

THE EFFECT OF PAUSE TIME UPON THE COMMUNICATIVE  
INTERACTIONS OF YOUNG PEOPLE WHO USE AUGMENTATIVE  
AND ALTERNATIVE COMMUNICATION

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## **Abstract**

Minimal research exists regarding the effectiveness of pause time as an independent strategy for communication partners to support the communication of young people who use augmentative and alternative communication (AAC). To date, pause time has been investigated as component of a group of interaction strategies only; therefore its validity as an interaction strategy for communication partners is unknown. The purpose of this study was to examine the effectiveness of variation in pause time as an interaction strategy when communicating with young people who use AAC.

Eight participants aged 8:11 to 20:08 years (mean 16.02 years), who used a variety of AAC systems, participated in the study. Three pause time conditions were trialed during a scripted shared storybook reading task: two, 10 and 45 seconds in which to initiate a response. A total of 27 conversational turn opportunities were provided to participants over the course of the task. If no response was initiated within the pause time, the examiner moved on to the next turn opportunity. If a response was initiated, the participant was provided time to finish their turn. Turns were analyzed for percentage of responses made to a turn opportunity, mean length of utterance in words (MLU), percentage of assertive conversational acts made and the modes of communication used.

Findings of the study indicated that participants were more likely to respond to a turn opportunity when their communication partner allowed a longer pause time. Additionally, a longer pause time resulted in a higher MLU. Participants did not use a greater number of assertive conversational acts or use their AAC system over other modes of communication when provided a longer pause time. Results are discussed in relation to

the current AAC literature and implications of the findings for clinicians and communication partners of young people who use AAC.

## **1.0 Introduction**

### **1.1 Communication.**

Conversational communication is a shared process that involves the dynamic and continuous transfer of messages between a sender and their receivers (Hutchby & Woffitt, 1998; Levinson, 1983; Van Riper & Erickson, 1996). Communication in its simplest form involves the formulation and expression of a message by a “speaker” and the decoding and interpretation of the message by a “receiver”. Responses to the message are made and thus a reciprocal process of giving and receiving information is initiated. Participants in a conversation must work together to achieve orderly and meaningful communication (Clarke & Wilkinson, 2008; Higginbotham & Wilkins, 1999; Hutchby & Woffitt, 1998). Partners can support each other’s turns by using strategies such as intonation patterns to signal turn-taking opportunities, looking at their partner when expecting a response, adjusting the complexity of syntax and vocabulary according to the language level of their partner and pausing to allow their partner processing, formulation and response time.

Communication takes place in a variety of forms and modes including; speech, signs and symbols such as written language, gesture, facial expressions and body language (Oller, Oler, & Badon, 2006; Van Riper & Erickson, 1996). To increase the success of communication both parties involved must be competent in the same code used (e.g. speak the same language or use the same sign language) and have specific shared assumptions (e.g., having the same meanings associated with specific gestures and facial expressions). A “communication breakdown” may occur when one party misinterprets or

is unable to understand the intended message of their communication partner. Communication breakdowns often cause frustration or embarrassment and slow the rate of communication down (Basil, 1992; Higginbotham & Wilkins, 1999).

In the general population, speech is the most common form of communication used. In New Zealand, speech occurs at the relatively rapid rate of 280 syllables per minute in adults (Robb, Maclagan, & Chen, 2004) and 180 syllables per minute in preschool aged children (Robb & Gillon, 2007). The characteristically fast rate of speech leaves populations, who for some reason are unable to use speech typically, facing significant communication challenges. In addition, people who do not employ speech as their primary mode of communication may utilize other modes of communication that their communication partners either misinterpret or do not interpret as communication at all, causing frequent and significant communication breakdowns (Basil, 1992).

### **1.1.2 Typical Communication Interactions.**

Communication interactions that primarily utilize speech have several observable characteristics including turn-taking and pausing (ten Bosch, Oostdijk, & Boves, 2005). Turn taking is defined as “the process by which speaker and hearer exchange roles in the course of a conversation or any interaction” (Oller et al., 2006, pg 62.). The process of turn taking is innate, starting early in life (Northern & Downs, 2002; Oller et al., 2006; Papalia, Wendkos Olds, & Duskin Feldman, 2002). From birth, babies engage in exchanges with their parents that are rhythmic and in their first few months start to imitate actions such as tongue protrusion and vocalizations. Their imitations are in turn

imitated back by the parent, starting a vocalization-response pattern setting the early foundations for turn taking (Northern & Downs, 2002; Oller et al., 2006).

In adults, the process of turn taking follows a “talk-stop” pattern with a short pause as speaker turn changes. The Turn-Taking Model of Huchby and Woffitt (1998) states that turns are distributed in a systematic way among the conversation’s participants. One speaker talks at a time and turns are made with minimal gap and overlap in partner speech. People have a expectation of normal temporal flow (Higginbotham & Wilkins, 1999). The average amount of time between turns is usually microseconds with participants using techniques to predict turn transitions. Turn taking and the transition of speaking turn is usually done with minimal time cost. Wennerstrom & Siegel (2003) analyzed two 15-minute natural conversations between small groups of friends. Specific factors for conversation analysis included intonation, syntax and pause. They found that speakers manipulated these factors to indicate turn taking intentions. This allowed their communication partners, who were actively involved in an ongoing analysis and understanding of the conversation, to predict transition relevant places. The use of “adjacency pairs” are also used to predict turn opportunities and transfers (Hutchby & Woffitt, 1998; Levinson, 1983). Adjacency pairs are types of phrases that usually go together and predict a turn (e.g., question-answer, greeting-greeting, and invitation-acceptance/declination).

Pauses also contribute to turn taking in typical communication. Pauses are typically a silent gap or may be a “filled pause”. In English, filled pauses are typically interjections such as “oh” and “ah”. There are three types of conversational pause: within

utterance, within the same speaker's turn and between turn transitions (ten Bosch et al., 2005). The length of a pause varies according to factors including topic, character of the dialogue, culture and independent speaker characteristics. A longer than expected pause time can disrupt the conversational flow with a three second pause time widely regarded to be the "awkwardness limen" (Maroni, Gnisci, & Pontecorvo, 2008; ten Bosch et al., 2005). Researchers have found that people feel uncomfortable when pauses exceed three seconds and will seek to fill the pause in an effort to fill the "no gaps or overlaps" rule of conversation (Light, Binger, & Kelford Smith, 1994; ten Bosch et al., 2005; Wennerstrom & Siegel, 2003). In a study of typical adult dialogues, ten Bosch et al., (2005) found that the mean pause spread for the three types of pause was 0.30-0.52 seconds. This study analyzed 93 telephone dialogues of spontaneous conversations for the average pause time durations used. Wennerstrom and Siegel (2003) found similar results when they examined face-to-face adult dialogues in small groups. Again, pauses of 0.5 seconds or more were likely to result in a shift in speaker turn. The authors speculated that the shift of speaker turn occurred because speakers seek to minimize gaps due to the uncomfortable nature of pauses.

Maroni et al., (2008) found similar results for pause time in a study of teacher-student dialogues. Twenty-three interactive story-reading lessons in 12 classes across second to fourth grade were videoed three times during two weeks for a total of 15 hours. The teachers were taught to use the "Initiation-Response-Follow-Up" (IRP) technique for eliciting student interaction. The researchers were examining turn taking in classroom interactions but also measured pause times. They found that the average pause time used in classrooms was 0.5 seconds. Pauses between different speaker turns were the most

commonly occurring. They also found that speakers tend to follow the “no gaps or overlaps” rules of conversations with pauses being minimized where possible. When teachers were asked to increase their pause time from three to five seconds, there was an increase in student responses, length of utterance, variety of vocabulary and a reduction in errors. However the teachers reported that use of increased pause time “un-natural”.

Conversations between children are also characterized by pauses that are often less than the three-second awkwardness-limen. In a study of timing and turn taking in children’s conversations, Garvey and Beringer (1981) found that speaker-switching pauses in child-child interactions between typical speakers is usually less than one second with an average of 1:1 seconds. 48 dyads of three aged-matched peers between 2.10 and 5.7 years of age were videoed during a 15 minute free play session in a clinic playroom. The authors speculated that the children used their expectations of a normal range of pause duration in timing their start of a turn at speaking. While pauses did vary across individuals because of the topic and the speaker’s own attention in their activity, this study shows that even in young children, pauses are brief and they naturally try to fill empty conversational space.

Therefore, conversations between adults, children and adults with children all use pauses that are usually less than one second. A pause of three to five seconds is considered awkward for the speakers who will try to minimize these gaps. Brief pauses may be used to indicate a change in speaker turn. People who do not communicate primarily by speech may find it difficult to initiate a turn or respond to a partners turn within typical pause duration.



### **1.1.3 Interactions between parents and children experiencing typical development.**

It is well known that young children with parents who interact with them frequently, are likely to develop superior speech and language skills compared with children who experience limited interactions (Baumwell, Tamis-LeMonda, & Bornstein, 1997; Fewell & Deutscher, 2004; Northern & Downs, 2002; Rosenthal Rolins, 2003). From birth “motherese” is used with babies (Oller, Northern and Downs). Motherese is the unique way in which parents or adults talk to infants. It is characterized by the adult using a higher pitch than normal, a slower rate of speech, animated facial expressions and exaggerated stress on syllables and words. The adult also uses pauses to provide opportunities for the infant to take a turn in the exchange. These pauses are often used in conjunction with looking expectantly at the child to indicate their turn opportunity to them. Providing opportunities for the child to take a conversational turn allows them to practice their communication skills. Providing longer pause time than is typical in adult conversation helps children to formulate their language and coordinate their speech in order to make a response (Liboiron & Soto, 2006; Light et al., 1994; Light, Dattilo, English, Gutierrez, & Hartz, 1992; Oller et al., 2006).

### **1.1.4 Interactions between parents and children with disabilities.**

Interactions between children with severe communication impairments, or other disabilities, and their communication partners are characteristically asymmetrical in the number of conversational turns taken and in the control over the conversation. Parents and other communication partners tend to dominate the conversation and often use less pause time than when interacting with typical children (Light et al., 1994; Light, Collier,

& Parnes, 1985). Light et al., (1985) videoed eight children between the ages of four and six years, who had physical disabilities and were unable to speak, and their primary caregivers during a 20-minute free play session. The researchers transcribed the interactions and analyzed the communicative patterns. They found that the caregivers controlled the interactions by taking up more conversational space and took more than double the amount of turns than the children. They also initiated the majority of topics, thereby controlling the interactions and type of responses made by the children. Overall the caregivers' mean pause time was 0.69 seconds and they constantly treated pauses of more than two seconds as a communication breakdown and proceeded to take another turn. Therefore, Light et al., (1985) concluded that the children did not have adequate time to initiate their own topics and frequently forfeited their "optional" turns.

Lack of pause time gives children with disabilities decreased opportunity in which to formulate and express a conversational turn. One possible contributing factor to this phenomenon is the different priorities of parents who have children with disabilities than parents of children without disabilities (Light & Kelford Smith, 1993; Myers, 2007; Wood & Hood, 2004). Light & Kelford Smith surveyed 15 parents of preschoolers who had a disability and 15 parents of preschoolers without disabilities. Both sets of parents identified communication as their first priority, however other priorities differed. Parents of the children who had a disability identified physical needs such as toileting, mobility and feeding as their priorities while parents of the children without disabilities identified social relationships and literacy activities. Therefore, interactions with children with severe disabilities are likely to be questions about their physical needs: eliciting limited responses. The authors concluded that because parents of children who have disabilities

tend to be more focused on physical needs, they provide less access to literacy materials and experiences, which help facilitate language learning and social interactions. Partners also frequently anticipate the child's wants and needs so that the child does not have the opportunity to express these (Light et al., 1992). Partners may also have low expectations of the child due to the presence of an disability, leading to decreased communication opportunities provided by the partner and thus less conversational turns by the child (Light et al., 1985). However, some children with disabilities have access to augmentative or alternative communication (AAC) systems which may aid their communication. AAC is defined and discussed below.

## **1.2 Augmentative and Alternative Communication**

### **1.2.1 Definition of Augmentative and Alternative Communication.**

Speech language therapists increasingly look towards augmentative and alternative communication (AAC) to meet the communicative needs of people with disabilities. AAC encompasses the use of devices and systems that provide a means of communication through modes other than natural speech. AAC is employed with people who, for various reasons, have difficulty communicating effectively through a spoken medium. AAC is used both to facilitate the use of expressive language and to enhance comprehension of language (Reichle, Beukelman, & Light, 2002). It is a rapidly developing area and as technology improves so do the AAC options available (Beukelman & Mirenda, 1998; Johnston, Reichle, & Evans, 2004; Schlosser & Sigafos, 2006; Sevak & Ronski, 1999). AAC systems fall into two primary categories: "high-tech" and "lite-tech". Lite-tech systems include manual signing and pictorial

communication boards and books. High-tech systems include devices that are computerized or electronic, such as dedicated communication devices with voice output (Johnston et al., 2004; Lloyd, Fuller, & Arvidson, 1997).

AAC is useful for a wide range of groups including children and adults with congenital impairments (e.g., Autism, Down Syndrome, Cerebral Palsy) or acquired communication impairments from head injury, stroke or degenerative diseases (e.g., Motor Neuron Disease, Parkinson's Disease). Within this group, a wide range of cognitive, physical, sensory, behavioral, social and learning abilities exist that must be considered in the development of an effective AAC system (Beukelman & Mirenda, 1998; Reichle et al., 2002; Sevak & Ronski, 1999).

Given the wide range of systems and devices available, selection of an AAC system for a candidate can be a confounding decision. Four main components must be considered in the selection of a system: (1) symbols, (2) aids, (3) techniques and (4) strategies (Sevak & Ronski, 1999). Symbols take the place of spoken words and can be visual, auditory or tactile in nature. They are either "aided" or "unaided". Aided symbols are those that use an object or device to communicate, including communication boards, books and devices. Unaided symbols use the speaker's own body and do not rely on external equipment, for example, gestures and signs. A technique refers to the way the person selects and conveys messages. This can be either by direct selection (i.e., pointing, signing or key selection), or by scanning selection in which a user is required to indicate when their choice of symbol is presented in a sequence. Strategies are techniques used by people who use AAC and their communication partners to teach and facilitate communication.

A multimodal approach to communication is important for communication success (Beukelman & Mirenda, 1998; Light & Beukelman, 2003; Lloyd et al., 1997). People using AAC should be encouraged to use all their communicative abilities including speech or vocalizations, gesture, eye gaze or other modes alongside the use of any AAC system. Therefore, communication partners must be equipped with the knowledge and skills to recognize and respond to all modes of communication (Kent-Walsh & McNaughton, 2005; Light et al., 1992).

Four goals of AAC assessment and intervention as outlined by Sevick and Ronski (1999) include a) the physical operation of the AAC device or system; b) the development of language and communication interaction skills; c) using AAC in inclusive settings; and d) development of natural speech and literacy skills. In order for the delivery of AAC services to be effective in achieving these goals, assessment and intervention needs to occur in natural environments and include communication partners.

### **1.2.2 Characteristics of communication between young people who use AAC and their communication partners.**

People who use augmentative and alternative communication (AAC) do so because of severe communication impairments that may be related to physical or intellectual impairment. Interactions between communication partners and young people who use augmentative or alternative communication (AAC) generally follow the same patterns of interaction as other children with disabilities. That is: a dominance in turn taking by communication partners who use more closed questions, show a lack of responses to the communication attempts of the person using AAC and not pausing long

enough to provide opportunity for a turn to occur (Carter & Maxwell, 1998; Downing, 2005; Lund & Light, 2007; Myers, 2007). In addition, people using AAC are unique in the methods and modes of communication they employ and may need significantly more pause time in order to access their communication, resulting in a slower overall rate of communication. A phenomenon of “learned helplessness” can result from the communication patterns involving people who use AAC. This and the other characteristics of communication between young people who use AAC and their communication partners are further discussed below.

#### *1.2.2.1 Slower rate of communication*

Communication by people who use AAC is often slower than that of typical speakers (Carter & Maxwell, 1998; Harris, Skarakis Doyle, & Haaf, 1996; Todman, 2000). Decreased speed of communication typical of people using AAC was highlighted by Harris et al., (1996) in a language output analysis of a five-year-old boy with developmental verbal apraxia. The child used a variety of communication boards with up to 80 symbols on each. At the start of the study the child produced 240 “words” in a 12 minute sample, a significant difference from the 180-280 syllables per minute produced by typical speakers. The most proficient people who use AAC employ word and phrase based systems that can achieve about 15 words per minute (Bedrosian, Hoag, & McCoy 2003). With technology now available to use utterance-based systems, communication using AAC devices may be up to 65 words per minute, which is still significantly slower than speech-based discourse.

A slow rate of communication is often a result of physical impairments that make accessing devices challenging or to the extra cognitive load an AAC system can place on a person who uses AAC (Light, 1989). Indeed, an AAC system can often be a barrier rather than a facilitator of effective communication because of its slow rate and the extra demands it places on people's cognitive, physical and processing resources (Carter & Maxwell, 1998; Higginbotham & Wilkins, 1999; Todman, 2000). Some people who use AAC may even forgo communication opportunities rather than tolerate lengthy pauses (Johnston et al., 2004; Light et al., 1985). As a result, AAC systems are frequently under-utilized or abandoned altogether.

A secondary issue related to the slowness of using an AAC system in communicative discourse is that people using AAC often have long pauses in their communication, in which they may be formulating or attempting to access a message. These long pauses are correlated with negative impressions of the person's communicative competence and general competence (Hoag, Bedrosian, McCoy, & Johnson, 2008; Todman, 2000). People who use AAC, and their communication partners, often prefer pre-stored, accessible phrases even though they may not resemble the person's ideal message, Todman's (2000) study found that 30 different observers rated perceptions of a AAC user's competence and positive personal qualities higher as her rate of communication increased. The study involved a single case, six-phase analysis of a 40 year-old woman with cerebral palsy who used a Lightwriter™ device. The use of the device increased her conversational rate from 36 to 64 words per minute and decreased her average pre-speech pause times from nine to five seconds across the intervention phases. The participant was also taught strategies to increase her rate of communication.

These included: turnarounds, comments, quick-fires and perspective shifts. Although the findings of this study are limited due to the single subject design, the findings do suggest that low levels of communication by people who use AAC may not be solely attributable to motor impairments with more contribution from their pragmatic abilities. Therefore, providing opportunities and pause time in which to communicate may help facilitate the practice and learning of pragmatic skills.

People who use AAC may be rushed by their communication partners' expectations of the conversation tempo to match norms (Clarke & Wilkinson, 2008; Wennerstrom & Siegel, 2003). In typical conversations an "awkwardness limen" occurs when there is a pause of greater than three seconds. Most pauses between speaker turns are barely noticeable, usually milliseconds in length. This makes it difficult for an augmented communicator to fulfill basic communication needs such as getting attention, turn taking, interrupting or expressing a message (Higginbotham & Wilkins, 1999). People using AAC are also effected by the "temporal imperative" model argued by Clarke (1996). This is where the communicator must provide a "public account" of any time passing in an interaction. People using AAC are at a disadvantage because they are unable to do this until their message can be played or displayed. Therefore, their communication partners may not recognize and allow the extra time needed to formulate responses. For a person using AAC to signal their intention to take a turn, they must rely on their communication partner to wait while they compose their message. The "immediacy premise" was also proposed by Clarke (1996). In natural conversations, the listener is expected to process a phrase almost as soon as their partner finishes it. People who do not use AAC take advantage of this to plan their response in order to take their



turn and maintain the temporal flow expectations of the dialogue. People who use AAC may have difficulty processing or accessing their response in the same timely manner. Delays in the production of a message can cause frustration, communication breakdowns, loss of attention and distraction in both the person using AAC and their partner (Higginbotham & Wilkins, 1999).

In order to keep their communication partners engaged in the conversation, a person who uses AAC may limit their responses in an effort to take their turn in the conversation; therefore, they may not have adequate time to use their full range of communicative skills or express their ideal message. Hoag et al., (2008) demonstrated this by examining the trade-offs between the relevance of a pre-stored message and the speed of message expression. Ninety-six sales clerks viewed scripted, video-recorded bookstore interactions between a person using AAC and a person acting as a cashier. The person using AAC used either pre-stored messages with repeated words/phrases, messages with excessive information, messages with inadequate information and messages with partly relevant information. Although overall, participants preferred messages that were slower with information that was more accurate, they also showed a preference for pre-stored messages that are more quickly accessed but often contain limited or partially relevant information. This indicates that speed of delivery is a factor that affects the communication partners' perceived effectiveness of communication. The findings also demonstrate that partners may expect a person who uses AAC to have speedy access to their message and prefer to have shorter messages that take less time to compose.

#### *1.2.2.2 Lack of responses to the communicative attempts of people who use AAC.*

People who are unfamiliar an AAC user's mode of communication or AAC system may have difficulty understanding the user's communicative acts. Successful communication depends on the partner's ability to perceive behaviors that have communicative intent and to interpret the message being relayed (Schepis & Reid, 1995). People who use AAC often receive no response to their communication attempts because their partners may not recognize these behaviors as communicative acts (Reichle et al., 2002). Lack of responses to communicative attempts of people using AAC, is one of the contributors to the asymmetrical discourse patterns that are frequently observed to occur between people who use AAC and their communication partners. Additionally, people who use AAC may lose motivation to communicate if they receive little response to their communicative attempts which may lead them to limit their communication and become passive in the communication process (Basil, 1992).

#### *1.2.2.3 Dominance in turn-taking by the communication partner*

Studies have shown that communication partners typically dominate turn taking during interactions with people who use AAC. (Carter & Maxwell, 1998; Downing, 2005; Lund & Light, 2007; Myers, 2007). Lund and Light (2007) studied conversational samples between seven adult men who had used AAC for at least 15 years and three different communication partners. Turn-taking patterns, communicative functions and linguistic complexity were analyzed. Even though the subjects were very familiar with the use of their AAC system, it was found that their communication partners; 1) took more than double the amount of communicative turns, 2) had longer turns, and 3)

controlled the focus of the conversations. The users were often in the respondent role and demonstrated limited linguistic complexity with most of their responses being confirmations, denials or provision of limited information, and usually with single word utterances. In addition, people who use AAC often forfeit their responses to non-obligatory turns and limit their responses to obligatory turns (Light & Binger, 1998; Light et al., 1985). Obligatory conversational turns require a response such as open and closed questions; non-obligatory turns are those to which a response is optional, such as comments and statements. Similar findings were reported for communication between young children who used AAC and their primary caregivers (Light et al., 1985). Eight children between the ages of four and six years and their primary caregivers were videoed in a 20 minute free play session. Again, interactions were asymmetrical with the communication partners initiating more topics, taking more turns and controlling the conversation by requesting specific information, with predominantly closed questions.

#### *1.2.2.4 Communication partners using closed questions more frequently than open questions.*

The tendency of communication partners to use closed questions when interacting with young people who use AAC contributes greatly to asymmetrical interaction patterns. In the studies mentioned above, the partners frequently used a higher occurrence of closed or rhetorical questions, directives and requests for information with people who use AAC (Lund & Light, 2007). These elicit restricted responses compared to typical conversations where the use of “wh” and open questions is more prevalent. A person using AAC is often in a respondent role in which they use limited responses such as

yes/no and single word utterances. Because communication partners initiate the majority of interactions, thereby having more control over the interaction, initiating a conversational turn is difficult for many people who use AAC. This may be attributable to decreased interactions with their communication partners and lack of pause time provided by a communication partner to enable the person using AAC to initiate a turn (Scepis & Reid, 1995).

#### *1.2.2.5 Inadequate Pause Time Allowed by Communication Partners.*

Inadequate pause time has been found to result in asymmetry in discourse involving people who use AAC (Basil, 1992, Light et.al, 1992). It is thought that this results from limitations in what can be expressed in the time provided by communication partners. Light et.al (1994) reported unbalanced interactions between preschoolers who use AAC and their mothers, when compared to interactions between preschoolers experiencing typical development and their mothers. Story reading interactions between five preschool aged children who used AAC and their mothers were examined and compared to preschoolers experiencing typical development. It was found that pauses of greater than two seconds by mothers of children who used AAC were infrequent, despite the fact the children who use AAC are likely to need even more time in which to initiate or respond. The mothers treated a pause of more than two seconds as a communication breakdown and proceeded to take another turn. The children who used AAC were more involved with the physical aspects of book reading, such as turning the pages compared to the children experiencing typical development. Also mothers of children who used AAC tended to simply “read” the book. However, some mothers of children who used

AAC, not only read the text, but also labeled and talked about the pictures, related the story to the child's personal experiences, asked their child to point out things in the book and asked more open ended questions of the child while reading. The children of these mothers used a higher amount of communicative behaviors. These findings demonstrate that communication partners have a responsibility in providing communication opportunities and sufficient pause time to allow children using AAC to take a turn. This may not come naturally to all communication partners. Higginbotham and Wilkins (1999) state that the issues related to the temporal differences between conversations involving AAC and natural conversations often becomes the burden and responsibility of the person using AAC. However, because communication is a cooperative process, both communication partners and people using AAC should work together to overcome these issues. Manipulating the provision of communication opportunities and pause time may have significant implications for the communicative output of people who use AAC. Indeed, the effort to overcome barriers may inhibit people who use AAC from communicating at all, leaving them dependent on others to anticipate their needs and wants.

#### *1.2.1.6 Learned Helplessness.*

The interaction patterns often established between people who use AAC and their communication partners can lead to 'learned helplessness' (Basil, 1992). This is a phenomenon where passivity in conversation by the person using AAC becomes habitual. This can be attributed to a lack of responsiveness by communication partners to the communicative attempts of a person using AAC, decreased expectations of the person

using AAC and adults trying to satisfy the child's needs, decreasing the child's motivation to communicate. Because conversational passivity is a learned phenomenon, people using AAC who are given opportunities, encouraged to communicate and taught skills to manage social discourse, can learn to be more active conversationalists (Todman, 2000).

### **1.2.3 Current Perspectives on AAC: Developing Communicative Competence**

There has been a shift in focus from the physical access, system attributes and development of vocabulary and grammar in the person who uses AAC, to the development of communicative competence for the person using AAC (Bedrosian, 1997; Calculator, 1997; Cheslock, Barton-Hulsey, Ronski, & Sevcik, 2008). Communicative competence refers to the person's ability to communicate effectively in known and unknown contexts, with familiar and unfamiliar people (Bruno & Dribbon, 1998). Light (1989) outlines the four areas of competence that are targeted and evaluated in AAC intervention. These include; linguistic competence, operational competence, social competence and strategic competence. Linguistic competence encompasses the mastery of the linguistic code of a native language as well the "code" of the AAC system (pictures, symbols, signs etc). Operational competence refers to the learning of technical skills required to use an AAC system, including scanning and selection methods. Social competence involves the knowledge of the social rules of communication such as appropriate turn taking, discourse strategies, active participation in conversations and responsiveness to communication partners among others. Strategic competence is the ability to use compensatory strategies to communicate to the best of one's ability within

the restrictions of an AAC system. This includes strategies to manage communication breakdowns. Therefore, the environments in which AAC is used, the role of communication partners and employing multimodal approaches to communication are now also considered in the research and clinical practice in the AAC field (Blackstone, 1994; Cheslock et al., 2008; DeRuyter, McNaughton, Caves, Nelson Bryers, & Williams, 2007; Granlund, Bjorck-Akesson, Wilder, & Ylven, 2008; Johnson, Inglebret, Jones, & Ray, 2006; McNaughton, Rackensperger, & Benedek-Wood, 2008).

#### **1.2.4 Current Approaches to AAC Intervention**

##### *1.2.4.1 Teaching skills directly to the person who uses AAC*

Research has shown that teaching some skills, strategies and language directly to the person using AAC can be helpful in enhancing their communicative competence (Dattilo & Camarata, 1991; Johnston, McDonnell, Nelson, & Magnavito, 2003; Light, Binger, Agate, & Ramsay, 1999). In a study of six participants, between the ages of 10 and 44 who all used AAC devices, an instructional program utilized a least-to-most prompting hierarchy to teach the participants to use partner-focused questions (Light et al., 1999). Participants were involved in between four and fourteen sessions using simulations and real world practice. All participants increased the use of partner -focused questions as a way to initiate, extend and maintain interactions and this continued two months post intervention. Participants quoted their satisfaction from the changes made during the treatment phase because their interactions with communication partners lasted longer. Blind observers also rated the participants' communicative competence as higher upon the implementation of partner-focused questions. This study was unique in that it

included participants of a variety of ages and disabilities, showing that this intervention may be generalized to a wide range of people who use AAC.

In a smaller study involving just two adult males with cerebral palsy, Dattilo and Camarata (1991) used a multiple baseline experimental design to teach the use of a Touch Talker augmentative device with Minspeak software. Additionally, the participants were taught to introduce topics to a conversation and also provided the opportunity for leisure education to help determine preferred individual topics for conversation. Initially the participants increased both their initiations and responses during interactions in their residences with a slight decrease after intervention ended. Additionally social validation measures were sought by interviewing caregivers, clinicians and friends. They reported an increase in the conversational activity of the participants and a decrease in frustration for both parties.

Preschoolers and young children may also benefit from being taught interaction skills. The use of functional communication using AAC was the target of a study which included three preschool aged children (Johnston et al., 2003). The researcher identified ongoing classroom routines and activities in which communication opportunities could be established. Peers and teachers were then taught to model the use of the AAC system. Specific guidance was given to each participant using a least-to-most prompt hierarchy, followed by a five second pause. The participant was then either awarded with a reinforcing consequence or comment. All the participants increased their communication levels at a one-week maintenance probe. The teachers also reported that the intervention was socially valid. The authors of this study noted that it was impossible to ascertain what components of the intervention were most effective and that each component needs



to be examined in regard to effect on intervention outcomes. Additionally the longer term impacts of the intervention findings of this study are limited to the one week follow-up.

Using language for social interactions is a main focus for developing communicative competence in people who use AAC. Because people who use AAC are often in a passive and respondent role in conversations (Basil, 1992), they often do not get the chance to practice and refine socio-linguistic skills. This combined with developmental impairments and the nature of AAC systems themselves, means that many people who use AAC need to be specifically taught social-regulative vocabulary and pragmatic skills (Adamson, Ronski, Deffebach, & Sevick, 1992; Granlund et al., 2008; Reichle et al., 2002; Starble, Hutchins, Favro, Preluck, & Britner, 2005). A change in the use of social-regulative lexigrams during and following an intervention with people using AAC was reported by Adamson et.al (1992). The study included 12 youth with severe spoken language impairment in a systematic-observation design, over a two-year longitudinal period. The researchers found that including social-regulative symbols in the AAC system (e.g., “please”, “I’m finished”) expanded the focus of conversation in the home and school environments. Previous to the study vocabulary included in the AAC systems of the participants was primarily noun words, which is typical in AAC. Prior to the study, parents and teachers as the communication partners took part in three instructional sessions. They were trained in the operation of the device, modeling use of the device and how to integrate and facilitate use of the device in their environments. Although specific facilitation strategies are not described in this study, it can be assumed that the strategies taught were those given as current best practice in the AAC literature. These include: being in close proximity to the A person who uses AAC, responding

quickly to the user's communicative attempts, use of "wh" and open-ended questions, modeling language and the AAC system and pausing expectantly (Basil, 1992; Binger, Kent-Walsh, Berens, Del Campo, & Rivera, 2008; Downing, 2005; Kent-Walsh & McNaughton, 2005). Although the participants did not alter their frequency or clarity of device use following the intervention, they did make use of the social-regulative vocabulary provided which may have aided the range and flexibility of their communication.

In addition to social-regulative vocabulary, pragmatic conversational skills may also need to be taught to people using AAC. In particular, initiation, conversation maintenance, conversational control and self-expression skills are frequently targeted during intervention (Downing, 1987; Myers, 2007; Reichle et al., 2002; Todman, 2000). Providing communication partner-initiated pause time is an integral part of any intervention program that targets pragmatic skills. Myers (2007) explains that communication partners may need to be specifically taught the interaction strategies suggested by the AAC literature, including the use of pause time, to facilitate the active participation of the person using AAC. Providing pause time encourages initiation and maintenance conversations. It also gives the conversational control over to people using AAC, encouraging them to be more spontaneous in their self-expression.

The above studies prove directly teaching to people using AAC can be effective across different ages, AAC systems and disabilities. However, many people who use AAC may have limited benefit from being taught skills directly because of the nature of their disability. Many will rely on the skills of their communication partner to provide a platform for easy and effective communication.

*1.2.4.2 Teaching strategies to the communication partner to facilitate communication with the person who uses AAC.*

Communication partners play a significant role in facilitating interactions and developing communicative competence in people who use AAC (Hamilton & Snell, 1993; Reichle et al., 2002; Snell, Chen, & Hoover, 2006; Starble et al., 2005; Stiebel, 1999). Usually communication partners are primarily family members, teachers, care staff and peers but may also include unfamiliar people in the wider community. Having specific strategies to teach communication partners of people using AAC is important as they interact on a daily basis with the AAC user in natural contexts. Communication partners are also the “experts” when it comes to knowing the needs, wants and communication styles of the person using AAC (Carter & Maxwell, 1998; Cheslock et al., 2008; Myers, 2007). Communication partners who employ effective interaction strategies help facilitate the linguistic, social, operational and strategic competence of people who use AAC (Hamilton & Snell, 1993; Myers, 2007; Snell et al., 2006). Therefore, therapy is more likely to be effective, generalized and maintained if it occurs in natural contexts such as the home and school environments, and involves communication partners (Blackstone, 1994; Blackstone, Williams, & Wilkinds, 2007).

The AAC literature identifies the following skills in which to train communication partners as a critical part of intervention: (1) increasing proximity to the AAC user, (2) increasing responsiveness to the communicative attempts of the person using AAC, (3) using ‘wh’ and open questions, (4) use of a cueing hierarchy, (5) providing aided AAC models, and (6) use of expectant delay or pause (Batorowics,

McDougall, & Shepherd, 2006; Binger et al., 2008; Carter & Maxwell, 1998; Downing, 2005; Kent-Walsh & McNaughton, 2005; McNaughton et al., 2008). However, most studies have included some or all of these strategies as part of a group of strategies taught in an intervention program. Specific information on the effects of strategies such as pause time is limited (Liboiron & Soto, 2006; Light et al., 1992; Myers, 2007; Newcombe, 2000; Snell et al., 2006).

Research has shown that teaching communication strategies directly to communication partners has favorable outcomes on the communication of people using AAC. Intervention programs for early communicators, outlined by McCayley & Fey (2006), all use teaching skills and strategies directly to communication partners (i.e. Milieu approaches, The Hanen Intervention Program, Picture Exchange Communication/PECS program and focused language stimulation). These programs all employ pause or wait time as a strategy. For example, in the Milieu Approach and PECS program, communication temptations are created when the adult waits for the child to initiate an interaction. Cheslock et al., (2008) focused on partner instruction as a method to increase the expressive communication, communication with new partners, intelligibility, turn taking and ability to answer different question types in an adult with intellectual disability who used a speech-generating device. The participant was a 30 year-old woman who was trialing the use of a Dynamyte™ Speech Generating Device. The participant's mother and sister acted as the communication partners in the intervention programme. They were instructed in the use of strategies that included increasing communication opportunities, providing aided input, language modeling and providing 10 second pause time after a turn. Two instructional sessions took place over

three months with the mother and sister of the participant asked to employ the strategies taught during typical family routines. As a result of the program the participant was able to increase her naming, intelligibility, number of words produced in conversation, turns taken and ability to answer questions. Her responses to questions increased from 39 to 66 percent. Two years later, the participant had maintained these gains. Although single case study design has its limitations, this particular research demonstrated that teaching skills and strategies to communication partners could be an effective and time efficient intervention approach. Just two instructional sessions over a period of three months led to notably improved communication competence in the person using AAC.

Myers (2007) also found favorable results when teaching interaction skills directly to communication partners of four children who use AAC. The children attended a four-week intensive intervention program with two hours of daily instruction that focused on oral language, literacy and technology skills and the use of social language. The children were taught in a class setting and received both individual instruction and participated in workshop style activities. This approach was integrated with parents receiving instruction on the “key” strategies to encourage active participation of their child in conversation: increasing proximity, using open-ended questions, modeled language use and pausing. All of the participants made progress in the areas targeted during the intervention, however only two of the participants maintained the progress at a six to eight week follow-up. However the continuation of progress may have been influenced by factors such as the home environment, school setting and support and the parent’s support and continued use of the strategies. This study is limited by its small sample size, however this is representative of the research in the field. Therefore research

to date suggests that teaching interaction strategies to communication partners has favorable impacts on the communicative abilities of people who use AAC. The maintenance of these strategies by communication partners in typical daily contexts is also important.

More specific information about the effectiveness of intervention strategies and how to teach them is needed (Kent-Walsh & McNaughton, 2005; Newcombe, 2000). Partners benefit from explicit instruction in communication strategies as some strategies are not acquired naturally (Myers, 2007). Pause is one strategy that does not usually come naturally to people because of lower expectations of people who use AAC and the “awkwardness lemin”, meaning that they find it difficult or uncomfortable to use extended pause time. Families of people who use AAC also identify the teaching of strategies as an area of need (Angelo, Jones, & Kokoska, 1995; Starble et al., 2005). Specific information about strategies, such as pause is needed in the field of AAC to provide guidelines for intervention and teaching communication partners.

#### *1.2.4.3 Shared storybook reading to facilitate interaction and language with young people who use AAC.*

Shared storybook reading is noted by several authors as a useful format in which to teach strategies to communication partners (Batorowics et al., 2006; Binger et al., 2008; Harris et al., 1996; Light et al., 1994). Book reading is an ideal activity to elicit language because of the predictable routines of shared reading. Specific language can be taught through books and language output is easily scaffolded by the facilitator. The structure of reading can help the facilitator provide more communication opportunities

for the person using AAC. Harris et al., (1996) explain that the use of turn taking during book reading gives the person using AAC more opportunities to participate in the interaction.

Many books follow a predictable storyline or may be familiar to the person using AAC so they can anticipate a turn and what their turn might be, thus preparing them to take the turn. Any vocabulary associated with the book can be stored and accessed in an AAC system or device. Facilitators are able to make more accurate predictions of what vocabulary the person who uses AAC might want to access based on the theme of the book. Predicting the vocabulary needs of people using AAC in other daily life situations is more difficult with less structure to guide facilitators in identifying what vocabulary an AAC user may want access to.

In addition strategies that facilitate communication such as pausing expectantly, cueing hierarchies, using open ended questions and being in close proximity to the person who uses AAC can be taught to communication partners, such as parents, using reciprocal reading contexts as a model in which to teach these skills. The book provides structural support to both the communication partner and the person using AAC to practice these strategies (Batorowics et al., 2006; Liboiron & Soto, 2006). In an example of using story-reading contexts to teach parents to support message productions of their children who used AAC, Bringer et al., (2008) adapted an instructional programme to teach turn-taking and facilitation techniques to Latino parents. Three parents and their children who used AAC participated in the study. None of the parents used the target strategies before the research programme. Target strategies taught included; using “wh” questions, modeling the use of the AAC system, responding to each turn made by the

child, pausing with or without eye contact according to cultural norms, and the “RAA” reading strategy (Read, Ask, Answer). All the dyads involved in this study successfully implemented the use of the instructional strategy into book reading activities and this was correlated with the children in the study increasing their use of multi-symbol messages. Gains in both the parents’ use of strategies and their childrens’ communication were maintained at a six to eight weeks follow up.

Employing books as a platform in which to facilitate discourse instruction is important because people who use AAC are at risk of literacy development difficulties (Wood & Hood, 2004). Many children who use AAC have fewer opportunities to experience literacy materials owing to physical, cognitive, visual, learning or other impairments. Parents of children who use AAC often do not identify literacy as a priority as they also work to balance time-consuming toileting, mobility and feeding needs. Light et al., (1994) revealed how story reading interactions between preschoolers who used AAC and their mothers were different compared to typical preschoolers. Promoting reading and literacy experiences for children who use or may use AAC is important as literacy levels can influence the choices of AAC systems, future employment opportunities and other experiences available (Light et al., 1994).

### **1.3 Pause Time in AAC**

#### *1.3.1 Pause time and the development communicative competence*

Providing pause time while engaged in interactions with people who use AAC may be critical as a strategy to facilitate the development of their communicative competence (Basil, 1992; Binger et al., 2008; Downing, 2005; Johnston et al., 2003;



Light et al., 1994; McCauley & Fey, 2006). People who use AAC may benefit from their communication partner increasing their pause time between utterances and turns. Pausing is the provision of a silent gap in talking, often beyond what feels comfortable and may be accompanied with an expectant look. Pausing allows extra processing time to decode language, including relating new vocabulary, and provides the person using AAC with ample opportunity to take a turn. Increased time in which to formulate and express messages may also help develop linguistic competence. The AAC user may be encouraged to try new vocabulary or syntax if time is provided, allowing practice and exploration of their linguistic codes. Pause time is needed to allow people who use AAC to operate their device or system, and again, time to practice this in an unhurried manner. Social competence may also be encouraged by providing pause time. Exaggerated pause time indicates a turn opportunity to a person using AAC allowing them to be more active in the conversation. Strategic competence also relies on partners providing pause time so that AAC users can indicate their conversational intents and manage communication breakdowns more effectively.

Providing pause time to facilitate the development of communicative competence is a communication-partner-initiated strategy. Language intervention programs for children with delayed or disordered language all use pause time as part of the programme components (Lloyd et al., 1997). Namely, communication partners, usually parents, are taught to extend pause time during interactions with their children. This serves to offer, extend, tempt and make communication opportunities more salient. The AAC literature also frequently cites pause time, as a strategy to use when interacting with people who

use AAC. Beukelman and Mirenda (1998) state that allowing and using pause time is one of the most important skills communication partners can learn.

Clinically, it is thought that pause time is useful for people using AAC for several reasons. Firstly, pauses may help the communication partner recognize communicative behaviors and attempts by a person using AAC and therefore respond accordingly (Clarke & Wilkinson, 2008). Secondly, pauses serve to provide the time needed for people who use AAC to be more spontaneous and independent in their communication. For example, providing a greater pause time reduces pressure on the an AAC user to communicate at a typical rate. They may be more likely to communicate independently, decreasing their dependency on communication partners to anticipate their needs and wants. Moreover, pause can also serve to prompt initiations by and signal turn transfers to people using AAC (Light et al., 1985; Newcombe, 2000). Extended pause time also makes up for device related delays and physical impairments that may slow the augmented communicator down (Higginbotham & Wilkins, 1999). Higginbotham and Wilkins discuss several cases of individuals who use AAC. The users said that they often do not communicate their message because they overvalue their communication partner's time compared to their need to communicate. If communication partners extend pause time, a person who uses AAC may be encouraged to communicate and value their need to express needs, wants, opinions and ideas. Even small changes in the behaviors of communication partner, such as extended pause time, can have impacts on the communication and level of activity in a conversation by of the people who use AAC.

Several studies have been conducted that taught pause time as part of a group of strategies to communication partners. Basil (1992) included four young school-aged

children and their parents in an intervention programme which consisted of four family training sessions. The sessions covered; 1) the use of communication boards, 2) providing limited amounts of information to the child at one time, 3) using open questions as much as possible, 4) responding to all of the child's communicative attempts and 5) waiting for approximately 10 seconds after asking a question, requesting information or giving an instruction. Results found that as the parents learned and implemented the strategies taught, the percentage of the childrens' non-responses decreased significantly. In addition Downing (1987) instructed facilitators to accept pauses of up to 10 seconds while interacting with three adolescents who used AAC. Providing this delay appeared to help the person using AAC initiate conversations. Downing stated that the pause used needed to be very pronounced (i.e: 10 seconds) as compared to the three seconds considered to be uncomfortable between typical speakers. Similarly, Kozleski (1991) included a marked pause time in the group of strategies used to increase the number of requests made by two students with severe cognitive and physical disabilities. High interest items were presented to the students and a pause of up to 45 seconds given before a prompt was made to encourage the students to use their communication boards. Both students increased their frequency of requesting after a brief intervention period. These studies show that when pause is included in a group of interaction strategies used by communication partners, people using AAC are likely to be more active in interactions. Studies suggest that pause time needs to be significantly more than what is comfortable for typical speakers, with times of 10 seconds or greater reported in the literature. Because the use of extended pause time is uncomfortable and unnatural for many communication partners, they may benefit from explicit instruction in the use of effective

pause time with people who use AAC (Liboiron & Soto, 2006; Light & Binger, 1998; Light et al., 1992).

Pause time in AAC has only been studied within a group of strategies thus far, meaning that the effect of pause time upon the communication of people who use AAC has not been ascertained (Johnston et al., 2003; Kent-Walsh & McNaughton, 2005; Light et al., 1992; Myers, 2007). Research is needed to document the efficacy of pause time in AAC interactions as an intervention strategy. Independent measures of the results of pause time upon the communication of people who use AAC are required to accurately and effectively teach communication partners of people who use AAC. In fact, a lack of validated performance measures in the field of AAC is a barrier to the design of interventions, guidance of communication partners and evidence-based practice (Downing, 2005; Johnston et al., 2004; Reichle et al., 2002; Smith, Higginbotham, Leshner, Moulton, & Mathy, 2006.; Snell et al., 2006). Speech-language therapists also identify the need to have more evidence and information about intervention strategies that are effective so they can confidently guide the communication partners of people who use AAC. The development of specific pause based strategies that can be taught to communication partners will help provide better intervention for people using AAC.

#### **1.4 Summary and Hypothesis**

In summary, the use of pause time has been identified clinically as a critical strategy to use when interacting with people who use AAC. It signals the opportunity for a person using AAC to demonstrate a communicative skill and gives them more time to execute this skill within cognitive or physical constraints. However, there is paucity of

research regarding the use of pause time as a clinical strategy, optimal pause duration and the effect of pause upon the communicative output of people who use AAC. Although AAC literature frequently cites the instruction of extended and expectant pause time to communication partners as a component of AAC interventions. The relationship between communication partner pause time and communication by young people who use AAC has not been thoroughly investigated. Examining the relationship between pause time and the communication by people who use AAC will lead to a greater understanding of pause as a clinical strategy, providing guidelines for future research and intervention.

The purpose of the present study was to examine the effects of three different lengths of pause time upon the communication of people who use AAC as measured by; a) percentage of responses, b) Mean Length of Utterance (MLU), c) type of conversational act and d) mode of communication. In order to ascertain this information sought the study aimed to examine the following research questions:

1. Does use of increased pause length by a communication partner increase the percentage of responses made by a person using AAC to conversational turn opportunities? It was hypothesized that as use and length of pause increases, there will be an increase in responses to conversation turn opportunities by people using AAC.
2. Does increased pause length affect the Mean Length of Utterance (MLU) of a person using AAC? It was hypothesized that when communication partners use increased pause length, people using AAC will demonstrate longer conversational turns.
3. Does increased pause length increase the likelihood that a person using AAC will use more assertive conversational acts? It was hypothesized that as pause length is increased people using AAC may use more assertive conversational acts.

4. Does increased pause length increase the likelihood that a person using AAC will use their AAC system over other modes of communication? It was hypothesized that providing increased pause length will encourage people using AAC to use their AAC device or system more than other modes of communication.

## **2.0 Method**

### **2.1 Participants**

Eight individuals (five males, three females) who used an augmentative or alternative communication (AAC) device or system participated in the study. The participants ranged in age from 8:11 to 20:08 years with a mean age of 16:02 years. Biographical data for the eight participants is presented in Table 1. To be eligible for participation in the study each participant was required to meet the following criteria: 1) had used their AAC system for at least six months prior to the study, 2) raised in a family that spoke New Zealand English as their first language, and 3) was aged between five and 21 years of age. Sex, type of AAC used and medical diagnosis were not controlled for in the study.

Participants were recruited through the following channels; local schools who had students with special needs enrolled, New Zealand AAC service providers (e.g., Talklink and Astech) and via direct contact with participants known to the researcher. Informed consent was obtained directly from the participant, if over 18 years of age, or from a parent or legal guardian for those participants who were unable to provide informed consent for him or herself due to age or disability. The study was reviewed and approved

by the Human Ethics Committee at the University of Canterbury. See Appendix A for a copy of the ethics approval.

Table 1  
Biographical Data of the Eight Participants

Participant	Age	Disability*	PPVT -4**	TONI -3***	AAC Systems
1	8:11	CP GDD.	N/A* ***	N/A* ***	Hand reach: to yes/no symbols mounted opposite corners of wheelchair tray. Eye Gaze: to up to three 4cm X 4cm color pictures presented at eye level, on a black background. Vocalizations/Smiles to confirm choice.
2	20:08	ID.	24	63	Makaton Sign Language. Speech: some word approximations. Communication Book: A3 size clear folder with approximately 20 Boardmaker symbols per page accessed to through pointing.
3	19:09	GDD	30	64	Pollyanna Dynavox with Speech Output: Accessed through direct typing. Communication Book: A3 size clear folder with approximately 20 Boardmaker symbols per page accessed to through pointing.
4	15:06	D.S A.S	20	62	Laptop with Clicker 5 Software: Different topic boards with approximately 10 symbols per board. Accessed by mouse click. Speech: "yes" and "no". Gesture: various spontaneous gestures. PECS: folder used at home but not at school so not used in this experiment.
5	14:10	C.P	20	60	Dynavox V/Max: accessed through auditory scanning and big mac switch mounted between legs on wheelchair. Vocalisations: for yes and no. Gesture: Spontaneous gestures.
6	17:11	D.S	22	63	Speech: Sentences up to 5 or 6 words with varying intelligibility. Palmtop Device: Accessed through touch screen with vocabulary organized by topic.
7	18:04	I.D	43	62	Makaton Signs. Communication Book A3 size clear folder with approximately 20 Boardmaker symbols per page accessed to through pointing. Vocalizations: some word approximations.
8	18:10	I.D	23	62	Makaton Signs. Communication Book: A3 size clear folder with approximately 20 Boardmaker symbols per page accessed to through pointing. Vocalizations: some word approximations.

N.B: \* CP= Cerebral Palsy, GDD=Global Developmental Delay, ID=Intellectual Disability, DS= Down Syndrome, AS=Autism.

\*\* Scores reflect standard scores (Mean=50, SD=10)

\*\*\* Scores reflect quotient scores (Mean=100, SD=15)

\*\*\*\* Participant unable to complete formal testing because of the nature of their disability.



## **2.2 Procedure**

The research was conducted in two phases over two or three sessions: (1) pretesting and observations and (2) experimental procedure. Pretesting involved the completion of a questionnaire, observation of the participant in a typical interaction with a familiar communication partner, and completion of the Peabody Picture Vocabulary Test-Fourth Edition (PPVT-4) (Dunn & Dunn, 2007) and the Test of Non-Verbal Intelligence-Third Edition (TONI-3) (Brown, Sherbenou, & Johnson, 1997) where able and developmentally appropriate. All participants completed the study at their home, school or campus clinic at their choosing.

At the completion of pretesting and observations, parents or school staff were given a copy of the book required for the experimental procedure and were asked to read it with the participant three to four times during the week. This was intended to familiarize participants with the story. A list of vocabulary associated with the book was generated by the researcher (see Appendix B) and programmed into the participant's AAC device or included in their AAC system by their parent/school staff and the researcher. This enabled the participant to become familiar with the material so that they may be encouraged to contribute to the interaction. The researcher returned to complete the experimental phase of the research an average of 17 days after the initial testing. The researcher attempted to schedule the experimental phase seven days after the pretesting, but this was extended for some participants due to illness which effected the mean. Full details of each research phase are provided below.

### *2.2.1 Pretesting and Observations.*

#### *2.2.1.1 Questionnaire.*

The study began with a questionnaire that was completed by the participant or their parent(s). The questionnaire was demographic in nature. It included questions about the participant's AAC system and methods and modes of communication. See Appendix C for a copy of the questionnaire.

#### *2.2.1.2 Observations.*

Following the completion of the questionnaire, the researcher observed participants and a familiar communication partner (e.g., parent, teacher or caregiver) during a typical daily interaction for approximately 30-45 minutes. Communication partners were instructed to interact with the participant during a familiar structured routine in their natural environment such as a class discussion, story reading, playing a game or snack time. This observation served two purposes. Firstly it familiarized the researcher with the participant's methods and modes of communication and secondly, allowed the participant to become familiar and comfortable with the researcher's presence.

#### *2.2.1.3 Standardized Measures.*

To ensure that the book and vocabulary used later in the study were at an appropriate level for the participant two standardized assessments were completed: (1) The Peabody Picture Vocabulary Test Fourth Edition (PPVT-4) (Dunn & Dunn, 1997) and (2) the Test of Non Verbal Intelligence Third Edition (TONI-3) (Brown et al., 1997). Administering these assessments helped facilitate rapport between the researcher and participants. The PPVT-4 is a test of receptive vocabulary and was considered appropriate as testing does not require a verbal response from the participant. It is suitable to use with those who depend on AAC as pointing, gesture, scanning and other modes of indication can all be used by the participant to indicate their response. The TONI-3 assesses intelligence, aptitude, abstract reasoning and

problem solving skills. It is suitable for people who use AAC as it uses "...pantomimed directions and nonverbal format...with individuals who are unable to listen, speak, read or write." (p.g. vii). This is useful for young people who have disabilities because it does not rely on the use of language, reading, writing, speaking or listening. It requires no verbal responses and participants can respond by pointing, nodding or making some gesture to indicate their response choice.

Participant 1 was unable to complete formal testing due to poor vision and working memory difficulties. Additionally, this participant also had frequent seizures, which meant he had difficulty attending for any period to complete testing. Instead, the researcher spent 45 minutes alongside the participant in class and a 30-minute play session to facilitate rapport and familiarize the researcher with the participant's communication modes. The PPVT-4 and TONI-3 were adapted for a second participant (5) who was unable to point to his response choice. The researcher would point to each response option and participant 5 would indicate yes or no. All other participants were able to point to their answers independently. See Table 1 for individual participant results across both the PPVT-4 and TONI-3.

### *2.2.2 Experimental Procedure.*

As previously stated, the experimental procedure was completed an average of 17 days following the pretesting and observations. This was undertaken to allow familiarization time for the participant. Specifically it enabled them to become familiar with the book used for the experimental component and any associated vocabulary added into their AAC system. The experimental procedure was preceded by a warm up activity of a game of the participants' choosing. Two interactions occurred in participants' homes with the remainder in the participants' schools. The interactions were all video recorded using a Panasonic SDR-H250 3.1 mega pixel video camera. The camera was placed at a right angle to the participant,

approximately two meters away, in open view of the participant but as inconspicuously as possible. The video captured any speech, vocalizations, gesture or device use. The front or side profile of the researcher was also visible. The ambient noise levels in each setting were judged to be sufficiently low as so to allow for video recording of the interactions. The two components of the experimental phase are described below.

#### *2.2.2.1 Warm-up activity.*

A total of 20 to 30 minutes was spent on a warm-up with a familiar activity that occurred prior to the formal experimental procedure. The participants were engaged in general conversation with the researcher for 10 to 15 minutes and were then offered a choice of developmentally appropriate activities to undertake with the researcher. The participant was then engaged in the activity of their choosing for a further 10 to 15 minutes to build rapport and allow the participant to relax and become desensitized to the video camera.

#### *2.2.2.2 Book reading interactions.*

Two books were selected for this task: (1) *The Very Hungry Caterpillar* (Carle, 1969) and (2) “Face to Face With Whales” (Nicklan & Nicklan, 2008). *The Very Hungry Caterpillar* was selected for use with participants who achieved a raw score of 100 or less on the PPVT-4. This book was chosen as it is a popular, well known children’s book and creates many communication opportunities in its reading. For participants who scored 100 or more on the PPVT-4, “Face to Face With Whales” (Nicklan & Nicklan, 2008) was selected to share because of its generic topic and more complex language structures.

During the experimental component, the researcher shared the book with the participant using a carefully designed scripted reading task. The script was designed with the variables of pause duration and turn opportunity in mind. Three types of turn opportunity

were provided to the participants: open questions, closed questions and comments/statements. These were presented an equal number of times across the scripts to control for the possibility that participants might respond differently to different opportunity types. The opportunities were presented under three conditions of pause time allowed for the participant to commence initiation of a response within: two, 10 and 45 seconds. An equal number of turn opportunities and pause times were included for each participant. See Table 2 for details.

Three different scripts for each book were generated to allow the three pause time conditions to be presented in a different random order among participants to decrease the possibility of order effects. In addition, the occurrence of each type of turn opportunity (open questions, closed questions, comment/statement) was counterbalanced across the scripts.

Regarding pause time, the participant was allowed the determined set time (two, 10 or 45 seconds) within which to initiate a response. If no response was initiated within the set pause time the researcher moved on to the next part of the script. A pause was identified as a break in speaking by the researcher and the researcher looking expectantly at the participant. The scripts are provided in Appendix D.

Table 2

*Number of Pause Time Conditions for Each Turn Opportunity*

Turn Opportunity	Pause Time Condition		
	2 Seconds	10 Seconds	45 Seconds
Comment/Statement	3	3	3
Open Question	3	3	3
Closed Question	3	3	3

## **2.3 Data Analysis**

### *2.3.1 Participant Conversational Turn Analysis.*

All video material was transcribed verbatim according to the SALT-NZ transcription guidelines (Gillon, Westerveld, Miller, & Nockerts, 2002). A summary table for each experimental condition across each participant was created that included the following data for each response: response occurring to a turn opportunity, Mean Length of Utterance (MLU), type of conversational act and the modes of communication used. See Table 3 for full details. The summary tables for each participant are included in Appendix E.

Table 3

*Data Categories for Analysis*

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*DATA*

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Percentage of Responses

Mean Length of Utterance (MLU)

In Morphemes

Conversational Act

Assertive Conversational Acts	Request for Information (RQIN) Request for Action (RQAC) Request for Clarification (RQCL) Request for Attention (RQAT) Comments (ASCO) Statements (ASST) Disagreements (ASDA) Performatives (PERF)
Responsive Conversational Acts	Response to request for Information (RSIN) Response to request for Action (RSAC) Response to request for Clarification (RSCL) Response to request for Attention (RSAT) Response to assertives (RSAS)

Discourse Function

Initiate Topic (I)	
Maintain Topic (M)	
Extend Topic (E)	
Extend Tangentially (ET)	

Mode of Communication

AAC System	
Speech	
Gesture	
Vocalisation	

---

### *2.3.2 Measurement of Responses.*

Each participants percentage of responses to a turn opportunity across the pause time conditions (two, 10 and 45 seconds) was calculated across open questions, closed questions, comments/statements and overall turn opportunities. This was done by counting up the number of responses made and dividing by the number of turn opportunities for each condition. For final scores, group means were used. These were calculated by adding all the individual scores together and dividing by eight (the number of participants).

### *2.3.3 Measurement of MLU*

MLU in words was counted for each response made by the participant. Utterances were sorted by pause time opportunity: two seconds, 10 seconds and 45 seconds. Average MLU in response to each pause time opportunity was calculated by adding the MLU scores and dividing by the total number of responses made. For final scores, group means were used. These were calculated by adding all the individual scores together and dividing by eight (the number of participants).

### *2.3.4 Measurement of Assertive Conversational Acts Used*

The percentage of assertive conversational acts used by the participants (see Table 3) in their responses was calculated by dividing the number of assertive conversational acts used over the total number of responses made to each different pause time opportunity. For final scores, group means were used. These were calculated by adding all the individual scores together and dividing by eight (the number of participants).

### *2.3.5 Modes of Communication Used.*



The mode of communication used for each response made under different pause length conditions was recorded. The percentage of use of each type of mode of communication was calculated by dividing the use of the mode by the number of responses made. For final scores, group means were used. These were calculated by adding all the individual scores together and dividing by eight (the number of participants).

## **2.4 Reliability Measures**

### *2.4.1 Inter-judge reliability*

Inter-judge reliability procedures were completed on 25% of the video sample. An independent examiner who was an experienced speech language therapist and doctoral student was trained in the coding rubric and coded 25% of randomly selected video data. Measures that were coded included: (1) A response occurring to a turn opportunity, (2) mode of communication used, (3) MLU in words and (4) Conversational Act. Cohen's kappa was used to determine the level of agreement between the two coders. The level of agreement ranged from 0.83 to 0.94. Table 4 presents the reliability measure results.

Table 4

*Inter-judge reliability.*

---

Measurement	Cohen's Kappa
Response Occurring	0.94
Mode of Communication	0.87
MLU in words	0.83
Conversational Act	0.83

---

## **2.5 Statistical Analysis.**

Statistical analysis was completed using one way repeated measures Analysis Of Variance (ANOVA) at  $p < 0.05$ . Normality and homogeneity of data was confirmed. Post-hoc analyses were conducted using Bonferroni t-test at  $p < 0.05$ . Separate ANOVA and post-hoc analyses were completed for each hypothesis. Themes for percentage of responses made to turn opportunities, MLU, percentage of assertive conversational acts made and mode of communication were examined in relation to the three different pause time conditions.

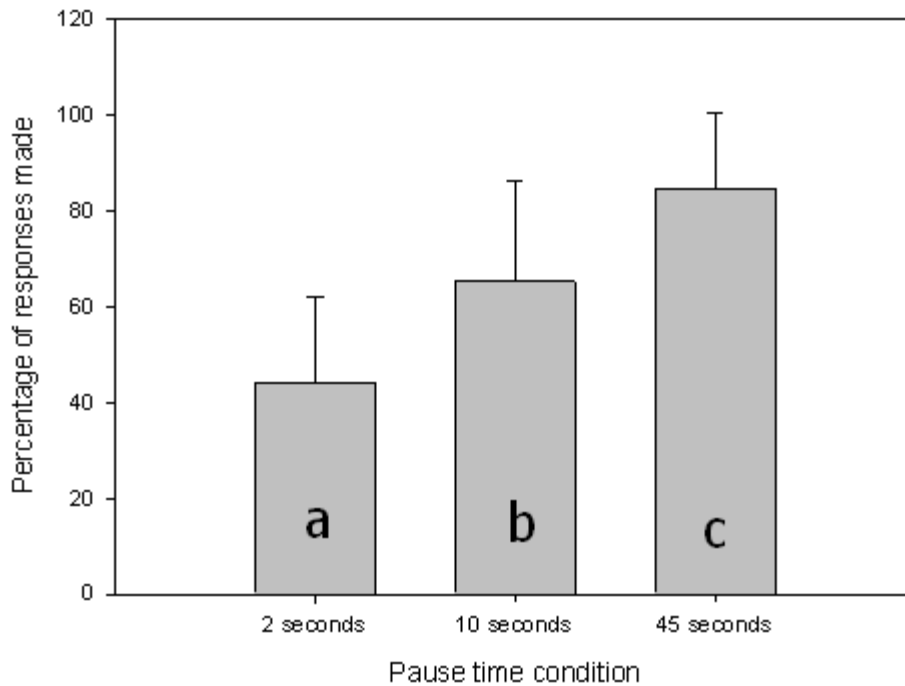
### 3.0 Results

To investigate the effect of communication partner pause time, upon the communication of school-aged students who use AAC, a comparison was made between the participants' communicative outputs in response to three different pause time conditions: two seconds, 10 seconds and 45 seconds. Specifically, the percentage of responses made to a turn opportunity, MLU, the percentage of assertive conversational acts used and the modes of communication were examined.

The results are presented in four sections. The first section contains individual and group results regarding the percentage of responses made to each pause time condition. The second section contains results regarding the participants' MLU in response to the different pause time conditions. The third section displays the results of the participants' use of assertive conversational acts in response to the different pause time conditions and the fourth section contains results of the modes of communications used.

#### *3.1. Percentage of responses to different pause time conditions*

Overall group results for percentage of responses made to turn opportunities, across each pause time condition, are provided in Figure 1. Statistical analysis across pause duration conditions indicated a significant difference existed in the percentage of responses made to turn opportunities with increased pause time [ $F(2,14)=34.844$ ,  $p<0.001$ ]. Post hoc analysis demonstrated that participants exhibited significantly more responses to turn opportunities in the 45 second pause conditions compared to the two second ( $t=8.346$ ,  $p<0.001$ ) and 10 second conditions respectively ( $t=4.006$ ,  $p=0.004$ ).



*Figure 1.* Bar graph showing the mean group responses made to turn opportunities across the three pause time conditions. Bars denote the mean score, error bars denote standard deviation. Means exhibiting different corresponding letters were statistically significant using Banferroni t-test post hoc analysis at  $p < 0.05$ .

Descriptive analysis by individual participant was then completed to determine if this effect resulted from one or two participants' mean scores only, or was a general trend across all participants. Individual percentage responses to turn opportunities are plotted in Figure 2. Examination of results indicated that, overall, all participants appeared to increase the number of responses made to turn opportunities when pause time was increased, with the exception of participant 2 who responded at the same level for both the 10 and 45 second pause time conditions.

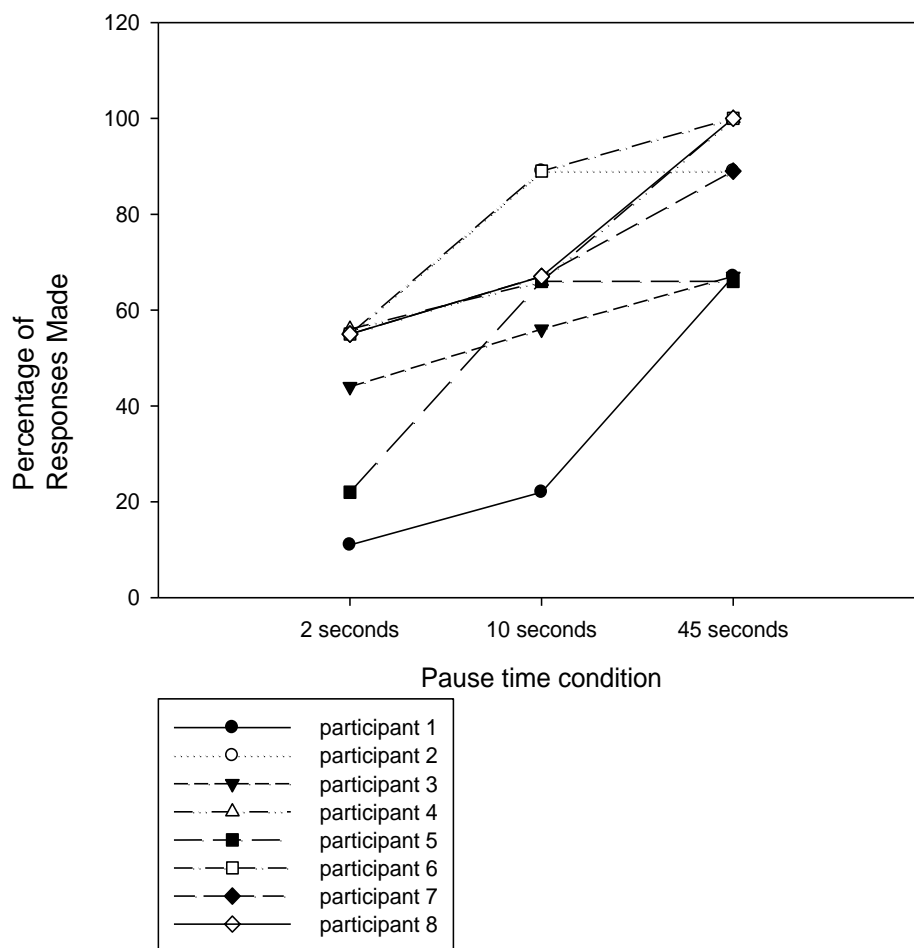


Figure 2. Line graph showing individual percent of responses made to turn opportunities across the three pause time conditions.

Results were subsequently analyzed by type of turn opportunity to determine if one type of opportunity contributed to percentage of responses made by participants. Table 5 demonstrates the percentage of responses made to increased pause times when individuals were presented with comments/statements, open questions and closed questions. For the open question opportunity type statistical analysis revealed a significant difference across pause duration conditions [ $F(2,14)=50.13, p<0.05$ ]. Posthoc examinations indicated that percentage response was significantly increased in the 45 second condition compared with both the 2

seconds ( $t=4.25$ ,  $p<0.01$ ) and 10 second ( $t=2.76$ ,  $p<0.05$ ) conditions respectively. For the closed question opportunity type statistical analysis revealed a significant difference across pause duration conditions [ $F(2,14)=7.706$ ,  $p<0.05$ ]. Posthoc examinations indicated that percentage response was significantly increased in the 45 second condition compared with the 2 second condition ( $t=2.961$ ,  $p<0.01$ ) and the 10 second compared with the 2 second conditions ( $t=2.961$ ,  $p<0.05$ ). For the comments/statements opportunity type statistical analysis revealed a significant difference across pause duration conditions [ $F(2,14)=11.5$ ,  $p<0.05$ ], Posthoc examinations indicated that percentage response was significantly increased in the 45 second condition compared with the 2 second condition ( $t=11.5$ ,  $p<0.01$ ).

Table 5

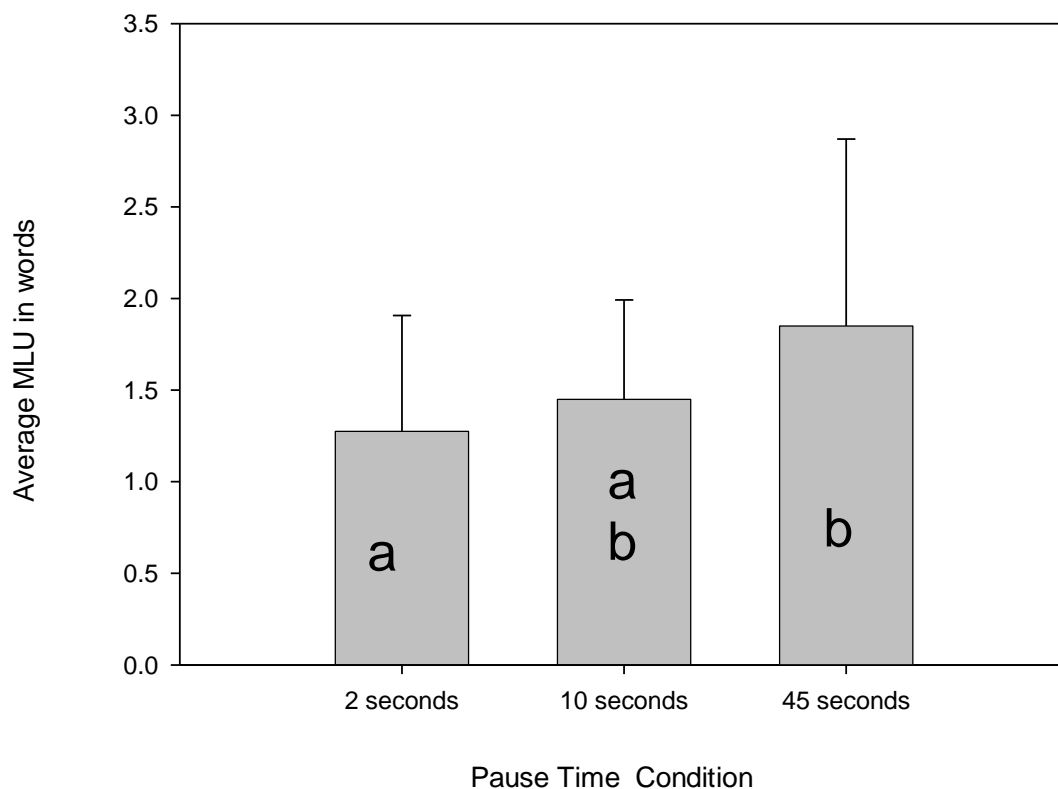
*Group mean percentage of responses made to each opportunity type across the different pause time conditions*

Turn opportunity type	2 seconds	10 seconds	45 seconds
Open Question	33.3% (SD 25.3)	50% (SD25.3)	83.4% (SD 25.2)
Closed Question	74.9% (SD 23.7)	95.9% (SD 11.7)	91.6% (SD 23.7)
Comment/Statement	33 % (SD 16.5)	49.5% (SD 16.5)	83.5% (SD 66.5)

NB: SD=Standard Deviation

### *3.2 MLU of responses to different pause time conditions*

MLU was calculated for each participant's utterance in response to the different pause time conditions. Responses across each condition were averaged for the group and are presented in figure 3. A one-way repeated measures ANOVA revealed a significant difference in MLU across the three pause time conditions [ $F(2,14)=5.241$   $p=0.020$ ]. Post hoc testing indicated a significant increase in MLU in the 45 second compared with the two-second pause time conditions only ( $t=3.158$ ,  $p<0.05$ ).



*Figure 3.* Histogram showing the mean group MLU in words across the three pause time conditions. Bars denote the mean score, error bars denote standard deviation. Means exhibiting different corresponding letters were statistically significant using Banferroni t-test post hoc analysis at  $p < 0.05$ .

Given the high degree of individual variation, as evidenced in standard deviations, individual participant results were plotted in Figure 4. Examination of descriptive data revealed that participants' individual differences contributed to the spread of scores with participants 4 and 8 tending to use a greater MLU.

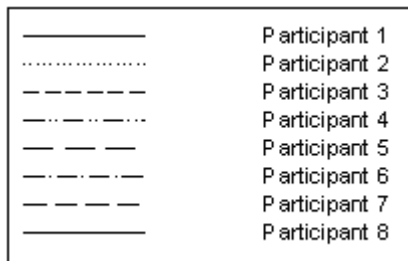
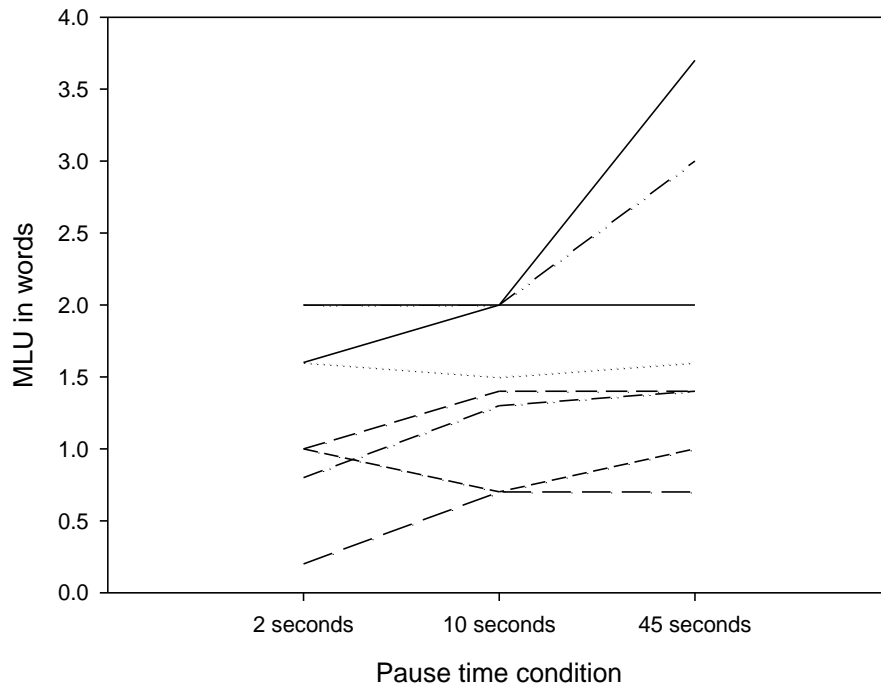


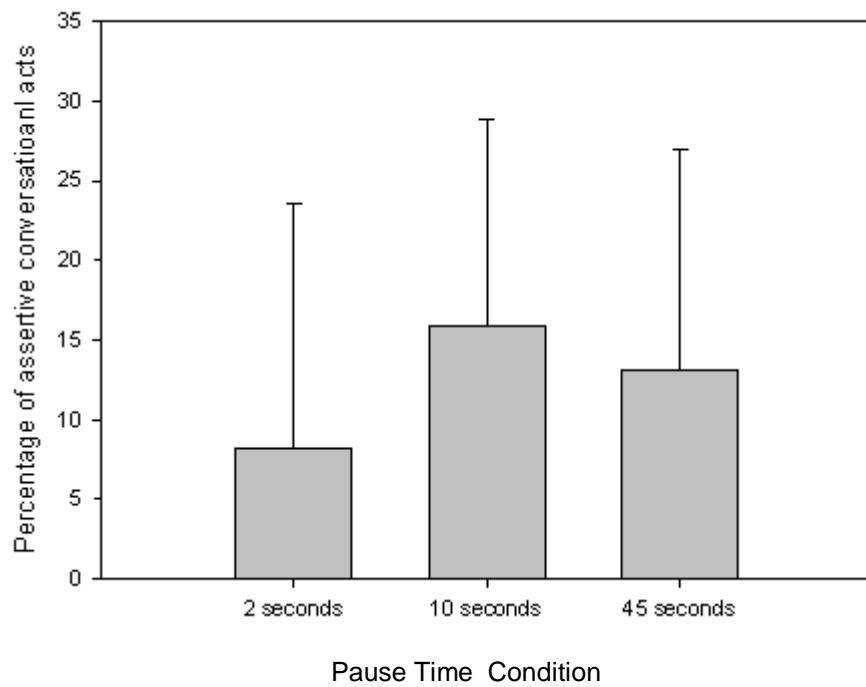
Figure 4. Line graph showing individual MLU scores across the three pause time conditions.

### 3.3 Use of assertive conversational acts in response to different pause time conditions

The type of conversational act (assertive or responsive) for each of the participant's turns was coded (see Table 3 for details of coding). While full coding was conducted as outlined in Table 3, only the average results for the percentage of assertive conversational acts, not responsive, are presented. The percentage of assertive conversational acts made by each participant for the three pause time conditions was calculated and group results are presented in Figure 4. A one way repeated measures ANOVA performed on the percentage of



assertive conversational acts made reveal no significant effect of pause time [ $F(2,14)=0.754$   $p=0.489$ ].



*Figure 5.* Histogram showing the mean group percentage of assertive conversational acts used across the three pause time conditions. Bars denote the mean score, error bars denote standard deviation.

### 3.4 Mode of communications used

Each participant's responses were coded according to the mode of communication employed, as a breakdown of responses made only (occurrences of 'no response' were not coded), across the three pause time conditions (see table 3 for details of coding). The utterances were sorted by pause time condition for the group, with results presented in Figure 5. One way repeated measures ANOVA performed on the percentage of AAC use over other modes of communication revealed no significant pause time effect [ $F(2,14)=1.018$   $p=0.387$ ].

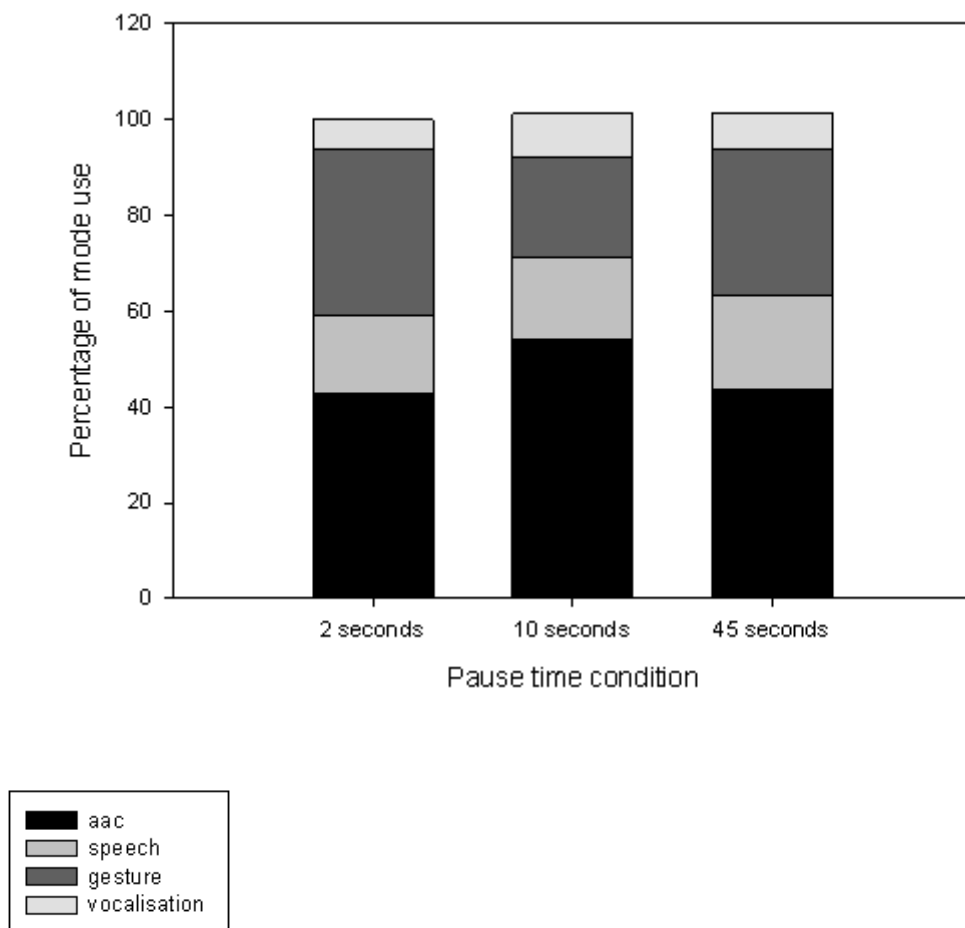


Figure 6. Stacked bar graph showing the group modes of communication used for responses made across the three pause time conditions.

## 4.0 Discussion

The purpose of the present study was to determine the effect of variation in communication partner pause length upon the communicative output of young people who use AAC. Specifically, the effect of pause time on the level of responses to a conversational turn opportunity, MLU, percentage of assertive conversational acts made and modes of communication used by young people who use AAC were investigated. Based on the AAC literature that suggests using pause time as a strategy when interacting with people who use AAC (Basil, 1992; Bedrosian, 1997; Beukelman & Mirenda, 1998; Binger et al., 2008; Kent-Walsh & McNaughton, 2005; Liboiron & Soto, 2006; Myers, 2007), four research questions were posed. The results pertaining to each question are discussed below.

*4.1. Research Question One: Does use of increased pause length by a communication partner increase the percentage of responses by a person using AAC to conversational turn opportunities?*

Results of the current study indicated that participants were more likely to respond to a turn opportunity with increased pause time. This was in line with the hypothesis that the participants would increase their percentage of responses to turn opportunities as communication partner pause time increased from two to 10 to 45 seconds within which the participants could initiate a turn. This reflected across the group as a whole and in individual responses. This finding was consistent with results of past studies which have shown that increased pause time, as part of a group of interaction strategies, can facilitate communication by young people who use AAC (Basil, 1992; Bedrosian, 1997; Kent-Walsh & McNaughton, 2005; Light et al., 1994). The present study shows that increasing pause time alone has significant impact on an AAC user's ability and willingness to take a conversational turn.

This result provides further evidence for the roles of communication partners when providing intervention and services to people who use AAC.

People who use AAC may increase their responses to turn opportunities when provided more pause time for several reasons. Firstly, providing extra pause increases turn opportunities and makes these opportunities more salient. This sets a precedent and expectation for a response to occur. Many people who use AAC become accustomed to having less turn opportunities than people who communicate typically and also receiving less response to their communication attempts (Basil, 1992, Light et al., 1994). Creating an expectation for a response and then allowing adequate time for the formulation and expression of a response through augmented and alternative modes may help encourage people who use AAC to become more active conversationalists. Previous research shows that communication partners typically dominate turn taking (Carter & Maxwell, 1998; Downing, 1987; Lund & Light, 2007; Myers, 2007). Providing more and longer pauses reduces the likelihood of a person using AAC being “cut-off” while they may be processing a previous turn and formulating their own turn. Moreover, when partners pause and wait for a response, they may be more likely to look for and recognize any communicative attempts of the person using AAC.

The results of this study also compared favorably to those of Maroni et al., (2008) who found that when teachers allowed longer pauses in their classroom discussions, students were able to make more responses, using more words and reduce their errors. This study suggests that these findings can be extended to people who use AAC with a longer pause time being used. This has significant implications for teachers who have students who use AAC in their classrooms. Maroni et al., found that pausing for longer than three seconds did not come naturally to teachers and that they needed to make a conscious effort to do so. Therefore

teachers of students who use AAC may require direct coaching in order to use an even longer pause time to allow the AAC user adequate time to respond to a turn opportunity.

People who use AAC often forgo their communicative turns in order to maintain the conversational tempo norms expected by communication partners (Clarke & Wilkinson, 2008; Hoag et al., 2008; Johnston et al., 2004; Wennerstrom & Siegel, 2003). Providing longer pause time slows the overall rate of interaction down to a level that may be more suitable for people who use AAC. People using AAC require a much slower rate of conversation because of physical and/or cognitive barriers, or indeed the AAC system itself, which may take time to operate (Carter & Maxwell, 1998; Higginbotham & Wilkins, 1999; Light, 1989; Todman, 2000). Providing pause time beyond what may be comfortable for the communication partner can help a person who uses AACs overcome these barriers.

While overall, increased pause time resulted in an increase in the percentage of responses by the participants, this was found to differ according to turn opportunity type. Specifically the participants in the current study were more likely to respond to comments/statements and closed questions than open questions. This may be because closed questions and comments are often easier to respond to, requiring only minimal responses such as 'yes' and 'no'. This is in contrast to much research that suggests communication partners use open questions to facilitate interaction by people who use AAC (Basil, 1992; Binger et al., 2008; Lund & Light, 2007; Myers, 2007). Therefore, it could be recommended that if open questions are being used as an interaction strategy, facilitators need to be mindful that a young person who uses AAC may need additional support and encouragement to answer than just providing longer pauses.

*4.2 Research Question Two: Does increased pause length affect the Mean Length of Utterance (MLU) of a person using AAC?*

The current study found a significant difference in MLU between the pause time conditions of two seconds and 45 seconds, with participants exhibiting longer conversational turns in the latter. This demonstrates that people using AAC may need exponentially longer pause time than typical speakers in order to develop and demonstrate linguistic competence. A person who uses AAC may be encouraged by longer pause time to try and use more vocabulary, more complex syntax and expand their turns. There is pressure on people who use AAC to communicate at a typical rate (Higginbotham & Wilkins, 1999). Increasing pause time may decrease this pressure, thereby encouraging a person who uses AAC to express their ideal message. Moreover, an increase in MLU with longer pause time facilitates operational competence as it provides time to the AAC user to operate their device or system in order to take a longer turn.

Adamson et al., (1992) found that youth with cognitive impairments were likely to use new vocabulary integrated into their AAC devices when supported by communication partners. The authors did not discuss how the communication partners supported the use of new vocabulary but that they attended three one-hour instructional sessions. The current study has established that providing appropriate pause time is an effective method for communication partners to employ to encourage the use of new vocabulary. The instruction of use of pause time could easily be integrated into instructional sessions such as those described by Adamson et al.,.

*4.3 Research Question Three: Does increased pause length increase the likelihood a person using AAC will use more assertive conversational acts?*

The current study found that people who use AAC were not likely to use a greater percentage of assertive conversational acts when pause time was increased. This may have been because the current study used a scripted task in which communicative turns were

created for the participant so they were placed in a more respondent role. Additionally, the participants and the researcher were limited in their familiarity of each other that may have affected the participants' willingness to use assertive conversational acts. Furthermore, Basil (1992) explained that lack of assertive conversational acts might be owing to the learned helplessness phenomenon. People who use AAC may require active encouragement and specific instruction on increasing assertiveness. Developing social competence is a challenge for many people who use AAC and despite research that focuses on teaching communication partners interaction strategies, this may not be sufficient for AAC users to be more active conversationalists.

Although the participants in the current study may have been limited by the use of a script and set topic of conversation, the lack of assertive conversational acts produced support previous research that indicates people who use AAC can benefit from specific teaching of conversational skills (Dattilo & Camarata, 1991; Downing, 1987; Todman, 2000). Therefore, although increasing communication partner pause time can increase the number of responses to turn opportunities, it is not sufficient as an independent strategy to encourage assertive conversational acts such as requests and comments by people who use AAC and may require specific instruction.

*4.4 Research Question Four: Does increased pause length increase the likelihood that a person using AAC will use their AAC system over other modes of communication?*

In contrast to the hypothesis, the results indicate that participants were not likely to use their AAC system over other modes of communication when their communication partner provided increased pause time. It was hypothesized that providing increased pause time to young people who use AAC, would encourage them to use their AAC device or system more than other modes of communication, thereby serving to develop their operational competence.

This was because of the physical and cognitive loads often associated with using an AAC system, and that providing pause time would help over-come these barriers to using AAC. However, this hypothesis was not supported in the current study. When the participants made a response, they employed other modes of communication (speech, gesture and vocalizations) over 50 percent of the time. This is consistent with findings of Bruno and Dribbion (1998) who found that parents recognized speech, gesture and eye gaze as primary modes of communication and an AAC system as a secondary mode of communication in their children who used AAC.

Additionally, the participants in this study may have lacked the operational and/or linguistic competence to use their AAC system to fulfill every conversational turn. Evidence that supports this interpretation comes from Kent-Walsh & McNaughton (2005), Light & Beukelman (2003), Light & Binger (1998) and Lloyd et al. (1997) who explain that teaching device operation should be one of the main focuses of intervention. The participants in this study may have benefited from further support and practice in using their AAC system in a shared storybook reading context.

Alternatively, the participants in the current study may have used other modes that were easier and faster to fulfill particular turns. For example, a quick sign for “yes” and “no” may be faster than accessing the same message through a device. A number of researchers (e.g., Bruno & Dribbion (1998) and Light & Beukelman (2003)) strongly advocate the “multi-modal” approach to communication for people using AAC. This approach involves encouraging and developing all methods and modes of communication that are available for an individual to employ. This has implications for communication partners who must be able to recognize and support different modes of communication. However a multi-modal approach provides people who use AAC greater flexibility in their communication to suit different situations, partners and messages.



## 5.0 Clinical Implications

The findings from this study suggest that providing extended pause time of up to 45 seconds, can help young people who use AAC to be more responsive to turn opportunities and demonstrate greater linguistic competence. Therefore, as previously observed (Basil, 1992) Light et al., 1994) it appears that communication partners have a significant role to play in supporting the development of communicative competence of people using AAC. Previous research identified that teaching skills, such as pause time, directly to communication partners can have favorable impacts on the communicative abilities of people who use AAC (Batorowics et al., 2006; Cheslock et al., 2008; Myers, 2007). The findings of this study reinforce this and suggest that pause time is a critical skill to be targeted during intervention with communication partners of young people who use AAC. These skills must be installed in communication partners as these people spend more time with the person using AAC than speech-language therapists and are in prime position to implement strategies in natural contexts throughout the day. It is important to target pause time as an interaction strategy because use of extended pause time can be unnatural for communication partners owing to the awkwardness limen (Clark, 1996; Clarke & Wilkinson, 2008; Wennerstrom & Siegel, 2003). Partners may need specific instruction in when to pause and how long to pause for. Pausing can also help partners to look for and recognize communicative attempts by the a person using AAC (Reichle et al., 2002)

Although communication partner pause time can be an effective independent strategy, its effects in the current study were limited to increasing the responsiveness and MLU of the participants. Therefore it can be assumed that teaching communication skills directly to people who use AAC should be done alongside communication partner-based intervention. Conversational, social interaction, AAC system operation and linguistic based skills can all be

taught to people who use AAC to increase their control over conversations, assertiveness, activeness and general communication abilities. Light et al., (1999) found that teaching partner-focused questions helped people using AAC initiate, maintain and extend interactions. Similarly, Dattio and Camarata (1991) taught the participants in their study how to introduce topics into conversation as a means to increase their initiations and responses. Additionally, Adamson et al., (1992) used the introduction of social-regulative symbols into an AAC system to support participants' expansion of range and flexibility of their communication.

Furthermore, it was interesting to note that the participants in this study used their AAC system or device less than half the time, utilizing other modes of communication the rest of the time. These results suggest that clinicians and communication partners need to be supportive of the multi-modal approach to communication (Light & Beukelman, 2003). Communication partners may need to be taught to recognize and accept different modes of communication and respond appropriately. People who use AAC should be encouraged to employ all modes of communication available to them and the AAC system should not be viewed as their only source of communication.

## **6.0 Limitations**

While this study identified an increase in the likelihood that a participant will respond to a conversational turn when allowed increased pause time by their communication partner, these results need to be interpreted with several limitations in mind. Firstly, the small sample size (n=8) must be recognized. Future studies with increased participant numbers would be of benefit confirm the study findings. More over, the participants were not a heterogeneous group and varied greatly in their age, AAC system and cognitive abilities. This makes it difficult to recommend optimal pause time in relation to the group as a whole because of the varying individual characteristics. Furthermore the results for all participants are presented

primarily as group values. Detailed examination of individuals may provide additional information regarding the effect of pause time on the individual's communication that is not revealed when summarized according to the group.

Another factor to consider is that the participants had only met the examiner one to two times before the experiment was completed. Unfamiliarity with the examiner as a communication partner may have affected the participants' conversation and AAC use. Studying the effect of pause time with more familiar communication partners would help determine if familiarity of communication partner affects the participants' responses to turn opportunities under different pause time conditions.

The current study used a structured story reading task that may have limited participants' communication as the topic was set and turn opportunities created for them. Although all participants were provided with multiple turn opportunities from comments/statements, open and closed questions, the use of a script may have pre-empted their responses to a degree. Further research into the use of pause time in naturally occurring conversations could help further the understanding of the role of pause time as an intervention strategy.

## **7.0 Directions for Future Research**

Studies that include a greater number of participants that could be matched on various characteristics will provide greater specificity around optimal pause times for interactions with people who use AAC. This would support clinicians to provide concrete recommendations about specific durations of pause communication partners should provide. Further studies should also include naturally occurring conversations with familiar communication partners.

Additionally, research should focus on establishing the effectiveness of other interaction strategies that are frequently cited in the AAC literature including; increasing responsiveness to the AAC user, using open and 'wh' questions, use of cueing hierarchy and providing AAC models (Batorowics et al., 2006; Binger et al., 2008; Carter & Maxwell, 1998; Downing, 2005; Kent-Walsh & McNaughton, 2005; McNaughton et al., 2008). An understanding of the independent impacts of these strategies would contribute to the development of best practice guidelines for the instruction of communication partners. It would also help clinicians understand how these strategies may be combined for optimal effects and the prioritization of strategies for individual clients.

## **8.0 Conclusions**

The percentage of responses made by young people who use AAC were significantly higher as communication partner pause time increased from two to 10 and then 45 seconds. Additionally, MLU also increased as participants were provided 45 seconds within which to initiate a response. Participants were not more assertive in their conversation between pause time conditions. They also did not use their AAC system more as pause time increased. The results of the present study suggest that the responsiveness of young people who use AAC is closely related to the pause time allowed by their communication partner. The same can be said for their ability to take a longer turn. Therefore, communication partners should be instructed in the use of pause time as a interaction strategy to support the communication of young people who use AAC.

Young people who use AAC are likely to require direct instruction and encouragement to develop skills and strategies to be active and assertive in conversations. Communication partners need to support this by providing extended pause time and responding appropriately to communicative attempts. Additionally, young people who use AAC should be encouraged

to use all modes of communication available to them to help them be effective and active conversationalists. An AAC system should be viewed as just one component of a person's communication "toolbox". Communication partners should be taught to recognize and respond to different modes of communication employed by people who use AAC as opposed to simply responding to device output.

Future research evaluating the effectiveness of pause time used by familiar communication partners in everyday contexts would increase the understanding the effectiveness of pause time. Moreover, information on the effect of pause time on the communication of people using AAC who share similar characteristics would help develop a guide for how to best utilize pause time for individuals using AAC.

Research into the independent effects of other strategies often taught to communication partners, including increasing responsiveness to communicative attempts by people who use AAC, using open and 'wh' questions, use of cueing hierarchy and providing AAC models would provide information on the effectiveness of these strategies and guide their use in clinical intervention.

Finally, pause time is of critical importance to increasing the communicative competence and development of young people who use AAC. Increasing the communicative ability of such young people has benefits for their participation in their communities and society. Therefore, including the instruction and monitoring of the use of pause time by communication partners should be a priority of any speech language therapist working with people who use AAC.

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## 10. Appendices

### Appendix A: Human Ethics Committee Approval Letter

Ref: HEC 2009/69

16 June 2009

Hilary Mathis  
Department of Communication Disorders  
UNIVERSITY OF CANTERBURY

Dear Hilary

The Human Ethics Committee advises that your research proposal “The effect of varied pause length upon the communicative interactions of individuals who use alternative or augmentative communication.” has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 9 June 2009.

Best wishes for your project.

Yours sincerely

Dr Michael Grimshaw  
*Chair, Human Ethics Committee*

## **Appendix B: Vocabulary Lists**

### The Very Hungry Caterpillar Story:

1. Caterpillar
2. Butterfly
3. Hungry
4. Eat
5. Apple
6. 1,2,3,4,5
7. Ice-cream
8. Sick
9. Personalized Vocabulary: favorite fruit/food

### The Whale Story:

1. Yes
2. No
3. Whale
4. Photo

5. White

6. Big

7. Small

8. Family

9. Five

10. Baby

11. Dad

12. Food

13. Mouth

14. Horns

15. Wet

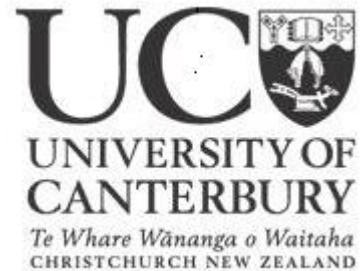
16. Smooth

17. Birds

18. Good

## **Appendix C: Questionnaire**

Hilary Mathis  
 C/- Communication Disorders  
 University of Canterbury  
 Private Bag 4800  
 Christchurch  
 DATE



**Department of Communication Disorders**

**Questionnaire and Demographic information**

This questionnaire is part of the research project 'The effect of partner initiated pause length upon the communicative interactions of individuals who use alternative or augmentative communication'.

Please answer the questions below. Feel free to ask the researcher, Hilary Mathis, for clarification about any of the questions.

1. Demographic Information.

Your Name:	Your relationship to the student:
Your son/daughter's name:	Student's Age:
Medical Diagnosis:	Other people who live at home with your son/daughter:

2. Communication Device Questions:

What communication devices or systems does the student use?	How long has the student been using these devices or systems for?
What other methods and modes of communication does the student use?	What would you say is the student's main method/s of communication?



What are some typical daily routines the communication device is used in? (for example: story time, meal times, bath time)	

### 3. Questions about videoing

Are you comfortable for Hilary to be present in your home and for videoing to take place of Hilary interacting with you son/daughter?	If not, would there be another setting you would be comfortable for video to be recorded?
Are there any special considerations you would like to share before your son/daughter is videoed?	

I consent to the results of any assessments being made available for future studies if required.

Name:

Signature:

Date:

Thank you for your time in filling out this questionnaire. Should you have any further questions or considerations please contact Hilary Mathis on (03) 364 2987 ext 7603, Dr Dean Sutherland on (03) 364 2987 ext 7176 or Dr Megan McAuliffe on (03) 364 2987 ext 7075.

## Appendix D: Scripts.....

### The Very Hungry Caterpillar Script 1

N.B:

(-) = text from book

<-secs>=pause time

1. I brought a book to share with you today. <2secs> comment/statement
2. It is about a caterpillar, have you ever seen a caterpillar? <10secs> closed question
3. This caterpillar has little legs (point to legs), and little hairs on its back (point to hairs) and two eyes (point to eyes), can you show me your eyes? <45secs> closed question
4. hmm, the caterpillar in this story is very hungry. I wonder why that might be? <10secs> open question

Let's read and find out.

(In the light of the moon a little egg lay on a leaf.)

6. There is the moon (point to moon) and there is the egg (point to egg). What is in the egg do you think? <45secs> open question

7. Oh look at that big sun. <45secs> comment/statement

(One Sunday morning the sun came up and –pop! Out of the egg came a tiny and very hungry (point to caterpillar)...

8. <2secs> closed question .....caterpillar.

9. I wonder where he is going? <10secs> open question

10. Oh, what do you think he is doing here? <2secs> open question

(He started to look for some food.)

11. He must be hungry. <45secs> comment/statement

12. Do you know what this is (point to apple?) <10secs> closed question

(On Monday he ate through one apple. But he was still hungry.)

14. These are pears, do you like pears? <45secs> closed question

15. What other fruit do you like to eat? <45secs> open

(On Tuesday he ate through two pears but he was still hungry.)

(On Wednesday he ate through three plums, but he was still hungry.)

16. Wow, he is eating a lot of food for such a small caterpillar. <10secs>

comment/statement

18. Oh Yum, these are my favorite, strawberries. <2secs> comment/statement

(On Thursday he ate through four strawberries, but he was still hungry).

(On Friday he ate through five oranges, but he was still.....)

19. <45secs> closed question hungry.

21. Can you count the oranges with me? One two....<2secs> closed question 3,4,5

22. What do you think is going to happen now? <10secs> open question

23. Oh wow! Look at all this food! <2secs> comment/statement

(On Saturday he ate through one piece of chocolate cake, one (point to ice-cream))

24. <10secs> closed question ice-cream cone,

(one pickle, one slice of Swiss cheese, one slice of salami, one lollipop, one piece of cheery pie, one sausage, one cupcake, and one slice of watermelon!)

25. That was a lot of food! How do you think the poor caterpillar feels now? <2secs> open question  
 (That night he had a stomachache!)
26. I'm not surprised! <10secs> comment/statement
27. Which of these foods do you like to eat? <2secs> open question
28. Oh, he looks better on this page. <45secs> comment/statement
29. Do you now what this is? <2secs> closed question a leaf  
 (The next day was Sunday again. The caterpillar ate through one nice, green leaf, and after that he felt much better)  
 (Now he wasn't hungry any more-and he wasn't a little caterpillar any more. He was a big, fat caterpillar)  
 (He built a small house, called a cocoon, around himself. He stayed inside for more than two weeks)  
 (Then he nibbled a hole in the cocoon, pushed his way out and.....)
30. What do you think happens to the caterpillar? <45 secs> open question  
 (He was a beautiful butterfly)
31. That is a pretty butterfly, it has lots of colors. <10 sec> Comment/statement
- The End.

### The Very Hungry Caterpillar Script 2

N.B:

(-) = text from book  
 <-secs>=pause time

1. I brought a book to share with you today. <10 secs> comment/statement
2. It is about a caterpillar, have you ever seen a caterpillar? <2secs> closed question
3. This caterpillar has little legs (point to legs), and little hairs on its back (point to hairs) and two eyes (point to eyes), can you show me your eyes? <10secs> closed question
4. hmm, the caterpillar in this story is very hungry. I wonder why that might be? <45secs> open question  
 Let's read and find out.  
 (In the light of the moon a little egg lay on a leaf.)
6. There is the moon (point to moon) and there is the egg (point to egg). What is in the egg do you think? <2secs> open question
7. Oh look at that big sun. <10secs> comment/statement  
 (One Sunday morning the sun came up and -pop! Out of the egg came a tiny and very hungry (point to caterpillar)...
8. <45secs> closed question ...caterpillar.
9. I wonder where he is going? <10secs> open
10. Oh, what do you think he is doing here? <2secs> open question  
 (He started to look for some food.)
11. He must be hungry. <2secs> comment/statement
12. Do you know what this is (point to apple?) <45secs> closed question  
 (On Monday he ate through one apple. But he was still hungry.)
14. These are pears, do you like pears? <2secs> closed question

15. What other fruit do you like to eat? <10secs> open  
 (On Tuesday he ate through two pears but he was still hungry.)  
 (On Wednesday he ate through three plums, but he was still hungry.)
16. Wow, he is eating a lot of food for such a small caterpillar. <45secs>  
 comment/statement
18. Oh Yum, these are my favorite, strawberries. <10secs> comment/statement  
 (On Thursday he ate through four strawberries, but he was still hungry).  
 (On Friday he ate through five oranges, but he was still.....)
19. <2secs> closed question hungry.
21. Can you count the oranges with me? One two....<10secs> closed question  
 3,4,5
22. What do you think is going to happen now? <45secs> open question
23. Oh wow! Look at all this food! <2secs> comment/statement  
 (On Saturday he ate through one piece of chocolate cake, one (point to ice-cream))
24. <10secs> closed question ice-cream cone,  
 (one pickle, one slice of Swiss cheese, one slice of salami, one lollipop, one piece of  
 cheery pie, one sausage, one cupcake, and one slice of watermelon!)
25. That was a lot of food! How do you think the poor caterpillar feels now? <2secs>  
 open question  
 (That night he had a stomachache!)
26. I'm not surprised! <45secs> comment/statement
27. Which of these foods do you like to eat? <10secs> open question
28. Oh, he looks better on this page. <45secs> comment/statement
29. Do you now what this is? <45secs> closed question a leaf  
 (The next day was Sunday again. The caterpillar ate through one nice, green leaf, and  
 after that he felt much better)  
 (Now he wasn't hungry any more-and he wasn't a little caterpillar any more. He was a  
 big, fat caterpillar)  
 (He built a small house, called a cocoon, around himself. He stayed inside for more than  
 two weeks)  
 (Then he nibbled a hole in the cocoon, pushed his way out and.....)
30. What do you think happens to the caterpillar? <45 secs> open question  
 (He was a beautiful butterfly)
31. That is a pretty butterfly, it has lots of colors. <2 sec> Comment/statement  
 The End.

### **The Very Hungry Caterpillar Script 3**

N.B:

(-) = text from book

<-secs>=pause time

1. I brought a book to share with you today. <45 secs> comment/statement
2. It is about a caterpillar, have you ever seen a caterpillar? <2secs> closed question
3. This caterpillar has little legs (point to legs), and little hairs on its back (point to hairs)  
 and two eyes (point to eyes), can you show me your eyes? <45secs> closed question

4. hmm, the caterpillar in this story is very hungry. I wonder why that might be?

<10secs> open question

Let's read and find out.

(In the light of the moon a little egg lay on a leaf.)

6. There is the moon (point to moon) and there is the egg (point to egg). What is in the egg do you think? <10secs> open question

7. Oh look at that big sun. <2secs> comment/statement

(One Sunday morning the sun came up and –pop! Out of the egg came a tiny and very hungry (point to caterpillar)...

8. <10secs> closed question ...caterpillar.

9. I wonder where he is going? <2secs> open question

10. Oh, what do you think he is doing here? <45secs> open question

(He started to look for some food.)

11. He must be hungry. <10secs> comment/statement

12. Do you know what this is (point to apple?) <45secs> closed question

(On Monday he ate through one apple. But he was still hungry.)

14. These are pears, do you like pears? <10secs> closed question

15. What other fruit do you like to eat? <10secs> open question

(On Tuesday he ate through two pears but he was still hungry.)

(On Wednesday he ate through three plums, but he was still hungry.)

16. Wow, he is eating a lot of food for such a small caterpillar. <2secs>

comment/statement

18. Oh Yum, these are my favorite, strawberries. <45secs> comment/statement

(On Thursday he ate through four strawberries, but he was still hungry).

(On Friday he ate through five oranges, but he was still.....)

19. <10secs> closed question hungry.

21. Can you count the oranges with me? One two.....<45secs> closed question 3,4,5

22. What do you think is going to happen now? <2secs> open question

23. Oh wow! Look at all this food! <10secs> comment/statement

(On Saturday he ate through one piece of chocolate cake, one (point to ice-cream))

24. <2secs> closed question ice-cream cone,

(one pickle, one slice of Swiss cheese, one slice of salami, one lollipop, one piece of cheery pie, one sausage, one cupcake, and one slice of watermelon!)

25. That was a lot of food! How do you think the poor caterpillar feels now? <45secs>

open question

(That night he had a stomachache!)

26. I'm not surprised! <45secs> comment/statement

27. Which of these foods do you like to eat? <2secs> open question

28. Oh, he looks better on this page. <10secs> comment/statement

29. Do you now what this is? <2secs> closed question a leaf

(The next day was Sunday again. The caterpillar ate through one nice, green leaf, and after that he felt much better)

(Now he wasn't hungry any more-and he wasn't a little caterpillar any more. He was a big, fat caterpillar)

(He built a small house, called a cocoon, around himself. He stayed inside for more than two weeks)

(Then he nibbled a hole in the cocoon, pushed his way out and....)

30. What do you think happens to the caterpillar? <45 secs> open question

(He was a beautiful butterfly)

31. That is a pretty butterfly, it has lots of colors. <2 sec> Comment/statement

The End.

### Whale book script 1

N.B:

(-) = text from book

<-secs>=pause time

1. I've brought a book to show you today. <2 sec> comment/statement

2. It's all about whales. <10 sec> comment/statement

3. Whales are big aren't they? <45 sec> closed question

4. Have you ever seen a whale? <2 sec> closed question

5. This whale has big wrinkles. <10 sec> comment/statement

6. A it's eye (point to eye). <45 sec> comment/statement

7. Let's read. <2 sec> comment/statement

8. Can you find the whales eye? <10 sec> open question

(The eye of a humpback whale is as big as a diner plate and its pupil is as big as an orange.)

9. Wow that's this big (hold up hands and show). <2 sec> comment/statement

10. Is your eye big like a whales? <10 sec> closed question

11. Oh, what do you see here? <45sec> open question

12. It looks like he's taking photos of it. <10 sec> comment/statement

13. Can you tell me about when you go swimming? <10 sec> open question

(We usually hold our breath to go underwater and photo-graph a whale. The whale has to help by being willing to stay near us. They are better swimmers than we are.)

14. Wow, I think it would be scary to be so close to a big whale! <45 sec>

comment/statement

(This humpback whale is singing into our underwater microphone. These whales sing the longest and most complex songs of any animal. Songs may be 10-20 minutes long.)

15. I didn't know whales sing-what do you think about that? <45sec> open question

16. Oh this whale looks different. Why is that? <2 sec> open question

(With their snow white skin and thick blubber, Belugas are well adapted to their life near northern ice. In the Canadian artic, one Beluga came up to look at me. Then left and returned with about 35 friends. Good thing they're so friendly looking!)

(Smaller and sleeker than the other great whales, Minkes are about 8m long and weigh 6 to 8 tons. Minkes are fast swimmers and eat a variety of foods. They are one of the few species still being hunted.)

17. Oh, wow, look at all the different types of whales on this page. <45 sec>

comment/statement

18. This picture shows how big they are-Can you find the biggest whale? <45sec> closed question

(Whales evolved from hoofed, meat-eating land animals. Their closet land relatives are hippos, cows, and deer. As whale adapted to life in the sea, their nostrils moved to the tops of their heads, they lost their hind limbs and their front limbs became flippers.)

19. Where are your hands? <10sec> closed question

20. This is this whales fins (point to fins) where are this whales fins (point to another whale)? <45 sec> closed question

21. Wow! What do you see here? <2 sec> open question

(A photograph taken from an airplane shows an 18-foot research boat and a much larger blue whale. These whales are the biggest animals on Earth. They are also the loudest, at times making calls that can be heard across and entire ocean.)

(In this whale pod, the big sperm whale on the left is a male that has been away from the others for years. The smaller ones are females and younger sperm whales. It looks like a family reunion!)

(A young blue whale weighs around 2 tons and is 7-8 meters long.)

22. Is that bigger than you? <2 sec> closed question

(For the seven to eight months it is nursing, its mother's rich milk will help it gain eight pounds per hour.)

23. Hmm I wonder what these pink things are..... <10sec> open question

(Krill are some of the most abundant animals in the ocean. They are a few inches long, are shaped like shrimp, and eat plants called algae. The biggest baleen whales eat krill.)

24. Oh what is this? (point to whales mouth). <2 sec> open question

(You can see the baleen in this humpback whales mouth.)

(Grey whales often feed by dragging their mouths along the ocean bottom. They suck up small animals in the mud and water, then spit out most of the muddy water.)

25. These whales look funny. What do you see? <45sec> open question

(Each whale's fluke, or tail, is distinctive. In fact, you can identify the whole species based on the shape of their flukes. Scientists can even identify some individual whales, such as humpbacks by their unique tails.)

26. Oh look, these people are touching the whale, have you ever touched a whale?

<10sec> closed question

(Grey whales were sometimes aggressive towards boats in the days when they were hunted. Today, they occasionally approach small boats with gentle intent, wanting to be touched by people. This is an experience these people will never forget.)

31. Can you find the whale's tail? <2 sec> closed question

(Where there are healthy oceans with lots of fish, krill, and other animals, you will find whales.)

The End

### Whale book script 2

N.B:

(-) = text from book

<-secs>=pause time

1. I've brought a book to show you today. <10 sec> comment/statement

2. It's all about whales. <45 sec> comment/statement



3. Whales are big aren't they? <10 sec> closed question
4. Have you ever seen a whale? <2 sec> closed question
5. This whale has big wrinkles. <2 sec> comment/statement
6. A it's eye (point to eye). <10 sec> comment/statement
7. Let's read. <45 sec> comment/statement
8. Can you find the whales eye? <2 sec> open question  
(The eye of a humpback whale is as big as a diner plate and its pupil is as big as an orange.)
9. Wow that's this big (hold up hands and show). <2 sec> comment/statement
10. Is your eye big like a whales? <45 sec> closed question
11. Oh, what do you see here? <10sec> open question
12. It looks like he's taking photos of it. <45 sec> comment/statement
13. Can you tell me about when you go swimming? <2 sec> open question  
(We usually hold our breath to go underwater and photo-graph a whale. The whale has to help by being willing to stay near us. They are better swimmers than we are.)
14. Wow, I think it would be scary to be so close to a big whale! <10 sec> comment/statement  
(This humpback whale is singing into our underwater microphone. These whales sing the longest and most complex songs of any animal. Songs may be 10-20 minutes long.)
15. I didn't know whales sing-what do you think about that? <10sec> open question
16. Oh this whale looks different. Why is that? <45 sec> open question  
(With their snow white skin and thick blubber, Belugas are well adapted to their life near northern ice. In the Canadian artic, one Beluga came up to look at me. Then left and returned with about 35 friends. Good thing they're so friendly looking!)  
(Smaller and sleeker than the other great whales, Minkes are about 8m long and weigh 6 to 8 tons. Minkes are fast swimmers and eat a variety of foods. They are one of the few species still being hunted.)
17. Oh, wow, look at all the different types of whales on this page. <2 sec> comment/statement
18. This picture shows how big they are-Can you find the biggest whale? <2sec> closed question  
(Whales evolved from hoofed, meat-eating land animals. Their closet land relatives are hippos, cows, and deer. As whale adapted to life in the sea, their nostrils moved to the tops of their heads, they lost their hind limbs and their front limbs became flippers.)
19. Where are your hands? <45sec> closed question
20. This is this whales fins (point to fins) where are this whales fins (point to another whale)? <10 sec> closed question
21. Wow! What do you see here? <45 sec> open question  
(A photograph taken from an airplane shows an 18-foot research boat and a much larger blue whale. These whales are the biggest animals on Earth. They are also the loudest, at times making calls that can be heard across and entire ocean.)  
(In this whale pod, the big sperm whale on the left is a male that has been away from the others for years. The smaller ones are females and younger sperm whales. It looks like a family reunion!)  
(A young blue whale weighs around 2 tons and is 7-8 meters long.)
22. Is that bigger than you? <10 sec> closed question



(For the seven to eight months it is nursing, its mother's rich milk will help it gain eight pounds per hour.)

23. Hmm I wonder what these pink things are.....<45sec> open question

(Krill are some of the most abundant animals in the ocean. They are a few inches long, are shaped like shrimp, and eat plants called algae. The biggest baleen whales eat krill.)

24. Oh what is this? (point to whales mouth). <10 sec> open question

(You can see the baleen in this humpback whales mouth.)

(Grey whales often feed by dragging their mouths along the ocean bottom. They suck up small animals in the mud and water, then spit out most of the muddy water.)

25. These whales look funny. What do you see? <2sec> open question

(Each whale's fluke, or tail, is distinctive. In fact, you can identify the whole species based on the shape of their flukes. Scientists can even identify some individual whales, such as humpbacks by their unique tails.)

26. Oh look, these people are touching the whale, have you ever touched a whale?

<2sec> closed question

(Grey whales were sometimes aggressive towards boats in the days when they were hunted. Today, they occasionally approach small boats with gentle intent, wanting to be touched by people. This is an experience these people will never forget.)

31. Can you find the whale's tail? <45 sec> closed question

(Where there are healthy oceans with lots of fish, krill, and other animals, you will find whales.)

The End

### Whale book script 3

N.B:

(-) = text from book

<-secs>=pause time

1. I've brought a book to show you today. 45 sec> comment/statement

2. It's all about whales. <2 sec> comment/statement

3. Whales are big aren't they? <10 sec> closed question

4. Have you ever seen a whale? <10 sec> closed question

5. This whale has big wrinkles. <45 sec> comment/statement

6. A it's eye (point to eye). <10 sec> comment/statement

7. Let's read. <2 sec> comment/statement

8. Can you find the whales eye? <45 sec> open question

(The eye of a humpback whale is as big as a diner plate and its pupil is as big as an orange.)

9. Wow that's this big (hold up hands and show). <10 sec> comment/statement

10. Is your eye big like a whales? <45 sec> closed question

11. Oh, what do you see here? <2sec> open question

12. It looks like he's taking photos of it. <2 sec> comment/statement

13. Can you tell me about when you go swimming? <45 sec> open question

(We usually hold our breath to go underwater and photo-graph a whale. The whale has to help by being willing to stay near us. They are better swimmers than we are.)

14. Wow, I think it would be scary to be so close to a big whale! <10 sec>

comment/statement

(This humpback whale is singing into our underwater microphone. These whales sing the longest and most complex songs of any animal. Songs may be 10-20 minutes long.)

15. I didn't know whales sing-what do you think about that? <2sec> open question

16. Oh this whale looks different. Why is that? <10 sec> open question

(With their snow white skin and thick blubber, Belugas are well adapted to their life near northern ice. In the Canadian arctic, one Beluga came up to look at me. Then left and returned with about 35 friends. Good thing they're so friendly looking!)

(Smaller and sleeker than the other great whales, Minkes are about 8m long and weigh 6 to 8 tons. Minkes are fast swimmers and eat a variety of foods. They are one of the few species still being hunted.)

17. Oh, wow, look at all the different types of whales on this page. <45 sec>

comment/statement

18. This picture shows how big they are-Can you find the biggest whale? <10sec> closed question

(Whales evolved from hoofed, meat-eating land animals. Their closet land relatives are hippos, cows, and deer. As whale adapted to life in the sea, their nostrils moved to the tops of their heads, they lost their hind limbs and their front limbs became flippers.)

19. Where are your hands? <2sec> closed question

20. This is this whales fins (point to fins) where are this whales fins (point to another whale)? <45 sec> closed question

21. Wow! What do you see here? <10 sec> open question

(A photograph taken from an airplane shows an 18-foot research boat and a much larger blue whale. These whales are the biggest animals on Earth. They are also the loudest, at times making calls that can be heard across an entire ocean.)

(In this whale pod, the big sperm whale on the left is a male that has been away from the others for years. The smaller ones are females and younger sperm whales. It looks like a family reunion!)

(A young blue whale weighs around 2 tons and is 7-8 meters long.)

22. Is that bigger than you? <2 sec> closed question

(For the seven to eight months it is nursing, its mother's rich milk will help it gain eight pounds per hour.)

23. Hmm I wonder what these pink things are.... <2sec> open question

(Krill are some of the most abundant animals in the ocean. They are a few inches long, are shaped like shrimp, and eat plants called algae. The biggest baleen whales eat krill.)

24. Oh what is this? (point to whales mouth). <45 sec> open question

(You can see the baleen in this humpback whales mouth.)

(Grey whales often feed by dragging their mouths along the ocean bottom. They suck up small animals in the mud and water, then spit out most of the muddy water.)

25. These whales look funny. What do you see? <10sec> open question

(Each whale's fluke, or tail, is distinctive. In fact, you can identify the whole species based on the shape of their flukes. Scientists can even identify some individual whales, such as humpbacks by their unique tails.)

26. Oh look, these people are touching the whale, have you ever touched a whale?

<45sec> closed question

(Grey whales were sometimes aggressive towards boats in the days when they were hunted. Today, they occasionally approach small boats with gentle intent, wanting to be touched by people. This is an experience these people will never forget.)

31. Can you find the whale's tail? <2 sec> closed question

(Where there are healthy oceans with lots of fish, krill, and other animals, you will find whales.)

The End

**Appendix E:** Summary Tables for the Participants.....

## Participant 1

Opportunity	Type	Response?	Mode	TIME TAKEN TO RESPOND	MLU	Conversational Act	Discourse Function
1	COM02	0	0	N/R	0	0	0
2	CQ10	0	0	N/R	0	0	0
3	CQ45	0	0	N/R	0	0	0
4	OQ10	0	0	N/R	0	0	0
5	OQ45	1	B	6.91	1	2A	C
6	COM45	1	B	1.26	1	2D	B
7	CQ02	0	0	N/R	0	0	0
8	OQ10	0	0	N/R	0	0	0
9	OQ02	0	0	N/R	0	0	0
10	COM45	1	B	11.32	1	2D	B
11	CQ10	1	B	5.78	1	2A	B
12	CQ45	1	D	1	1	2A	B
13	OQ45	1	B	14.28	2	2A	C
14	COM10	0	0	N/R	0	0	0
15	COM02	0	0	N/R	0	0	0
16	CQ45	0	0	N/R	0	0	0
17	CQ02	1	B	0	3	2B	B
18	OQ10	0	0	N/R	0	0	0
19	COM02	0	0	N/R	0	0	0
20	CQ10	1	B	7		2A	B
21	OQ02	0	0	N/R	0	0	0
22	COM10	0	0	N/R	0	0	0
23	OQ02	0	0	N/R	0	0	0
24	COM45	0	0	N/R	0	0	0
25	CQ02	0	0	N/R	0	0	0
26	OQ45	1	B	5.6	1	2A	B
27	COM10	0	0	N/R	0	0	0

## Participant 2

Opportunity	Type	Response?	Mode	TIME TAKEN TO RESPOND	MLU	Conversational Act	Discourse Function
1	COM45	0	0	N/R	0	0	0
2	CQ02	1	B	0.8	1	2A	B
3	CQ45	1	A	0.53	1	2B	B
4	OQ10	1	C	0.75	4	2A	B
5	OQ10	0	0	N/R	0	0	0
6	COM02	0	0	N/R	0	0	0
7	CQ10	1	B	1.1	1	2B	B
8	OQ02	0	0	N/R	0	0	0
9	OQ45	1	B	3.18	3	2A	C
10	COM10	1	B	4.25	1	1D	B
11	CQ45	1	B	2.95	1	2A	B
12	CQ10	1	B	1.47	1	2A	B
13	OQ10	1	B	1.37	1	2A	B
14	COM02	0	0	N/R	0	0	0
15	COM45	1	C	2.87	2	1E	B
16	CQ10	1	B	4.31	1	2A	B
17	CQ45	1	C	0	3	2B	B
18	OQ02	0	0	N/R	0	0	0
19	COM10	1	B	4.63	1	2E	C
20	CQ02	1	B	1	1	2A	B
21	OQ45	1	B	3.4	1	2A	B
22	COM45	1	B	4.43	1	2A	B
23	OQ02	1	A	0.58	3	2A	B
24	COM10	1	C	8.09	1	2D	B
25	CQ02	1	B	1.16	1	2A	B
26	OQ45	1	B	0.75	1	2A	B
27	COM02	1	C	0.7	1	1G	B

## Participant 3

Opportunity	Type	Response?	Mode	TIME TAKEN	MLU	Conversational Act	Discourse Function
1	COM10	0		N/R	0	0	0
2	CQ02	1	A	0	1	2A	B
3	CQ10	1	A	0.5	1	2B	B
4	OQ45	0	0	N/R	0	0	0
5	OQ02	1	B	1.31	1	2A	B
6	COM10	0	0	N/R	0	0	0
7	CQ45	1	B	2.91	1	1D	B
8	OQ10	0	0	N/R	0	0	0
9	OQ02	0	0	N/R	0	0	0
10	COM02	0	0	N/R	0	0	0
11	CQ45	1	B	21.43	1	2A	B
12	CQ02	1	A	0.37	1	2A	B
13	OQ10	1	B	0.56	1	2A	B
14	COM45	0	0	N/R	0	0	0
15	COM10	0	0	N/R	0	0	0
16	CQ02	0	0	N/R	0	0	0
17	CQ10	1	A	0	1	2B	B
18	OQ45	1	A	3.9	1	2A	B
19	COM02	0	0	N/R	0	0	0
20	CQ10	1	B	7.44	1	1D	B
21	OQ02	0	0	N/R	0	0	0
22	COM45	1	A	17.41	1	2E	B
23	OQ10	1	B	0.57	1	2A	B
24	COM45	0	0	N/R	0	0	0
25	CQ45	1	A	19.69	1	2A	B
26	OQ45	1	A	4.9	1	2A	B
27	COM02	1	A	0.6	1	2E	B

## Participant 4

Opportunity	Type	Response?	Mode	TIME TAKEN	MLU	Conversational Act	Discourse Function
1	COM02	0		N/R			
2	CQ10	1	B	1.57	3	2A	B
3	CQ45	1	B	0	1	2B	B
4	OQ10	0		N/R			
5	OQ45	1	B	4.12	1	2A	B
6	COM45	1	B	8.06	10	2E	D
7	CQ02	1	B	1	1	2E	B
8	OQ10	1	B	6	3	2E	B
9	OQ02	0		N/R			
10	COM45	1	B	1.41	5	2E	C
11	CQ10	1	B	1.9	5	2A	C
12	CQ45	1	C	0	1	2A	B
13	COM10	1	B	9.62	1	1E	C
14	COM02	1	B	2	1	1E	C
15	CQ45	1	A	4.59	1	2E	B
16	CQ02	1	A	0	5	2B	B
17	COM02	0		N/R			
18	OQ10	0		N/R			
19	CQ10	1	B	2.5	5	2E	B
20	OQ02	1	B	1.58	3	2A	C
21	COM10	0		N/R			
22	OQ02	1	B	1.63	1	2A	B
23	COM45	1	B	24.6	3	1D	C
24	CQ02	0		N/R			
25	OQ45	1	B	0.91	3	2A	B
26	COM10	1	B	0.78	3	2E	B
27							



Participant 5

Opportunity	Type	Response?	Mode	TIME TAKEN	MLU	Conversational Act	Discourse Function
1	COM02	0					
2	COM10	0					
3	CQ45	1	D	8.28	1	2A	B
4	CQ02	1	D	1.28	1	2A	B
5	COM10	1	D	5.84	1	2E	B
6	COM45	0					
7	COM02	0					
8	OQ10	1	A	0.84	1	2B	B
9	COM02	0					
10	CQ10	1	D	1.44	1	2A	B
11	OQ45	0					
12	COM10	0					
13	OQ10	1	D	8.47	1	2A	B
14	COM45	1	D	5.75	1	2E	B
15	OQ45	1	A	32.78	1	2A	B
16	OQ02	0					
17	COM45	1	A	7.1	1	2E	B
18	CQ45	1	A	1.21	1	2B	B
19	CQ10	1	A	4.25	1	2A	B
20	CQ45	1	A	1.63	1	2A	B
21	OQ02	0					
22	CQ02	0					
23	OQ10	0					
24	OQ02	0					
25	OQ45	0					
26	CQ10	1	D	1.78	1	2A	B
27	CQ02	1	A	1	1	2B	B

## Participant 6

	A	B	C	D	E	F	G	H
1	Opportunity	Type	Response?	Mode	TIME TAKEN	MLU	Conversational Act	Discourse Function
2	1	COM45	1	A	0.01	1	2E	B
3	2	CQ02	1	A	0	1	2A	B
4	3	CQ45	1	A	0	1	2B	B
5	4	OQ10	0					
6	5	OQ10	1	B	0.32	2	2A	B
7	6	COM02	0					
8	7	CQ10	1	B	2.25	1	2E	B
9	8	OQ02	0					
10	9	OQ45	1	B	1.53	1	2A	B
11	10	COM10	1	B	0	1	1G	B
12	11	CQ45	1	C	0	1	2A	B
13	12	CQ10	1	A	0	1	2A	B
14	13	OQ10	1	A	2.75	2	2A	B
15	14	COM02	0					
16	15	COM45	1	C	18.04	5	1E	B
17	16	CQ10	1	B	5.47	1	2E	B
18	17	CQ45	1	C	0	5	2B	B
19	18	OQ02	1	B	1	1	2A	B
20	19	COM10	1	C	5.06	1	2E	B
21	20	CQ02	0					
22	21	OQ45	1	B	0	1	2A	B
23	22	COM45	1	C	9.75	1	2E	B
24	23	OQ02	1	A	0	1	2A	B
25	24	COM10	1	C	1	1	2E	B
26	25	CQ02	1	C	0	1	2A	B
27	26	OQ45	1	B	0	1	2A	B
28	27	COM02	1	A	0	1	2E	B

## Participant 7

	A	B	C	D	E	F	G	H
1	Opportunity	Type	Response?	Mode	TIME TAKEN	MLU	Conversational Act	Discourse Function
2	1	COM10	0					
3	2	CQ02	1	A	0	1	2A	B
4	3	CQ10	1	A	0	1	2B	B
5	4	OQ45	1	B	3.06	1	2A	B
6	5	OQ02	0					
7	6	COM10	1	A	6.47	1	1G	B
8	7	CQ45	1	A	3.91	1	2A	B
9	8	OQ10	0					
10	9	OQ02	1	C	1.91	1	2A	B
11	10	COM02	0					
12	11	CQ45	1	C	6.5	1	2A	B
13	12	CQ02	1	C	0	1	2A	B
14	13	OQ10	1	A	1	1	2A	B
15	14	COM45	1	C	4.24	3	2E	B
16	15	COM10	0					
17	16	CQ02	1	B	2	1	2A	B
18	17	CQ10	1	C	0	5	2B	B
19	18	OQ45	0					
20	19	COM02	0					
21	20	CQ10	1	B	2.85	1	2A	B
22	21	OQ02	0					
23	22	COM45	1	C	20.07	3	2E	D
24	23	OQ10	1	A	0.9	1	2A	B
25	24	COM45	1	B	6.56	1	1D	D
26	25	CQ45	1	A	0	1	2A	B
27	26	OQ45	1	A	19.25	1	2A	D
28	27	COM02	1	A	0	1	2E	B

## Participant 8

Opportunity	Type	Response?	Mode	TIME TAKEN TO RESPOND	MLU	Conversational Act	Discourse Function
1	COM02	1	C	1.53	2	2E	B
2	CQ10	1	C	0	1	2A	B
3	CQ45	1	A	1	1	2B	B
4	OQ10	0					
5	OQ45	1	B	2.59	1	2A	D
6	COM45	1	B	2.59	1	2E	D
7	CQ02	1	B	0.59	1	2A	B
8	OQ10	0					
9	OQ02	0					
10	COM45	1	B,C	6.35	3	2E	C
11	CQ10	1	C	4	1	2A	B
12	CQ45	1	C	1	3	2A	C
13	OQ45	1	C	1.5	1	2A	B
14	COM10	1	B	6.47	1	2E	B
15	COM02	0					
16	CQ45	1	B	2	1	2A	B
17	CQ02	1	C	1	5	2B	B
18	OQ10	1	C	9	4	1E	B
19	COM02	0					
20	CQ10	1	C	3.18	1	2A	B
21	OQ02	0					
22	COM10	1	B	4.13	1	2E	C
23	OQ02	1	C	0	1	2A	B
24	COM45	1	C	6	21	1G	C
25	OQ45	1	B	0	1	2A	B
26	COM10	0					