Effects of Wait Time When Communicating with Children Who Have Sensory and Additional Disabilities

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Structured abstract: *Introduction:* This study utilized wait-time procedures to determine if they are effective in helping children with deafblindness or multiple disabilities that include a visual impairment communicate in their home. *Methods:* A single subject with an alternating treatment design was used for the study. Zero- to one-second wait time was utilized before prompting for a response during three baseline sessions. This was compared to 5-, 10-, and 15-second wait-time increments used during six intervention sessions. Three participants with visual impairments, developmental disabilities, and communication delays participated in the study. One of the participants was deafblind. *Results:* All three participants responded twice as often during intervention phases as in baseline sessions. The results showed that 5-, 10-, and 15-second wait times were effective when reciprocally communicating with children who have multiple disabilities with a visual impairment or deafblindness. *Discussion:* The findings of this study determined that wait time was effective and showed promising results for children with deafblindness or multiple disabilities. The study indicated that such children need time to process what is being asked in order to respond appropriately. Prompting quickly can frustrate the child with disabilities. Limitations of the study included heterogeneity and fragile medical condition of the participants, distractions, and the need for future research on the use of this technique. *Implications for practitioners:* By utilizing at least five seconds of wait time, parents and educators may be able to see an increase in appropriate responses from the child. Wait-time interventions could increase opportunities for learning, social interaction, and communication, and are easily implemented with little to no training.

For children with visual impairments and multiple disabilities, including individuals who are deafblind, developing meaningful and reliable communication skills with partners in their environments is a profound challenge. Everyone deserves the right to communicate, regardless of disability, and the capacity to connect with other people cannot be overstated (Hourcade, Pilotte, West, & Parette, 2004). Numerous studies have shown that in order for people with multiple disabilities to have the support they need to send and receive messages, they must have communication partners who are willing to listen and to wait for their responses (Duker, Van Doeselaar, & Verstraten, 1993; Lee, O'Shea, & Dykes, 1987; Lowry & Ross, 1975; Valcante, Roberson, Reid, & Wolking, 1989).

Broadly, it has also been found that special education teachers provide minimal wait time between the stimulus presentation and prompting for a response (Korinek, 1985). When this happens, children with multiple disabilities do not have enough time to process what is being asked in order to respond appropriately. Many studies have emphasized a lack of wait time as one component of the significant communication barriers that students with multiple disabilities, including those who are deafblind, face in inclusive settings specifically (Correa-Torres, 2008; Preisler, 1995; Sigafoos et al., 2008). Other studies show that when teachers and therapists provide insufficient wait time before prompting for a response or moving on to another task, they might be assuming that the student lacks the skill to respond appropriately (Lee et al., 1987). The combination of communication barriers and inconsistent wait time makes it very difficult for children with multiple disabilities, including deafblindness, to respond appropriately to requests.

Impact of multiple disabilities and deafblindness on communication

Deafblindness and multiple disabilities greatly impact all aspects of communication. In their review of single-subject studies from 1965 to 2006, Parker and colleagues found that appropriate communication interventions for this population was a central concern for special educators (Parker, Grimmett, & Summers, 2008). Communication skills are affected by sensory, motor, cognitive, and social capacities, and impairments in any of these developmental skill areas may interfere with communication development (Rowland, 2011). Learners with multiple disabilities demonstrate various abilities, but they share the need for extensive and ongoing supports in order to participate in home, school, and community activities (Siegel-Causey & Bashinski, 1997). The communications of others may not be accessible to children who are deafblind because of the use of different expressive forms. Deafblindness of any type or degree significantly alters the natural flow of interaction and information gathering for the infant or young child (Huebner, Prickett, Welch, & Joffee, 1995). The language and communicative environment that surrounds children who are deafblind must be consciously designed and supported (Miles & Riggio, 1999).

On the whole, children with disabilities have lower rates of intentional communication compared to children without disabilities. These low rates result in fewer opportunities for adults to respond and be able to shape communication development (MacCathren, 2000). Children with deafblindness also have extremely low rates of expressive communication, and most of their communication is entirely in response to adult cues (Rowland, 1990). Because many children with multiple disabilities have either impaired vision or restricted gross motor movement that interferes with establishing eye contact or even looking toward their communication partners, they often miss out on one of the most intentional communication behaviors: eye contact (Bruce & Vargas, 2007). This altered ability to make eye contact increases the risks that these children face in missing genuine opportunities to communicate.

The purpose of this study was to measure the effectiveness of time-delay procedures in increasing communication opportunities for children with multiple disabilities, including deafblindness, in their home. Effectiveness was measured by documenting communication responses with three different wait times before prompting occurs.

Time delay for students with multiple disabilities and deafblindness

Over the past years, there has been a substantial amount of literature supporting the use of wait-time and constant time-delay procedures in special education settings. Many studies have compared brief and extended wait time on the performance of individuals with profound cognitive disabilities (Duker et al., 1993; Lee et al., 1987; Lowry & Ross, 1975; Valcante et al., 1989). That research reported that children with profound cognitive disabilities will more accurately respond with extended wait time. Constant time delay has been shown to be effective in teaching students of various ages with various disabilities (Daugherty, Grisham-Brown, & Hemmeter, 2001).

A few of those studies included successfully teaching sight words to students with severe intellectual disabilities (Schuster, Stevens, & Doak, 1990); response to strangers by preschool children with developmental delays (Gast, Collins, Wolery, & Jones, 1993); teaching domestic and vocational "chained tasks" (in which a number of related tasks are combined into a "task chain" that groups the set of tasks into a single unit) to students with severe intellectual disabilities (Wolery, Ault, Gast, Doyle & Griffen, 1991); teaching snack and drink preparation skills to children with cognitive disabilities (Bozkurt & Gursel, 2005); teaching fine motor skills in daily living and safety activities in a task-analyzed manner that breaks a skill into smaller, manageable steps to individuals with severe intellectual disabilities (Schuster, Gast, Wolery, & Guiltinan, 1988; Winterling, Gast, Wolery, & Farmer, 1992); teaching task-analyzed gross motor skills (Zhang, Horvat, & Gast, 1994); and sight word reading by Hispanic learners with an intellectual disability (Rohena, Jitendra, & Browder, 2002).

Methods

The study presented here was intended to investigate the research question: Are wait-time procedures effective in helping children with multiple disabilities or deafblindness communicate in their homes? A single-subject with an alternating treatment design was used to conduct this study. Three sessions were conducted to obtain reliable baseline data, then three treatment conditions were counterbalanced randomly within sessions. Utilizing this design allowed for systematic replications of experimental effects within and across subjects (Valcante et al., 1989). The Institutional Review Board of Texas Tech University approved this research, and informed consent was obtained from parents and respondents before data were collected.

The independent variable in this study was the wait-time increments used in each of the intervention sessions. Time increments consisted of 5, 10, and 15 seconds of wait time. *Wait time* was defined as the time increment during which the communication partner allowed the student to respond before giving a physical or verbal prompt. The dependent variable in this study was the child's number of responses for each time increment during intervention sessions.

Participants

The following criteria were used in selecting the participants. Participants were identified as having visual impairment by ophthalmologist diagnoses as well as in their individualized educational programs (IEPs); participants were recorded as having multiple disabilities, including deafblindness, by the Bureau of Blindness and Visual Impairments (BBVS). All of the children in the study were identified as having communication difficulties, as identified in their IEPs, and were under the age of 11 through the duration of the study. Three children (two girls and one boy) with visual impairments, developmental disabilities, and communication delays participated in this study. Before this intervention began, signed consent from parents was obtained as well as assent from the students participating in the study. After the children were selected, the researcher met with the parents via phone or face to face to discuss the study in depth and answer questions. Interviews were then conducted with parents or caregivers to determine communication needs and goals as well as to gather more in-depth information about the child.

The names of the participants are pseudonyms. Participant 1 (Jennifer) was diagnosed as having mitochondrial disorder. She experienced seizures and developmental delays. She was also diagnosed with cortical visual impairment and hyperopia. Participant 2 (Joseph) had a diagnosis of cerebral palsy, seizure disorder, and septo-optic dysplasia. Participant 3 (Amanda) was deafblind and had a diagnosis of congenital anomalies, bilateral retinal colobomas, optic nerve scarring, and bilateral sensorineural hearing loss. She had to hold her head within two inches of objects to identify them and objects needed to have good contrast in order for her to discriminate one item from another.

Collection of baseline data

Baseline data was collected over three 10-minute sessions. In baseline sessions, the researcher asked the child to perform a task, then allowed a zero- to one-second wait time before verbally and physically prompting. Tasks included activating a cause-and-effect toy, finding a family member's picture, writing numbers and letters, and shaking a rattle. This determined their level of engagement and ability to process what was being asked in order to physically respond. The researcher ensured the child knew what the object was by utilizing visual, auditory, and tactual senses before starting baseline prompting. The task asked of the child was conformed to fit the individual likes, dislikes, and capabilities that were determined through the parent interview. During the interview, the parent identified two preferred objects, and these objects were used during all baseline and intervention sessions.

Each of the three participants utilized a different stimulus in an area that was comfortable to them. The stimulus was determined during the parent interview. Each parent identified items that were of interest to their child. During sessions for participant 1 (Jennifer), her mother and younger sister were also home. Jennifer's mother watched the sessions but remained out of view so as not to distract her. During two of the baseline sessions, the researcher utilized black-and-white pictures of family members that Jennifer enjoyed and she was asked to point to a particular family member. For the third baseline session, a musical cause-and-effect toy that Jennifer liked was used. She was asked to "turn it on" or "play music."

Throughout sessions for participant 2 (Joseph), his mother, brother, and sister were in the home. During two of Joseph's baseline sessions, a light-up musical switch was utilized, and for the third baseline session, a rattle was used. Joseph was asked to "turn it on" or "get the rattle." Items were changed during baseline sessions for Jennifer and Joseph because they needed new stimulation to stay engaged with the activity and to not become satiated with one object.

For participant 3 (Amanda), her mother, father, and sister were home for all of the sessions. Amanda's iPad was used during baseline sessions. She was asked to write specific numbers or letters on a program on her iPad. Amanda was shown cards with the letter or number written on them, and they were also given to her in sign language. She utilized the iPad both in school and at home for work and for pleasure. The participants' actions during baseline demonstrated whether they were processing what was asked of them and if they were able to respond.

Intervention phases

Observations and interventions occurred in the child's home environment. During these sessions, intervention strategies using 5-, 10-, and 15-second wait times occurred. Using wait-time increments determined if the child was more likely to complete the task if his communication partner waited before giving either a verbal or physical prompt. If the child did not complete the task during the specified amount of wait time, verbal or physical prompting occurred, the task was requested again, and the wait time continued. If the child did respond during the specified amount of wait time, they were verbally praised and the task was requested again. This sequence continued for 10 trials of each wait time for a total of 30 trials.

An example of this protocol would resemble the following. Present two photos to the child and ask, "Where is Mommy?" If the child correctly responds within the allotted wait time, praise the child. Immediately following the praise, prompt the child again, "Where is Mommy?" and initiate wait time. If the child does not respond correctly, say "No, that's not Mommy, this is Mommy," and show the child the correct picture using modeling or hand under hand; then prompt again and initiate wait time. If the child does not respond at all within the wait time, physically or verbally prompt again and initiate the wait time determined.

Throughout this intervention, the child had 10 trials for each time increment during each of the six sessions. All six intervention sessions were approximately 10 minutes in length. Sessions were kept short so as not stress or tire the child.

Parents or caregivers were shown videotapes after interventions occurred to show them how and if wait time helped their child communicate. After intervention sessions, a plan was developed to show parents how wait time aided their child in reciprocal communication and how they could be active communication partners. The plans were given to parents and offered to the students' IEP team members.

Data collection procedures

The researcher (the first author) in the study was in the home of the child to collect data a total of nine times. Intervention sessions were videotaped and adjusted to meet the needs of the participants as well as their families to ensure they were most alert and not disrupted by the study. Data were collected once weekly for the six weeks of interventions and coded through diagnostic video analysis. If the student became distressed during the intervention sessions, the researcher attempted to redirect the behavior by distracting the child or giving the child a break. If this did not work, the intervention session ended and was completed at a different time that week.

The researcher and an independent observer coded the number of responses during the allotted amount of wait time. The independent observer was trained on coding wait time prior to the sessions and by meeting with the researcher to review forms and watching practice videos from a previous pilot study to determine responses. The practice videos were similar in that they included various wait times and tasks similar to the ones used in the study. The researcher coded all of the videos and the independent observer coded 50% of all intervention sessions. Agreement between the observers was counted when both observers documented the same response within each time frame. Observers documented whether the child responded during each increment of wait time. Percentage of agreement was calculated at the end of each session by dividing agreements by the total number of observations times one hundred, resulting in more than 90% agreement for all three participants.

Results

The research question provided a framework for determining whether or not the participants were more likely to communicate and respond to what was being asked when utilizing time-delay procedures. Responses were measured by the number of independent responses after a verbal or physical prompt was given, out of the total number of 10 trials for each wait time for each intervention session. Initially, either a verbal or physical prompt was given, then the specific wait time was allotted before prompting occurred again. All three participants showed that they were able to complete tasks at a much higher rate when wait time was being utilized before verbal or physical prompting. During baseline phase, the participants all seemed uninterested in the activities that parents had indicated were enjoyable to them. Throughout the intervention phases, they demonstrated much more enjoyment and interest in what was being asked. These results showed that when wait-time procedures were utilized, children with multiple disabilities including deafblindness may be more likely to listen and respond to what is being asked of them in their home. They all showed an increase in their auditory processing and responses.

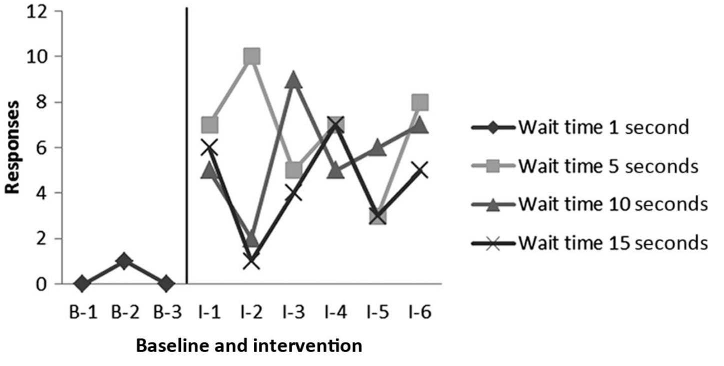

Figure 1. Jennifer—Wait-time results.

Jennifer

Jennifer was shown the stimulus, then prompting would occur within zero to one second after Jennifer was asked to complete a task such as being asked to "turn on" the cause-and-effect toy or "find Mommy" in a group of pictures. Prompting consisted of taking her hand and saying, "This is Mommy" or repeating, "Jennifer, find Mommy." She was originally engaged, but after the quick and constant prompting started, she showed that she was not interested in the activities by pulling her hand back and looking away. Jennifer appeared to become irritated with all of the prompting during baseline sessions. Jennifer only responded 3% of the time throughout the 30 baseline sessions.

Throughout the six intervention sessions, Jennifer was engaged visually and tactually. Prompting occurred at the end of the allotted wait time if Jennifer did not respond. Across all six intervention sessions of sixty trials for each wait time, Jennifer responded 66% of the time during the five-second wait times, 56% of the time during the 10-second wait times, and 40% of the time during the 15-second wait times. The intervention days when 10 or 15 seconds were needed corresponded to days she seemed tired or had had seizures earlier in the day. Overall, Jennifer needed five seconds or less to process what was being asked to be able to complete the task, but any amount of wait time showed more engagement visually and tactually than in baseline sessions (see Figure 1).

Joseph

During all baseline sessions when Joseph was asked to "turn on the music" or "get the rattle," he would briefly smile but was not visually or physically engaged and would not explore objects presented to him. Joseph only responded 6% of the time during baseline trials. Throughout the six intervention sessions, Joseph was very much engaged. He would often look away after being asked to complete a task, then come back and reach toward the object. Joseph showed, throughout the sessions, that it took him awhile to focus his vision and process what was being asked. During all intervention sessions, Joseph responded 66% of the time during the five-second wait times, 53% during the 10-second wait times, and 48% throughout the 15-second wait times. Joseph consistently showed that he needed at least five seconds or less to process

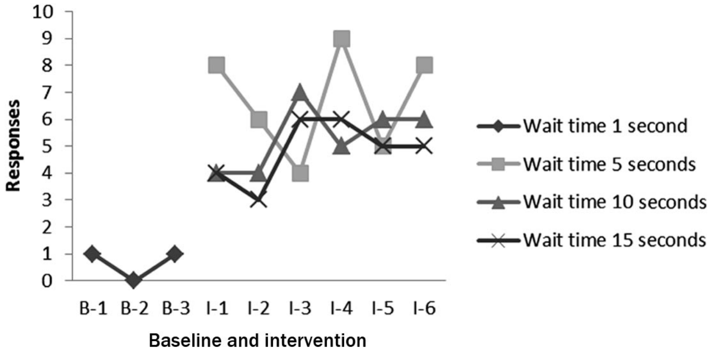

Figure 2. Joseph—Wait-time results.

what was being asked of him and respond. The days that Joseph needed more wait time corresponded with days that he had experienced seizures. Joseph showed more visual engagement with activities during intervention sessions as compared to baseline phases (see Figure 2).

Amanda

In the beginning of each baseline session, Amanda seemed engaged by the writing of letters and numbers on the iPad, but quickly got frustrated with the immediate verbal and physical prompting. She looked at the iPad and seemed to want to write the letters on her own, but did not have enough time before hand-over-hand prompting occurred. In the second baseline session, Amanda pulled her hand away and threw the iPad in frustration with all of the verbal and physical prompting. Amanda responded 6% of the time throughout baseline trials.

Throughout the intervention sessions, it took time for Amanda to understand and become engaged in the activity. Once she was focused on the activity, she remained physically and visually engaged in it for each wait time. Amanda responded 43% of the time during the five-second wait times, 31% during the 10-second wait times, and 63% during the 15-second wait times. She showed that she responded best during longer wait times. Throughout the sessions, she looked away from the activities for many seconds, then would pay attention and complete the task. Amanda showed that she needed more wait time than the other two participants to process what was being asked of her. Overall, she showed more engagement during intervention sessions than in baseline sessions (see Figure 3).

The plan given to the parents included a graph of how their child responded during each wait-time increment compared to during baseline phases. It included a written document that explained which increment of wait time the child responded to most often and how the parent could implement wait-time procedures in the home.

Social validity

Social validity was determined for both the participants and their families in this study. In examining social validity for the child's family, the researcher interviewed parents or caregivers to determine if wait-time procedures helped them communicate with their child. In

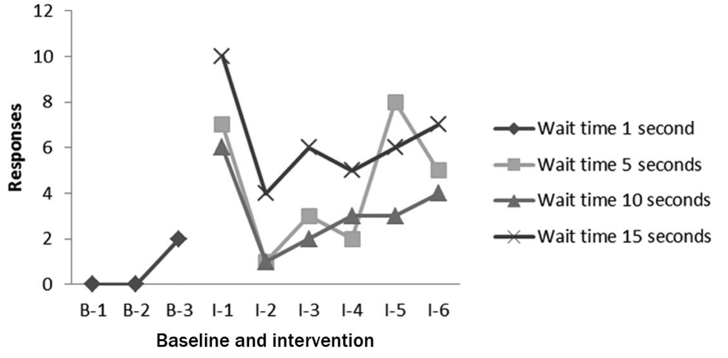

Figure 3. Amanda—Wait-time results.

response to the questions of whether their child increased their responses to them, all parents reported that they were better able to communicate with their child when utilizing wait time, and that they saw an increase in their child's responses to them. Two families requested that training be given to school staff members to encourage generalization from home to school. All three families reported that they were continuing to utilize wait-time procedures after the intervention sessions ended. Social validity was determined for participants by comparing their level of responses from baseline to intervention phases. Participants responded to their communication partners at a much higher rate during intervention phases than during baseline.

Limitations of the study

Several limitations of this study were acknowledged. The three children were a heterogeneous group. It was impossible to find three children with low-incidence disabilities including sensory impairment that exhibit the same visual acuities, hearing etiologies, and cognitive and communication delays. The heterogeneity of the group limited how the findings of this study can be applied to other children whose vision and disability status and educational or home settings differ significantly from the participants of this research.

A second limitation was the fragile medical conditions of students with multiple disabilities. Frequent changes in medications for participants, due to newly identified medical conditions, affected their responses during sessions. The amount of wait time needed on certain days seemed to correspond with the students' fragile medical conditions, which included seizures. It is suggested that further research be conducted to determine the correlation between wait time and seizures. A third limitation was distractions in the home environment. Although all the families were very accommodating of the need for quiet during the sessions, noises made by siblings in all three of the households easily distracted the participants.

Finally, this study would show more external validity if there were similar studies using wait-time techniques with low-incidence populations. Future studies are needed to support or contradict this study's findings.

Suggestions and adaptations for future research

The results in this study indicated that wait-time procedures may be effective in helping children with deafblindness or multiple disabilities communicate, and in aiding parents in becoming active communication partners. The study also revealed a number of questions to be addressed in future research.

The greatest need for future research is the need for further replication of wait-time procedures among children with low-incidence disabilities in the home environment. Although wait time is an established practice in special education, there is a need to examine the effects of these procedures on children who have dual sensory impairments or who have multiple disabilities. It is also important for these replications to be done in the home environment because children act differently in their home setting then in a clinical or school setting. Systematic replication will provide data on the effectiveness of the intervention for the same or similar populations.

A question to address in future research is, How much wait time is too long for the participants? It is important to know how much wait time is too long, so that the communication partner knows the participant is still actively engaged.

Conclusion

The goal of this study was to determine if wait-time interventions would be useful tools in aiding children with multiple disabilities or deafblindness to communicate in their home. The premise for this intervention involved systematically providing participants with more opportunities to demonstrate intentional communication and responses. The intentional measurement of participant responses to different increments of wait time, as well as setting the intervention in the student's natural routine in their home environments, were part of the intervention. According to the results, all three children increased their intentional communication during intervention sessions, which was verified by parents as well as through interobserver agreement.

Although it may intuitively seem that wait time is an essential part of working with students who are deafblind or with those who have multiple disabilities and visual impairments, it is important that known practice be supported by intervention research. Significantly, each of the participant's families continued to utilize wait-time and time-delay procedures to promote generalization of the intervention and to encourage an increase in intentional communication development. As many scholars have noted, interventions that involve parents in natural environments are even more essential for this population (Erickson, Hatton, Roy, Fox, & Renne, 2007). As part of a follow-up program to this research, classroom teachers and other professionals in the school setting were trained to use wait-time interventions by the parents of the participants of the study presented here, and two staff members at the particpants' school began utilizing the intervention and saw positive results.

Finally, the findings from this study created a basis for further research for participants with low-incidence disabilities. The outcomes further support the effectiveness of utilizing wait-time procedures in special education settings. Additionally, the study suggested that the use of wait-time procedures could increase intentional communication and aid parents or caregivers or both in becoming active communication partners. Wait-time procedures required little to no training and can be conducted by anyone. This type of strategy, as a single intervention or as a component of other communication interventions, has the potential to increase social, learning, and communication opportunities in the home environment for children with dual sensory impairments or multiple disabilities. Perhaps through its simplicity, it can also support more individuals with deafblindness or those with visual impairments and multiple disabilities to have more opportunities to share their voices with those in their lives.

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