Perspectives of the ASHA Special Interest Groups
SIG 12, Vol. 3(Part 3), 2018, Copyright © 2018 American Speech-Language-Hearing Association

"What Have You Been Doing?": Supporting Displaced Talk Through Augmentative and Alternative Communication Video Visual Scene Display Technology

Jessica Caron

Department of Communication Sciences and Disorders, The Pennsylvania State University
State College, PA

Christine Holyfield

Department of Rehabilitation, Human Resources and Communication Disorders,
University of Arkansas
Fayetteville, AR

Janice Light

Department of Communication Sciences and Disorders, The Pennsylvania State University
State College, PA

David McNaughton

Department of Educational Psychology, Counseling, and Special Education,
The Pennsylvania State University
State College, PA

Disclosures
Financial: Jessica Caron has no relevant financial interests to disclose. Christine Holyfield has no relevant financial interests to disclose. Janice Light has no relevant financial interests to disclose. David McNaughton has no relevant financial interests to disclose.
Nonfinancial: Jessica Caron has no relevant nonfinancial interests to disclose. Christine Holyfield has no relevant nonfinancial interests to disclose. Janice Light has no relevant nonfinancial interests to disclose. David McNaughton has no relevant nonfinancial interests to disclose.

Purpose**:** *Displaced talk, or talk about past or future events, is a common form of interaction for social closeness. Some school-age children with autism spectrum disorder are restricted in their use of displaced talk and, in turn, are restricted in their participation in social interaction. The purpose of the study was to preliminarily explore the use of an augmentative and alternative communication app with video embedded with visual scene displays (VSDs) to support participation in displaced talk surrounding the common question, "What have you been doing?"*

Method**:** *The study utilized an AB single-case design.*

Results**:** *The preliminary nature of the study did not allow for a conclusive causal finding, but the findings provided initial insight into the potential utility of the video VSD technology to support participation in displaced talk for an individual with autism spectrum disorder. At baseline, the participant seldom engaged in the communicative interactions; once the video VSD technology was introduced during intervention, he took significantly more communication turns and was more engaged during the sharing interactions.*

Conclusions**:** *More research is warranted to rigorously explore the efficacy of augmentative and alternative communication technology featuring videos with embedded VSDs as a communication support. The technology shows promise as a support for social interaction, particularly interaction involving displaced talk about past experiences.*

Mother: “What have you been doing?”

Daughter (10 yo): “Listening to music. And having dreams—weird dreams.”

—A morning conversation between a mother and daughter

Children share their personal experiences as part of their daily lives (Westby & Culatta, 2016). At school, they share with peers and school professionals something that happened earlier that day or over their weekend. At home, children share with their parents and siblings what happened at school or what plans they and a friend have made.

Such sharing may not necessarily contain vital information to be transferred. Rather, the sharing of personal experiences—from the routine to the extraordinary—serves to promote social closeness (Light, 1988). That is, children share past and future happenings to establish, maintain, and develop social relationships (Light, 1988). In the case of school-age children, much of this sharing occurs from student to parent, from student to student, or from student to school professional (e.g., teacher). Often, children participate in displaced talk by responding to adults’ (e.g., mothers’) questions about past or future events (Marvin & Cline, 2010; Wanska & Bedrosian, 1986).

Sharing past or future events—referred to throughout the remainder of the article as *displaced talk*—is a language skill that typically emerges during the second year of life and continues to evolve, with major gains in the complexity and frequency of its use occurring during the school years (Adamson & Bakeman, 2006). The developmental course of displaced talk is not entirely clear; however, its development likely begins during interactions toddlers have with adults about specific contexts (Adamson & Bakeman, 2006).

Some school-age individuals with autism spectrum disorder (ASD), however, are in the early stages of language development; that is, they are beginning communicators (Reichle, Beukelman, & Light, 2002). Beginning communicators have yet to develop the skills to engage in displaced talk, and their use of language in many ways is bound to the here and now (i.e., the current context; Adamson & Bakeman, 2006; Light, Parsons, & Drager, 2002; Siegel & Cress, 2002). The following examples illustrate the distinction between contextually bound talk and displaced talk: A school-age beginning communicator with ASD who points to the swing and signs swing on the playground to ask for a push is demonstrating contextually bound talk, whereas a student who shows her teacher her scraped knee from a fall off the swing over the weekend and signs swing and fall down is using displaced talk to share her past experience.

There are several reasons why beginning communicators with ASD may struggle with displaced talk. First, it may be the case that the beginning communicator has not yet developed strong symbolic schema of displaced events, people, and items; individuals for whom this is the case would need the context in front of them to communicate about it (Siegel & Cress, 2002). In addition, even if a beginning communicator with ASD does have these internal symbolic representations, they may not have access to a modality to communicate about past experiences; for beginning communicators with ASD who communicate primarily through gestures or leading an individual to an item or activity, aspects of the current context are the only options toward which the communicator can gesture or lead.

For school-age individuals, this struggle with displaced talk likely restricts participation in social interaction throughout the school day. Not only does this likely have a negative impact on quality of life but it also it severely limits the opportunities these students have for developing social relationships with others and for developing their social interaction skills through experience and practice. This is especially problematic for students with ASD for whom social communication is a hallmark impairment (American Psychiatric Association, 2013).

Research provides emerging evidence that augmentative and alternative communication (AAC) intervention (both technology and teaching) is effective in supporting social interaction and communication for the function of social closeness in school-age individuals with ASD (Ganz et al., 2012; Holyfield, Drager, Kremkow, & Light, 2017). For instance, Trottier, Kamp, and Mirenda (2011) found AAC intervention was effective to support two students with ASD in interacting socially with their peers while playing board games. Kravits, Kamps, Kemmerer, and Potucek (2002) found that AAC intervention promoted longer social interactions between a student with ASD and her peers in one classroom setting. Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002) found AAC intervention supported social communication behaviors in two school-age boys with ASD during play with an interventionist.

However, no intervention research published to date has evaluated the effect of AAC on displaced talk about experiences with school-age beginning communicators with ASD. In fact, the authors found no AAC intervention research targeting the use of displaced talk in beginning communicators of any demographic. Although there is no research currently that evaluates the effects of AAC technologies on displaced talk in beginning communicators with ASD, there is reason to believe that some AAC technologies could provide effective supports for displaced talk, at least in theory. In general, AAC technology may be uniquely poised to support social interaction around displaced talk given the visual supports it provides.

Visual scene displays (VSDs), or photos depicting people within life events, are a favorable AAC organizational option for beginning communicators with ASD (Light & Drager, 2007; Shane, 2006). These photos create a shared context around which a beginning communicator and a communication partner can interact. This contextual support is particularly powerful for beginning communicators whose expression may be limited to the contexts of their interactions. Empirically, VSDs have been found to support expressive communication in school-age beginning communicators with intellectual and developmental disabilities, including ASD (Holyfield, Caron, Drager, & Light, 2017). Despite their benefits, VSDs depict just static snapshots of events. However, people experience these events dynamically. So, although VSDs provide a great deal of context for beginning communicators, there are limitations to the amount of context they provide.

One solution for further increasing the contextual nature of AAC devices in supporting displaced talk is to utilize video technology. Unlike still photos, a video can capture the dynamic nature of events and can therefore replay a past event vividly and precisely. For a communication partner, this relays the context of the interaction in a comprehensive way, perhaps second only to being present for the event. For the beginning communicator, this replaying could assist in the retrieval of the event memory and the rehearsal of the event in working memory—providing support for potentially challenging cognitive tasks for children with ASD (Thistle & Wilkinson, 2013). In this way, a video can make the past event being shared less “displaced” and, therefore, more accessible for beginning communicators to relay. In addition, the transparency of a video could make it a highly salient representation option for beginning communicators. Finally, a video is a highly engaging informational and social medium viewed frequently by individuals across the globe (e.g., on the Internet, through the television).

However, although some AAC technologies currently support videos, the beginning communicator is limited to passive viewing of the video. Current AAC technologies do not infuse communication supports into videos of past events.

Light, McNaughton, and Jakobs (2014) conceptualized the harnessing of video technology as AAC by infusing communication supports into videos. Specifically, they proposed designing AAC technologies so that the video could be paused at any point to create a still image in the video as a VSD that could be programmed with hotspots containing voice output.

One mobile technology application (app), EasyVSD (Invotek, 2018), features video VSDs and allows for the capturing or importing of a video directly into an AAC app. That video can be paused at any point(s). When it is paused, the still on the screen is treated as a VSD onto which vocabulary can be programmed to support communication. For instance, if a child with ASD goes to a friend’s pool party, the child’s parent could take a video of him or her going down the slide. Then, the parent could pause the video when the child is part way down the slide, draw a hotspot around the child, and record his or her voice to program the hotspot to say, "Whee!" The parent could resume playing the video, pause it again when the child is entering the water, draw a hotspot around the splash, and program it to say, "Splash!" Although, in theory, it seems that AAC technology with video VSDs should support displaced talk about past experiences by beginning communicators, to date, there has been no research to explore the effects of this technology.

Goals of the Case Study

Given the lack of research to date, the current case study served as an initial exploration of the effect of an app featuring a video embedded with VSDs as an AAC support for displaced talk (i.e., sharing past experiences) for a school-age beginning communicator with ASD. Specifically, the current study asked the following questions: (a) Does the video VSD technology (accompanied by a brief, initial training) impact the frequency of communication turns expressed by a school-age student with ASD during a 5-min interaction with an interventionist focused on his sharing his past experiences? (b) Does any change in communication turn frequency maintain over time? (c) Does any change in communication turn frequency generalize to a different adult communication partner? (d) Does the technology impact the students' level of engagement during these interactions?

Given the case study design, there was a lack of experimental control that precluded definitive answers to these questions. However, the study provides important preliminary information about the potential effectiveness of this innovative technology option for supporting displaced talk in school-age individuals with ASD who are beginning communicators.

Method

Design

For this pilot study, a single-case, AB design was used to explore the effects of an AAC app on a Samsung tablet, Version 1.53 (that included speech output and video VSDs) on the number of communication turns taken by a school-age student with ASD during a 5-min sharing opportunity with an adult partner. The AB design is considered a preexperimental design because it does not sufficiently control for many threats to internal validity (e.g., history, maturation), yet the design can provide preliminary objective data regarding the effects of an intervention (Kazdin, 2011). The design consisted of two main phases: Phase A (baseline) and Phase B (intervention). Following a stable baseline over a minimum of five sessions, the app was introduced with one session per week over 6 consecutive weeks. Effects were measured during 5-min sharing interactions at baseline and intervention; effects were also measured across an additional partner, participant's teacher, to assess generalization. Finally, effects were measured 3 months after intervention concluded to observe maintenance.

Participant

This study was approved by The Pennsylvania State University's Internal Review Board, and the intervention was implemented by the first author. Individuals were eligible for inclusion if they (a) were diagnosed with ASD, (b) were at least 5 years of age, (c) presented with speech that did not meet all of their daily communication needs, (d) followed one-step directions, (e) were beginning communicators with use of at least 10 words/signs/aided AAC symbols expressively, (f) experienced difficulty participating in displaced talk, (g) lived in homes in which English was the first language, and (h) demonstrated unimpaired or corrected vision and hearing within normal limits per Individualized Education Program or parental/teacher report. Charlie, the participant selected for study participation, met all inclusionary criteria.

At the start of the study, Charlie was 9 years old. He attended a charter school for 5 hr a day. At the charter school, he received 1:1 services from behavior specialists and speech-language pathologists. He had functional hearing and vision, as reported by his mother. Charlie's teacher indicated he most commonly used physical communication (i.e., taking an adult to a desired object or activity), gestures, and approximately 10 idiosyncratic signs or sign approximations to communicate. With prompting, Charlie used about 20 spoken word approximations consistently (e.g., bye, hi, chip, cookie, bike). At the time of the study, Charlie was involved in a verbal behavior (Skinner, 1957) intervention program. The intervention worked on developing receptive and expressive language and the verbal operants of mand (requesting), tact (labeling), echoics (vocal imitation), and intraverbal (conversational skills). Charlie's goals focused on the production of echoics (i.e., imitations of sounds and spoken words), mands (i.e., demands or requests for preferred objects), and tacts (i.e., labels of common objects in the environment). At the start of the study, he did not have access to AAC technology. In addition to his expressive difficulties, he also had difficulty in understanding spoken language; he received a standard score of 40 (age equivalent 2;3 [years;months]) for the Peabody Picture Vocabulary Test–Fourth Edition (Dunn & Dunn, 2007). He was able to follow one-step, simple *wh*-questions and routine-based directions.

Materials

Video VSD application. The independent variable was the video VSD application that operated on a 10.1-in. Samsung tablet. The app, EasyVSD (InvoTek, 2018), included editing icons (e.g., for taking a video, for creating a hotspot) and a navigational menu on the left-hand side of the screen. The video or VSDs filled the remaining screen of the tablet (see Figure 1).The video VSD AAC app allowed for the capturing of videos and programming of VSDs and hotspots at any point within these videos. So, within the app, videos could be captured using the tablet's onboard camera. Then, videos could be paused at points of interest, at which point hotspots could be created to map voice output messages onto the points in the video, represented through a screenshot of that point in the video (i.e., a static VSD). For example, a 2-min video of Charlie riding a bike could be programmed at key moments in the process (e.g., getting on the bike, going fast, stopping the bike to say "Hi" to a teacher). The VSDs could then include hotspots to talk about the event that was paused and captured as a still image on the screen (e.g., peddling past a ball pit hotspots could say, "I am going fast," or "bike" and "crash"; see Figure 1). The selected video would play upon activation of the play icon, until it reached the first embedded preprogrammed VSD. At that preprogrammed point in the video, the video would automatically pause, creating a still VSD, providing a communication support, and allowing the option to select or create hotspots on the VSD. Selection of the play button, after a VSD appeared, continued playing the video from where the video had been paused.

Figure 1. An example of a custom augmentative and alternative communication display created within EasyVSD to support Charlie. The large right area is the location where videos with visual scene displays are displayed. The left menu includes options for navigating to different videos, pausing/playing videos, and editing visual scene displays.

Procedure

All sessions occurred in one-on-one interactions at the participant's school. Videos were captured during common motivating activities and used as the context for interactions. Captured videos lasted between 30 s and 2 min. Examples of the videos recorded included Charlie riding a bike, playing on a scooter, or playing with a favorite toy. During the 5 min of sharing, the discussion and sharing of a past event occurred at a table, with the tablet positioned in arm's length from both the participant and researcher.

Phase A: Baseline. During baseline, the researcher and participant sat at a table next to each other in a classroom. The structured sharing opportunity began when the researcher asked the participant, "What have you been doing?" This prompt was chosen to mirror child–adult interactions around displaced talk, which often involve adults asking questions about past activities with children responding to the adults' questions (Wanska & Bedrosian, 1986). After 30 s, if the participant did not respond, the adult provided an additional prompt, "What have you been doing? Show me." After the second prompt, if no communication attempts were made over a 1-min time period, the session was discontinued. If the participant attempted to communicate, the partner responded in the form of an extension (i.e., acknowledging and responding to the child's utterance while adding more information) or expansion (i.e., adding semantic and syntactic information to the original utterance) to set up another communication opportunity. These procedures continued until the participant made no communication attempts over a 1-min period or until the 5-min sharing activity was over. A minimum of five baseline sessions were completed with minimal variation across sessions.

Phase B: Intervention. After the final baseline session and prior to the first intervention session, a training session took place. During this training session, the researcher captured a short video of Charlie engaged in a motivating activity (e.g., riding his bike, playing in a ball pit, jumping on a trampoline, racing toy penguins) within the video VSD app. After this, the researcher paused the video five times at meaningful events within the activity (e.g., getting on the scooter, getting pushed, fake falling off the scooter, and crashing); each time the video was paused, a still VSD was automatically created, and the researcher added one to three hotspots (per VSD) within the initial short video. The researcher demonstrated how to use the video VSD app for the participant, including the selection of the control buttons (e.g., to play the video), navigating to VSDs, and the selection of hotspots. After one video was programmed with VSDs and hotspots, the researcher stated, "What have you been doing? Show me." Then, the researcher encouraged participation using a most-to-least prompting hierarchy: First, the researcher modeled the use of hotspots (for one VSD), then encouraged participation together (for two VSDs) and, then, allowed independent activations (the remaining VSDs).

After the participant demonstrated independent activations of hotspots during the training session, the intervention probe sessions began. The same procedures as described above for the baseline probes were followed during the intervention probes, except the tablet and AAC app were available to Charlie. After the completion of the probe of the 5-min sharing activity, the researcher captured a new video of the participant engaged in a motivating activity using the video VSD app. The video was programmed to include five embedded VSDs, with one to three hotspots per VSD. As the study progressed, the videos from previous sessions were available to Charlie in a menu within the AAC app.

Generalization and maintenance phases. A generalization probe was conducted during both the baseline and intervention phases. These probes followed the same procedures of baseline and intervention sessions, respectively, except that Charlie's teacher (trained on the procedures prior to the first session) served as the communication partner asking, "What have you been doing?" In addition, a maintenance probe was completed 3 months after the end of the intervention phase. This probe followed the same procedures as the intervention probes. The videos used in the intervention were available during the postgeneralization and maintenance phases. Because of the nature of the research project, Charlie did not have access to the tablet and app after the generalization concluded. Yet, at the end of the study, the app and commercially available options (e.g., GoVisual by Attainment) were discussed with Charlie's team and family.

Procedural fidelity. A graduate student in Communication Sciences and Disorders served as the primary coder for the study. She was blind to the goals of the study but was not blind to the actual conditions, as it was apparent in the videotapes whether or not the tablet with the video VSD app was present. She was trained on the first baseline video and first intervention video for the participant until reliability in coding was over 80%. Differences were resolved through discussion and clarification of definitions. Once training was complete, in order to ensure that all procedures were implemented as intended, a randomly selected sample, constituting a minimum of 50% of the sessions during each study phase, was checked against the standard procedures. Procedural integrity was calculated according to the following formula: number of steps correctly implemented divided by the total number of steps implemented correctly plus those omitted or implemented incorrectly. The mean procedural integrity was 90% (range: 80%–100%).

Measures and Data Analysis

Data collection and coding. All probe sessions during baseline, intervention, generalization, and maintenance were videotaped using a video camera set up on a tripod. Studiocode software (Sportstec Limited, 2015) was used to code videos for the dependent variables directly on the video file. A graduate student was trained on coding procedures using the first baseline and intervention video. During training, while playing the first baseline and intervention video clips, the first author coded in vivo, on Studiocode, with the graduate student for both variables (i.e., turns, engagement). During the coding process, videos of each session were viewed repeatedly to ensure accuracy in coding. The graduate student coded all sessions for the primary dependent measure (communication turns) and the collateral variable of engagement.

Communication turns. The primary dependent variable was the frequency of symbolic communicative turns expressed by the participant during the 5-min sharing opportunities during baseline, intervention, and maintenance. Based on Logan (2003), a turn was everything Charlie communicated (either via speech, sign, gesture, or activation of a hotspot on the VSD) until either the partner began a turn or 2 s passed with no communication. A turn was considered symbolic if it consisted of words (either spoken or through speech output from the AAC app), conventional signs, or conventional gestures (e.g., nodding head for “yes”).

The number of communication turns, per minute, was graphed for each probe in each condition (i.e., baseline, intervention, and maintenance). Visual analysis of the graphed data included inspection for differences between phases in terms of variability, mean, slope, and trend (Kennedy, 2005). Tau-U effect size (Parker, Vannest, Davis, & Sauber, 2011) was calculated to measure data nonoverlap between baseline and intervention phases (i.e., A and B). Tau-U effect sizes were interpreted as follows: <0.5 *minimal to no effect,* 0.5–0.69 *moderate effect,* and 0.7–1.0 a *large effect.*

Engagement. Data related to Charlie’s engagement were also collected. Time sampling was used to record if engagement was observed. *Engagement* was defined as eye contact or facial orientation directed toward the partner, the activity of focus, or the tablet with the video VSD app. The sampling occurred every 10 s for the length of the probe session (maximum of 5 min). Data were calculated by taking the number of observed moments of engagement (at the designated 10-s intervals) divided by the total number of 10-s intervals that occurred within the session to derive a percentage of engaged intervals. The percentage of engagement per 10-s interval was graphed for each probe for each condition (i.e., baseline, treatment, and maintenance).

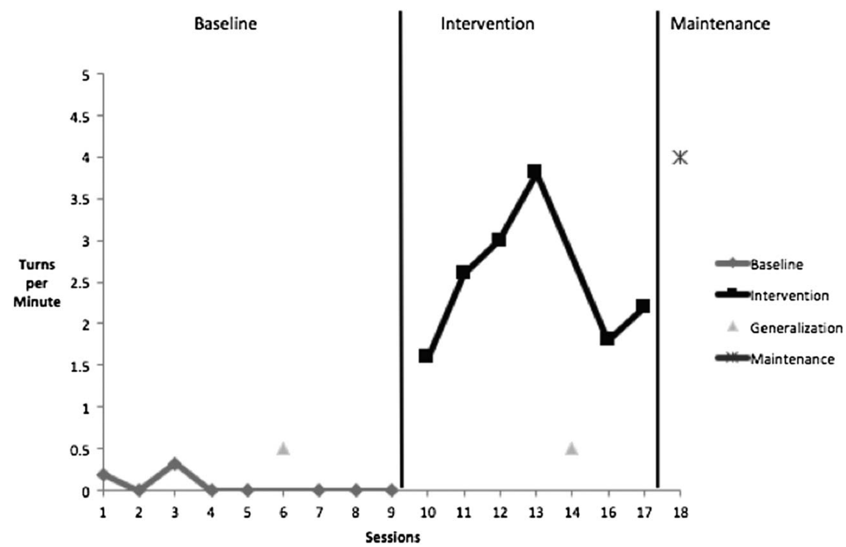
Reliability. A second graduate student was trained alongside the first student to serve as a coder for reliability purposes. During training, while playing the first baseline and intervention video clips, the first author coded in vivo, on Studiocode, with each research assistant for both variables (i.e., turns, engagement). Disagreements and questions were discussed, and upon establishing an interobserver agreement level of at least 80%, the research assistants began independently coding sessions. For each phase and each variable, 30% of sessions were coded. There was no overlap between training videos and videos used to calculate reliability. Percent agreement for each of the measures was calculated separately by dividing the agreements by agreements plus disagreements plus omissions and, then, multiplying by 100 to yield a percentage. The average interobserver reliability was 88% for communication turns (range: 83%–98%) and 95% for engagement (range: 90%–100%).

Results

Communication Turns

Charlie demonstrated an increase in communication turns per minute following the introduction of the video VSD app and one training session (see Figure 2). Visual analysis revealed that, during baseline, Charlie expressed an average of 0 (range: 0–0.3) communication turns per minute. In intervention, Charlie demonstrated immediate increases in communication turns after one training session when provided with the video VSD app; he averaged 2.5 (range: 1.6–3.8) turns per minute or a turn approximately every 20 s. Tau-U was calculated and resulted in an effect size of 1.0, suggesting the app featuring video VSDs may be highly effective in increasing participation in communication interactions around displaced talk, as evidenced by the increase in communication turns from baseline to intervention. In addition, Charlie maintained this rate of communication turns 3 months after intervention was completed, expressing four turns per minute (or a turn about every 15 s) in the final sharing opportunity probe during the maintenance phase. Although Charlie demonstrated increases in his rate of communication with access to the video VSD app with the researcher, he did not seem to generalize this increase to a different familiar adult (i.e., his teacher). Visual analysis does not suggest any change in the rate of communication turns during the generalization probes, with a different adult professional from baseline to intervention (a rate of 0.5 turns per minute during both the baseline and intervention generalization probes).

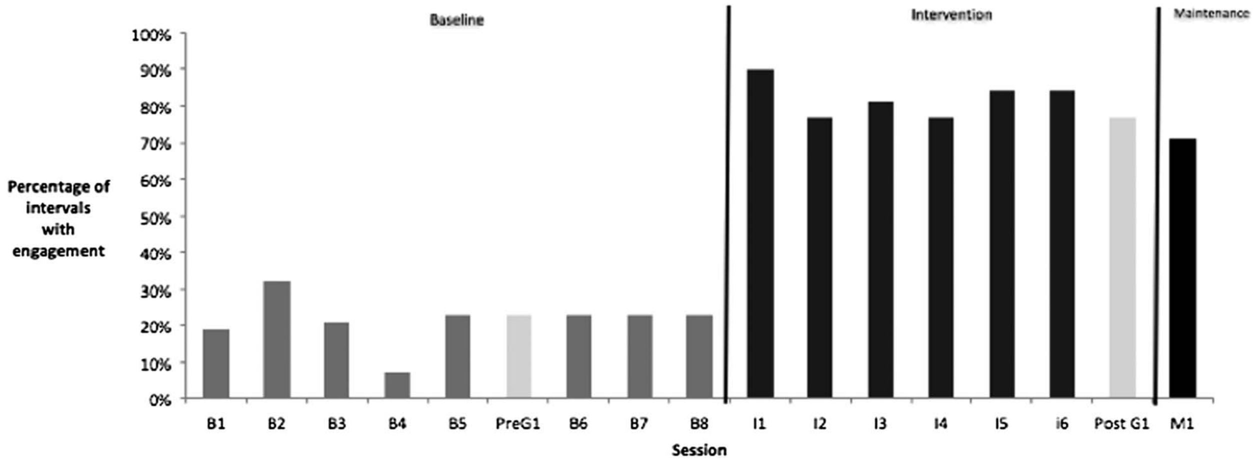
Figure 2. The number of communication turns expressed by Charlie per minute during baseline, intervention, maintenance, and generalization.



Engagement

During baseline, Charlie demonstrated the behavioral markers of engagement at an average of 21% of the intervals in which it was sampled (range: 7%–32%). Engagement levels were much higher during intervention, with an average of 82% (range: 77%–90%) of the intervals (see Figure 3). This increase in engagement was maintained months after the initial training and introduction of the app. Although Charlie did not demonstrate increased rates of turn-taking during generalization with the video VSD app, he did demonstrate increased engagement from the generalization probe at baseline (i.e., engaged in 22% of the intervals) to intervention (i.e., 80% of the intervals).

Figure 3. Percentage of intervals (sampled every 10 s) in which Charlie demonstrated engagement during baseline, intervention, generalization, and maintenance.



Discussion

The methodological limitations stemming from the AB design of the current study bar any definite conclusions regarding the effects of the video VSD app on the communication and engagement of this beginning communicator with ASD. Still, the preliminary results are promising. They provide initial evidence suggesting that AAC technologies featuring video VSDs may be a powerful tool for supporting displaced talk in school-age individuals with ASD and that this effect may maintain over time. In addition, the technology may also support the students' engagement during social interactions involving displaced talk; this increase in engagement in social interaction could have important social and academic consequences (Westby & Culatta, 2016). The preliminary data collected in the current study did not suggest the generalization of these positive findings to other communication partners. This may have been due to the limited familiarity the generalization partner had with the technology, a lack of more generalization sessions to familiarize the dyad with these interactions together, or other differences that could not be distilled from this preliminary study.

Overall, the results suggest the promise of applying the video VSD technology to support displaced talk in school-age individuals with ASD. These results are consistent with past research documenting the efficacy of AAC intervention in supporting social interaction among school-age individuals with ASD more generally (e.g., Trottier et al., 2011). The results are also consistent with research demonstrating the power of VSDs as a vocabulary organization option for supporting expressive communication in school-age individuals who are beginning communicators (e.g., Holyfield, Caron, Drager, & Light, 2018). The findings are also consistent with literature suggesting the importance of contextual support in children's sharing with adults through displaced talk (Marvin & Privratsky, 1999). In addition, the findings are consistent with research using the video VSD technology to support an individual with ASD for a different purpose—the independent completion of vocational tasks (O'Neill, Light, & McNaughton, 2017).

Clearly, the findings from the current study do not allow for a comprehensive understanding of (a) the efficacy of the video VSD technology or (b) the specific components of the technology that were most beneficial for Charlie. However, the video VSD was likely a powerful feature for supporting displaced talk through the dynamic context it offers (Light et al., 2014). In this study, Charlie's sharing through video allowed both him and his partner to relive a dynamic event. This contextual support likely served to scaffold both of their understandings of the event. From a language, cognitive, and social interaction standpoint, this likely made the interaction more accessible for Charlie (Adamson & Bakeman, 2006; Light & Drager, 2007; Thistle & Wilkinson, 2013). In addition, a video is an engaging medium attracting visual attention, particularly for people with ASD; embedding communication supports into that medium by programming VSDs transforms that medium into an engaging interaction context for users (Light et al., 2014). A video offers interest and engagement to communication partners as well and allows the partners to quasiexperience the event, creating a shared context from which the partner could provide meaningful scaffolding during the interaction. For these reasons, video VSDs offer a promising AAC option for beginning communicators' social interaction.

Clinical Implications

More research is needed to fully understand the role this technology can play in AAC intervention. However, the current study provides initial evidence; an AAC app with video VSDs can have a positive impact on the displaced talk of school-age beginning communicators with ASD during social interactions. Clinicians, then, could consider the use of such technology to support students who are limited in their social expression through displaced talk. This technology has the potential to enrich such interactions.

For example, beginning communicators could use video VSDs to share stories from home with their peers at school and vice versa, to participate in show and tell (possibly with the use of projection from the AAC device), to lay a contextual foundation to interactions with peers, and so forth. Clinicians could consider integrating this technology as one of the many modes used by beginning communicators they support who require AAC. Given the preliminary nature of the current findings and the limited conclusive evidence available about this intervention option, clinicians should collect consistent data and carefully evaluate to determine the impact, if any, of the technology on their clients' expression of displaced talk in social interactions.

Limitations and Future Research Directions

Although the results of this case study suggest that video VSD technology may have a positive impact on the communication and engagement of school-age children with ASD, there are methodological limitations to the study that limit any firm conclusions regarding these effects. The study lacked experimental control due to the AB design. The study also included only one participant, severely limiting the generalizability of the results. The study was very limited in duration and scope and evaluated the participant's behavior only in the context of highly structured interactions with the researcher.

Despite the lack of strong conclusions that can be drawn from the current study, the preliminary results were promising. Therefore, the most important future research direction from the current study is the evaluation of the video VSD AAC technology in rigorous intervention studies involving more participants. The need for such research is pressing. If, however, the preliminary findings from this study are confirmed in highly controlled research studies, then there are many directions in which this research could be expanded.

For instance, individuals from a variety of demographic backgrounds may benefit from such an intervention. This study explored the impact of the intervention on a school-age individual with ASD. Future research could explore the efficacy of video technology with embedded VSDs as a support for displaced talk for a wide range of groups such as young children with developmental disabilities, individuals with multiple disabilities and require alternative access, or adults who have experienced memory and language loss.

The first author served as the primary communication partner in the current study, imiting the ecological validity of the interactions and the methodological rigor of the evaluation. Partners play an influential role in social interactions with beginning communicators (Light et al., 2002). Although some initial generalization information was gathered in the current study, it was not robust. Different results may have been observed had communication partners been more trained. More information is needed about the role this technology plays in interactions with different communication partners. Future research should explore the impact of the video VSD technology when it is implemented in real-life social interactions with a range of typical communication partners, including family, friends, and professionals.

Furthermore, a video could be supportive in scaffolding beginning communicators' use of a variety of communication functions (e.g., information transfer). The focus of the current study was the expression of displaced talk during social interaction. Future research could evaluate the efficacy of AAC video VSD technology on beginning communicators' expression for all functions of communication (Light, 1988). In addition, future research should explore the benefits and implications of video VSDs in comparison to, or in conjunction with, static VSDs.

Finally, social interaction for individuals who use AAC can include a variety of avenues, such as social media (e.g., Caron & Light, 2016). The current study evaluated an app featuring video VSDs within the context of face-to-face interaction. Future research could determine the feasibility and efficacy of integrating technology such as that used in the current study into interactions over social media within which a video is a popular feature.

Conclusion

Responding to questions such as "What did you did this weekend?" "What's up?" or "What have you been doing?" allows individuals to engage in interactions serving to develop their social relationships (Light, 1988). For all people, participation in such social interaction is a large part of life and is tied to quality of life (Light et al., 2002). For beginning communicators with ASD, participation in such interaction has the additional benefit of providing opportunities to develop social communication skills, a central need for many individuals with ASD (American Psychiatric Association, 2013). This study provided preliminary evidence that AAC featuring video VSDs has the potential to support displaced talk from school-age beginning communicators with ASD. A video VSD is a powerful social interaction support because it is engaging both for people who use AAC and their partners, relieves memory demands, and recounts events dynamically—preserving the spatial and temporal contexts of events—making it an accessible and transparent representation option. Given the potential promise of this new technology, future research is urgently needed to more fully understand such technology and its efficacy. Such a research direction could move AAC intervention toward supporting all individuals in sharing their life experiences with others.

Acknowledgments

The contents of this article were developed under a grant awarded to Dr. Light from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR Grant 90RE5017). NIDILRR is a center within the Administration for Community Living (ACL), Department of Health and Human Services. The contents of this article/poster do not necessarily represent the policy of NIDILRR, Administration for Community Living, and Department of Health and Human Services, and you should not assume endorsement by the Federal Government. The authors would like to offer their gratitude and thanks to the participant in the study, the graduate students who assisted on the project (Ethan Richtsmeier and Amanda Slowey), and InvoTek for the realization of the software features for evaluation.

References

Adamson, L. B., & Bakeman, R. (2006). Development of displaced speech in early mother–child conversations. *Child Development, 77,* 186–200. https://doi.org/10.1111/j.1467-8624.2006.00864.x

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association Publishing.

Caron, J., & Light, J. (2016). Social media experiences of adolescents and young adults with cerebral palsy who use augmentative and alternative communication. *International Journal of Speech-Language Pathology, 19*(1), 30–42. https://doi.org/10.3109/17549507.2016.1143970

Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A., & Kellet, K. (2002). Using the Picture Exchange Communication System (PECS) with children with autism: Assessment of PECS acquisition, speech, social communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35,* 213–231. https://doi.org/10.1901/jaba.2002.35-213

Dunn, L., & Dunn, D. (2007). *Peabody Picture Vocabulary Test–Fourth Edition (PPVT-4).* Minneapolis, MN: Pearson Assessments.

Ganz, J. B., Earles-Vollrath, T. L., Heath, A. K., Parker, R. I., Rispoli, M. J., & Duran, J. B. (2012). A meta-analysis of single case research studies on aided augmentative and alternative communication systems with individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42,* 60–74.

Holyfield, C., Caron, J., Drager, K., & Light, J. (2017). *Effect of mobile technology featuring visual scene displays and just-in-time programming on communication turns by preadolescent and adolescent beginning communicators*. Manuscript submitted for publication.

Invotek. (2018). Retrieved from https://www.invotek.org/

Holyfield, C., Drager, K. D., Kremkow, J. M., & Light, J. (2017). Systematic review of AAC intervention research for adolescents and adults with autism spectrum disorder. *Augmentative and Alternative Communication, 33,* 201–212. https://doi.org/10.1080/07434618.2017.1370495

Holyfield, C., Caron, J., Drager, K., & Light, J. (2018). Effect of mobile technology featuring visual scene displays and just-in-time programming on communication turns by preadolescent and adolescent beginning communicators. *International Journal of Speech-Language Pathology*. Advance online publication. https://doi.org/10.1080/17549507.2018.1441440

Kazdin, A. E. (2011). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.

Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston, MA: Allyn & Bacon.

Kravits, T. R., Kamps, D. M., Kemmerer, K., & Potucek, J. (2002). Brief report: Increasing communication skills for an elementary-aged student with autism using the Picture Exchange Communication System. *Journal of Autism and Developmental Disorders, 32,* 225–230. https://doi.org/10.1023/A:1015457931788

Light, J. (1988). Interaction involving individuals using augmentative and alternative communication systems: State of the art and future directions. *Augmentative and Alternative Communication, 4,* 66–82. https://doi.org/10.1080/07434618812331274657

Light, J., & Drager, K. (2007). AAC technologies for young children with complex communication needs: State of the science and future research directions. *Augmentative and Alternative Communication, 23,* 204–216.

Light, J., McNaughton, D., & Jakobs, T. (2014). Developing AAC technology to support interactive video visual scene displays. *RERC on AAC: Rehabilitation Engineering Research Center on Augmentative and Alternative Communication*. Retrieved from https://rerc-aac.psu.edu/development/d2-developing-aac-technology-to-support-interactive-video-visual-scene-displays/

Light, J., Parsons, A., & Drager, K. (2002). “There’s more to life than cookies”: Developing interactions for social closeness with beginning communicators who require augmentative and alternative communication. In J. Reichle, D. Beukelman, & J. Light (Eds.), *Exemplary practices for beginning communicators: Implications for AAC* (pp. 187–218). Baltimore, MD: Brookes.

Logan, K. J. (2003). Language and fluency characteristics of preschoolers’ multiple-utterance conversational turns. *Journal of Speech, Language, and Hearing Research, 46,* 178–188.

Marvin, C. A., & Cline, K. D. (2010). Bus talk: A preliminary analysis of children’s decontextualized talk. *Communication Disorders Quarterly, 31,* 170–182. https://doi.org/10.1177/1525740109344220

Marvin, C. A., & Privratsky, A. J. (1999). After-school talk: The effects of materials sent home from preschool. *American Journal of Speech-Language Pathology, 8,* 231–240. https://doi.org/10.1044/1058-0360.0803.231

O’Neill, T., Light, J., & McNaughton, D. (2017). Videos with integrated AAC visual scene displays to enhance participation in community and vocational activities: Pilot case study with an adolescent with autism spectrum disorder. *Perspectives of the ASHA Special Interest Groups, 2,* 55–69.

Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy, 42,* 284–299.

Reichle, J., Beukelman, D. R., & Light, J. C. (Eds.). (2002). *Exemplary practices for beginning communicators: Implications for AAC*. Baltimore, MD: Brookes.

Shane, H. C. (2006). Using visual scene displays to improve communication and communication instruction in persons with autism spectrum disorders. *Augmentative and Alternative Communication, 15,* 8–13.

Siegel, E., & Cress, C. (2002). Overview of the emergence of early AAC behaviors: Progression from communicative to symbolic skills. In J. Reichle, D. Beukelman, & J. Light (Eds.), *Exemplary practices for beginning communicators: Implications for AAC* (pp. 187–218). Baltimore, MD: Brookes.

Skinner, B. F. (1957). *Verbal behavior.* Cambridge, MA: Prentice Hall.

Sportstec Limited. (2015). Studiocode (Version 5.8.4) [Video analysis software]. Available from https://vosaic.com/support/

Thistle, J. J., & Wilkinson, K. M. (2013). Working memory demands of aided augmentative and alternative communication for individuals with developmental disabilities. *Augmentative and Alternative Communication, 29,* 235–245. https://doi.org/10.3109/07434618.2013.815800

Trottier, N., Kamp, L., & Mirenda, P. (2011). Effects of peer-mediated instruction to teach use of speech-generating devices to students with autism in social game routines. *Augmentative and Alternative Communication, 27,* 26–39. https://doi.org/10.3109/07434618.2010.546810

Wanska, S. K., & Bedrosian, J. L. (1986). Topic and communicative intent in mother–child discourse. *Journal of Child Language, 13,* 523–535. https://doi.org/10.1017/S0305000900006863

Westby, C., & Culatta, B. (2016). Telling tales: Personal event narratives and life stories. *Language, Speech, and Hearing Services in Schools, 47,* 260–282. https://doi.org/10.1044/2016_LSHSS-15-0073

History:
Received February 12, 2018
Revised May 16, 2018
Accepted June 05, 2018
https://doi.org/10.1044/persp3.SIG12.123