling preparation, the camera angle should be widened ensure both participants are visible, as well as the speech generating device.

Instructions to Investigator (participant with aphasia story telling preparation)

- ☐ Bring participant with aphasia into room (seated at the table with reference to his visual field).
- ☐ Remind participant with aphasia that this is part of a research study (not for therapy). (Refer to script as needed)
- ☐ Scaffold participant with aphasia's story beginning with main idea and following sequential order of the story (included in session packet).

- ☐ Use written augmentation to facilitate participant with aphasia's task understanding.
- ☐ Demonstrate how the participant's story can be told using the display.
    - Allow the participant to activate the device following each time you demonstrate symbol activation. (They don't have to but they can)
- ☐ Use written augmentation to facilitate participant with aphasia's story-telling.
- ☐ Encourage participant with aphasia to use gestures (*in addition to the display*) to help him tell the story.
- ☐ Allow participant with aphasia to practice telling the story.
- ☐ Provide corrective feedback, as needed.
- ☐ Remind participant with aphasia that his job is to be sure to tell his personal story using as much verbal and nonverbal (e.g. gestures, pantomime) output as he can to his peer communication partner when he/she comes into the room. (Refer to script as needed)
- ☐ Allow five-minute break.

Instructions to Investigator (Peer communication partner cue card directions)

- ☐ Prior to entering the room peer communication partner reviewed the question cue card (included in packet). (See script as needed for PCP instructions)
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- ☐ Ensure they understand they must ask at least two of three questions given on the cue card during the conversation.
- ☐ Ensure they understand that shared reference regarding display is allowed/encouraged.
- ☐ Monitor conversation
- ☐ Investigator cues? If so please document on reverse side of checklist.