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ORIGINAL ARTICLE

Acquisition of Tacting Using a Speech-Generating Device in Group Learning Environments for Preschoolers with Autism

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Abstract Skinner (1957) described the tact as the most important verbal operant; however, there remains a disproportionate amount of research evaluating mand training compared to tact training for young children with autism. The current study sought to alleviate some of this disparity by evaluating the effectiveness of the iPad® and application Proloquo2Go™ as a speech-generating device, using a multiple baseline design, on the acquisition of a tact repertoire in three preschool aged children with autism. The procedures employed a time delay with full physical prompts, during a "circle time" routine. During the circle time routine, the classroom teacher would read the lift-the-flap children's book "Where's Spot?" and pause for five-seconds upon reaching the targeted animal for each respective student. During this time delay if the student independently selected the picture that corresponded to the animal, evoking the SGD's digitized output, the teacher provided verbal praise. If the child did not respond or responded incorrectly, a full physical prompt was used to evoke the tact of the animal. Results indicated that all three participants acquired the ability to tact at least one animal at 100% independence, across three consecutive sessions, after an average of four training sessions. This skill was also found to maintain for those two participants for whom maintenance data were taken. These results extend the evidence base on the use of the iPad® and application Proloquo2Go™ as a SGD, as well as, the research based on tacting acquisition.

Keywords Autism · Speech-generating device · Tact · iPad

Impairment in communication skills is a core feature of autism (American Psychiatric Association 2013). It is estimated that 30% of individuals with autism fail to develop functional vocal speech (Wodka et al. 2013). With early functional language identified

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as one of the strongest, most consistent predictors of social-communication, academic, and behavioral outcomes for individuals diagnosed with autism (Branson and Demchak 2009; Howlin and Moss 2012; National Research Council, U.S. 2001), increased priority and focus has been placed on establishing a means of functional communication in young children diagnosed with autism (Tager-Flusberg and Kasari 2013).

A robust body of research has demonstrated the efficacy of alternative or augmentative communication (AAC) for supporting the development of communication in individuals with autism (Rispoli et al. 2010). AAC systems include unaided approaches such as manual signing or gestures and aided approaches such as graphic icons, communication boards, and speech-generating devices (SGDs). More specifically, SGDs are portable, electronic devices that rely on the speaker's pressing of a picture symbol or alphabet keys on an electronic screen to evoke digitized or synthesized speech output (Lancioni et al. 2007; Wong et al. 2014). In 2014, the National Professional Development Center identified SGDs as an evidence based practice for children and youth with autism, documenting the potential benefits of using SGDs to target various communication skills across settings and situations (Wong et al. 2014).

As influenced by Skinner's analysis of verbal behavior (Skinner 1957), behavioral language intervention for children with autism stresses the critical value of explicit training of the following functional and distinct classes: (a) requesting and rejecting, (b) labeling and naming, (c) imitative responses, and (d) answering and conversational skills (Esch et al. 2010; Sigafoos 1997; Sundberg 2008). Skinner refers to these classes of communicative behavior (i.e., verbal operants) as mands, tacts, echoics, and intraverbals, respectively (Skinner 1957). Each verbal operant class represents a different type of operant contingency or verbal relation imperative to the development of a functional communication repertoire (Pierce and Cheney 2008; Johnston 2014), thus underscoring the importance of evaluating the use of newer technologies with AAC applications as SGDs for the acquisition of all primary verbal operants inherent to the establishment of a comprehensive verbal repertoire.

Skinner defined a *tact* as a verbal response controlled by a nonverbal stimulus (i.e., an object, action, or event), properties of those stimuli, or relations among stimuli (Pierce and Cheney 2008; Skinner 1957). More specifically, Skinner distinguished the tact as the most important verbal operant, citing the tact's critical role in the establishment and expansion of both basic and complex mand and intraverbal skills, further arguing that impaired manding or intraverbal repertoires may be a function of incorrect tacting (Skinner 1957). For example, Miguel and Kobari-Wright (2013) found that tact training produced the emergence of categorization and listener responding in two children with autism. Additionally, May et al. (2013) evaluated the emergence of intraverbal behavior following tact training in three adolescents with autism. Furthermore, research has indicated that tact repertoires can be used as an instructional procedure to occasion other verbal responses (Feng et al. 2015). Thus, the importance of a tact repertoire is evident. That said, few studies have investigated the effectiveness of employing hand held, tablet-based SGDs for tact training (Kagohara et al. 2012; Lorah et al. 2014b; van der Meer et al. 2015).

With the ongoing advances in technology combined with increased availability and portability, most recent investigative attention has been directed towards the use of hand-held, tablet-based devices with AAC applications as SGDs (i.e., the iPad® and application Proloquo2Go™). Several recent reviews have evaluated the research on

communication intervention incorporating these newer AAC devices as SGDs for an individual diagnosed with autism (Lorah et al. 2014a; Kagohara et al. 2013; Still et al. 2014; Schlosser and Koul 2015). Findings concur across reviews, indicating an emerging research base supporting the use of SGDs, including these newer modes of SGDs such as iPads® and iPods® in establishing mand repertoires for individuals with autism, a critical function for beginning communicators (e.g., Lorah et al. 2013; Kagohara et al. 2013; King et al. 2014; van der Meer et al. 2012; van der Meer et al. 2011). However, an unequal distribution of publications across verbal operants exists within the research evaluating traditional SGD as well as AAC in general. This documented discrepancy appears a particularly pressing issue, given the rapid increases in accessibility, popularity, and research attention specific to these newer technologies (i.e., iPads® and iPods®) for the purposes of communication/language intervention (Ganz 2015; Light and Mcnaughton 2013).

Despite the unequal distribution of research evaluating operants beyond the mand, preliminary evidence exists as to the effectiveness of these devices, in combination with behaviorally based instructional procedures, for the acquisition of a tact repertoire in children with an autism diagnosis. For example, Lorah et al. (2014a, 2014b) evaluated the effects of using the iPad® and application Proloquo2Go™ for responding with a carrier phrase to the questions "What do you have?" and "What do you see?" in three preschool aged children with autism or a developmental disability. Using a five second time delay with full physical prompts, all participants were taught to tact four items using the carrier phrases "I see" and "I have" in isolation as well as to discriminate between picture icons and sentence frames. Participants required an average of only six-training sessions to reach a mastery criterion of 80% across 2 consecutive sessions for the "I see" phase, three to reach mastery for the "I have" phase, and three to demonstrate discrimination between the sentence frames.

In a second study, Kagohara et al. (2012) conducted a two-part study using a multiple probe across participants designed to evaluate the effects of using the iPad® and iPod® Touch with Proloquo2Go™ application for teaching two boys aged 13 and 17 to tact academically relevant stimuli when asked both "What do you see?" and "What is this?". Teaching procedures involved the use of time delay, least-to-most prompting, and differential reinforcement. In Study 1, participants were taught to name 12 line drawings under two conditions (a) when shown a worksheet containing four photographs and asked "What do you see?" and (b) when shown a single photograph and asked "What is this?". Following three intervention sessions, one participant consistently tacted items under both conditions with between 83 and 100% accuracy. By the end of intervention, the other participant reached between 75% and 100% accuracy. In Study 2, participants were taught to name 18 line drawings from a common picture-vocabulary book. Both participants reached 100% independent, accurate tacting across three consecutive sessions, although one participant's performance decreased to 77% accuracy across the last two sessions of intervention.

In a related study, van der Meer et al. (2015) used a multiple baseline across matching tasks design to evaluate whether the same instructional strategies (i.e., time delay, graduated guidance, and differential reinforcement) used to teach picture naming/matching with an iPad-based SGD as the response mode (Kagohara et al. 2012) could be applied to establish correct picture and word matching in a ten-year-old student with autism. The participant required seven sessions to reach an acquisition

criterion of 80% across three consecutive sessions for picture to picture matching and, subsequently, 22 sessions to reach acquisition criterion for word to picture matching. Following intervention for picture to picture and word to picture, matching skills generalized to high levels of correct responding for picture to word and word to picture matching without systematic instruction. It is important to note that while the receptive matching activities did not necessarily require a vocal response from the learners, rendering the SGD technically unnecessary for completing the task (van der Meer et al. 2015). However, because the SGD was used as the response modality, the picture/word card controlled the selection of the corresponding (identical or non-identical) icon from the SGD screen producing relevant voice-output (e.g., "shoes") that was reinforced by non-specific reinforcement, and as such, the response of the learner could also be viewed as a form of impure tacting (van der Meer et al. 2015).

While the results of these studies documented positive results, indicating an emerging literature base supporting the use of tablet-based devices and portable media players as SGD for the purposes of tact training in individuals with autism, the existing research remains limited in quantity, but also in scope. In terms of scope, all three reviewed studies were conducted during highly structured, one to one instructional sessions at the table using vocal verbal discriminative stimuli (i.e., What do you see? What do is it? What do you have?). In other words, participants in two out of three studies were taught to tact items in response to both the vocal verbal antecedent stimuli (i.e., the questions) in addition to a nonverbal antecedent stimuli (i.e., the target 2D or 3D item). Hence, according to the Skinner's definition of a tact, it is not possible to definitively identify the participants' verbal behavior as pure tacts as opposed to pliance, as the above noted questions may have functioned as a mand for student responding. While this type of multiply controlled verbal responding (i.e., picture or object naming) is commonly required within educational activities geared towards establishing new vocabulary and/or pre-literacy skills (Kagohara et al. 2012), research indicates that use of vocal verbal antecedent stimuli alone (e.g., What is it? What do you see?) to establish tacting repertoires can interfere with establishment of stimulus control by the nonverbal antecedent stimulus itself (i.e., the object, event, action, or picture alone), while concurrently limiting generalization, maintenance, and spontaneity (Partington et al. 1994; Sundberg et al. 2000; Williams et al. 2006).

Given the importance of both pure and multiply-controlled tacting to participation across settings, and to the establishment and expansion of other verbal repertoires, further research should investigate the effects of using newer technologies as SGDs for aiding in the acquisition of tacting repertoires in children with autism, while also extending current research to address a wider variety of tacting skills necessary for participation across instructional settings (i.e. small group or large group instruction) and communicative-partners.

In summary, results from the current literature suggest that the iPad® and the application Proloquo2Go™ as a SGD may be effectively employed to facilitate the acquisition of verbal behavior for children with autism. However, the vast majority of research involving SGDs and children with autism has focused on procedures for establishing mand repertoires to the exclusion of other verbal operant relations (Ganz 2015). All verbal operants are essential components of an effective language repertoire and, as such, warrant further research attention (Skinner 1957). In addition, of the three studies that have evaluated the use of the iPad® as an SGD for the purpose of tact training, corresponding instructional procedures have been limited to highly structured,

one on one instructional sessions, and generalization outside the training environment was not formally assessed. Given the importance of implementing naturalistic training procedures, verbal operant training should be conducted across settings and instructional formats (i.e., group instruction, whole class instruction) and settings (i.e., procedures embedded in daily activities).

Thus, the purpose of the current study was to evaluate whether a five-second time delay, with a full physical prompt was effective in teaching picture tacting within group story time in the absence of a vocal verbal antecedent stimuli (i.e., What is it?), using the iPad® Mini and application Proloquo2Go™ as a speech-generating device in three preschool aged children with autism.

Method

Participants

As depicted in Table 1, three preschool aged children diagnosed with autism participated in the study. All three of the participants attended a four-week preschool group, three days per week, for 2.5 h per day, using the methodology of Applied Behavior Analysis. In total there were four children who attended the preschool learning environments. The participants were selected for participation in this study based on the following criteria: a) a primary clinical or educational diagnosis of autism applied from an independent agency; b) between the ages of three-to-five; c) use of an iPad® based speech-generating device (SGD) as a primary means of communication; d) a "minimal" tact repertoire as measured by the *Verbal Behavior-Milestones Assessment and Placement Program Barriers Assessment* (VB-MAPP; Sundberg 2008); and e) a Level Two mand repertoire as measured by the VB-MAPP. All three of the participants had previously acquired the ability to mand and discriminate between more than 10-picture symbols on the screen of the iPad® SGD, as measured through the VB-MAPP.

Materials and Setting

The materials included an iPad® Mini, generation two, and the application Proloquo2Go™, which was used as the speech-generating device. The iPad® Mini was covered in a protective case. During all sessions, the iPad Mini® was positioned within three inches, directly in front of or next to the participant. The screen of the iPad Mini® was arranged with three icons on the screen of the device, two icons that

Table 1 Participant information

Participant	Diagnosis	Age	VB-MAPP Scores	
			Tact Repertoire Barrier	Mand Repertoire
Rachel	Autism	4.2	4 (Minimal)	9
Norman	Autism	3.6	4 (Minimal)	8
Lisa	Autism	4.2	4 (Minimal)	7

corresponded to the tacting targets and one distractor icon. Sessions occurred during circle-time within the preschool learning environment. During circle time the participants were seated on an oval carpet with the teacher positioned in front of them, within six inches. Each of the participants had a 1:1 (therapist: student) instructor who was positioned directly behind them. During training this instructor acted as the interventionist providing prompting. The children's storybook that was used for baseline and training was *Where's Spot?* (Hill 2003). This book was selected, as it was a developmentally appropriate book for this population.

Teacher and Interventionist

The head teacher within the preschool learning environment was a doctorate student in Curriculum and Instruction, at the university where the study took place. Additionally, she was certified by the Behavior Analysis Certification Board™ as a Board Certified Behavior Analyst (BCBA). The 1:1 instructors/interventionists were master's degree level graduate students in Applied Behavior Analysis at the university where the study took place. Both the teacher and interventionists were trained on the procedures by the primary investigator, prior to the onset of the study.

Dependent Measurement

The dependent measurement system for this study involved the collection of probe data (either a yes response or a no response) in terms of independent tacting. The probe was scored as a "yes" if the participant selecting the visual icon on the screen of the SGD that corresponded with the visual stimuli within the book, with enough force to evoke the synthesized vocal output. The probe was scored as a "no" if the participant either selected an incorrect icon on the screen of the device or did not respond within five-seconds of the presentation of the stimuli. Data were collected by either the primary investigator or the classroom teacher.

Experimental Design

A multiple baseline across participants design (Gast 2010) was used to evaluate the effects of training on the demonstration of independent tacting. Training was introduced in a staggered format, following stability in baseline data.

Interobserver Agreement and Procedural Fidelity

Interobserver agreement (IOA) data were collected for 45% of trials, through the collection of data by both the primary investigator and the classroom teacher, using a trial-by-trial method. IOA was calculated by taking the number of agreements and dividing that by the number of agreements, plus disagreements, multiplied by 100. IOA was 100% for the dependent measure. Procedural fidelity was ensured by the collection of a fidelity probe by the interventionist following every session. Fidelity probes indicated that the procedures were followed, as designed, for 100% of the trials. Additionally, the primary investigator was present for 90% of sessions to ensure fidelity of implementation.

General Procedures

Circle Time Sessions took place during "circle time" within the preschool classroom. Typically, there were three "circle times" per day; however, on some instance there were only two due to the group activities that were planned by the classroom teacher. "Circle time" occurred at the same time each day, first immediately upon arrival, next 90-min after arrival, and then immediately prior to departure. "Circle-time" lasted an average of five-minutes; however, this also varied depending on the activities that were planned by the classroom teacher. The "circle time" activities included reading the "Where's Spot?" storybook, singing of songs, completing a calendar and weather activity, and a movement (i.e., dancing) activity.

Tacting Sessions Sessions occurred during the reading of the "Where's Spot?" storybook. "Where's Spot?" is a lift-the-flap storybook that contains an animal (i.e., bear, alligator, snake, etc.) under each flap. Each participant was assigned two target animals, on non-consecutive pages, that were already in that participant's listener responding repertoire (i.e., the participant could receptively identify the animal in an array). During the reading of the storybook, when the teacher arrived at the particular page that contained the target for the respective participant, the teacher would hold the book within three inches of the participant, read the text and pause. If the participant immediately lifted the flap, the teacher would then point to the animal and wait for five-seconds for the participant to independently tact. If the participant did not immediately lift the flap, the teacher lifted the flap, pointed to the animal, and waited five-seconds for the participant to independently tact. The book continued in this manner until all three of the participants had two opportunities to tact each two animals under the respective flaps. Thus, the participant had one opportunity to respond, per target animal, during each session, with an average of 2.7 sessions occurring per day. Each session lasted approximately two-minutes.

Baseline During baseline sessions, the story was read as described above. When the teacher reached the page in the book that displayed the targeted animal, she waited for five-seconds. If the participant did not tact the animal within five-seconds, or if the participant selected a picture-icon that lacked correspondence to the animal, the trial was scored as a "no" and the trial was concluded. If the participant independently tacted the animal, the teacher provided social praise such as "You're right! That is a snake.", the trial was scored as a "yes", and the trial was concluded. No prompting of accurate tacts occurred during baseline.

Training During training sessions, the story was read as described above. When the teacher reached the page in the book that displayed the targeted animal, she waited for five-seconds. If the participant did not tact the animal within five-seconds, or if the participant selected a picture-icon that lacked correspondence to the animal, the trial was scored as a "no" and the interventionist provided a full-physical prompt was used to evoke correct responding. The classroom teacher provided mild social praise contingent upon prompted responses. If the participant independently tacted the animal, the teacher provided exaggerated social praise, the trial was scored as a "yes", and the trial was concluded. Sessions continued in this manner until each participant achieved a

mastery criterion of 100% across both targets for three consecutive sessions. Once the participant met mastery criteria, maintenance sessions were introduced.

Maintenance

Maintenance sessions were conducted identical to baseline, in that no prompting occurred. Maintenance sessions continued until the last day of the four-week preschool program.

Results

The results for all three participants are depicted in Fig. 1. Baseline data for all three participants were highly stable, as there were no demonstrations of independent tacting prior to the introduction of training. Rachel and Norman both acquired the ability to tact both animals with relative immediacy, requiring an average of five sessions to reach mastery criterion. Additionally, the collection of maintenance data for Rachel and Norman indicate that this skill maintained, despite withdrawing the five-second-time delay prompting procedure. For Lisa, practical time constraints, with the conclusion of the preschool program only allowed for the acquisition of one of the targeted animals to mastery criterion. Additionally, maintenance data were not collected for Lisa, due to the preschool program ending.

Rachel

The tacting targets selected for Rachel were "hippo" and "penguin". As depicted in Fig. 1, she never independently tacted either target during three sessions of baseline. After three sessions of training, Rachel tacted both targets at 100% independence for three consecutive sessions, achieving mastery criterion, with an average of 50% independent responding across both targets. During nine maintenance sessions she averaged 100% independent responding for "hippo" and 67% independent responding for "penguin". Visual analyses of Rachel's data provide clear indications of experimental effect in terms of stability, magnitude, and immediacy. In regards to effect size, the calculation of the percentage of non-overlapping data indicates the treatment was moderately effective, with 83% non-overlapping data across baseline, treatment, and maintenance.

Norman

The tacting targets selected for Norman were "bear" and "monkey". He never independently tacted either target during nine sessions of baseline. After one session of training, Norman tacted both targets at 100% independence for three consecutive sessions, achieving mastery criterion, with an average of 75% independent responding across both targets. During five maintenance sessions he averaged 100% independent responding for both targets. Visual analyses of Norman's data provide clear indications of experimental effect in terms of stability, magnitude, and immediacy. In regards to effect size, the calculation of the percentage of non-overlapping data indicates the treatment was highly effective, with 95% non-overlapping data across baseline, treatment, and maintenance.

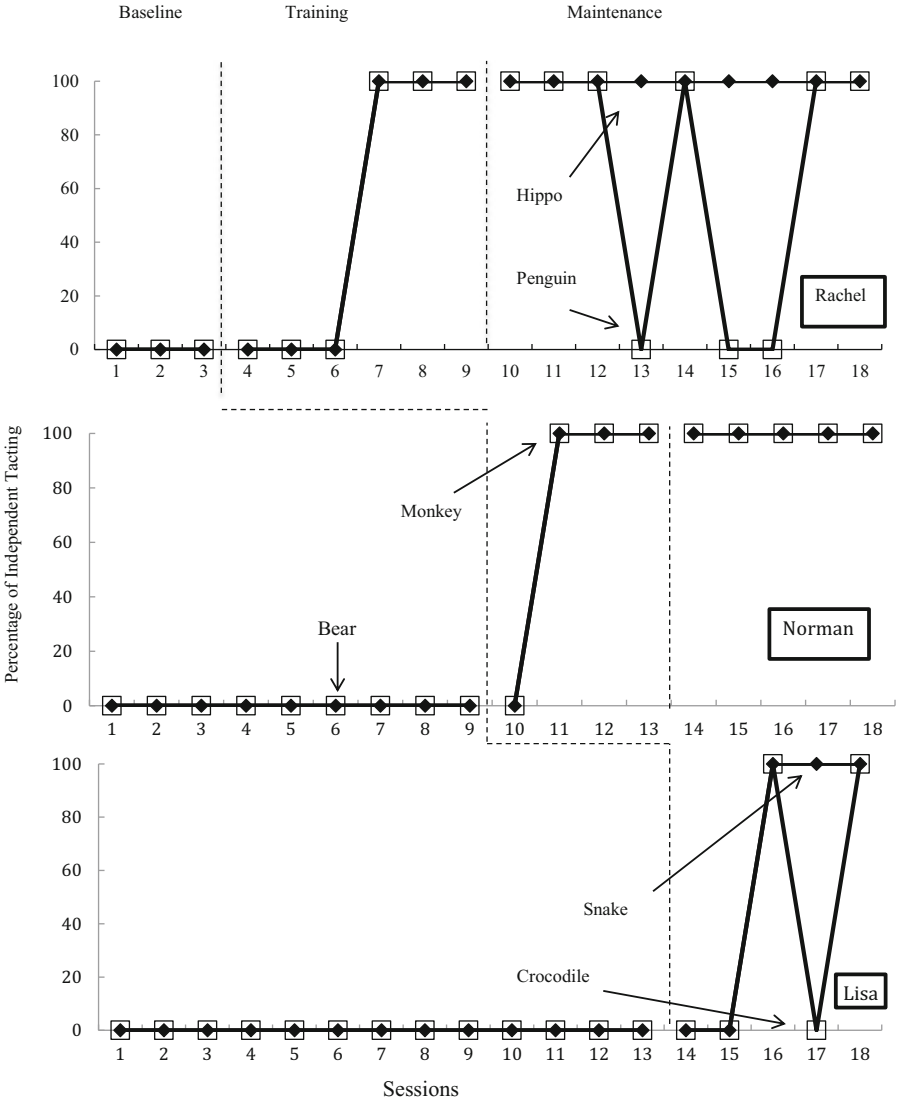

Fig. 1 Percentage of Independent Tacting. This figure depicts the percentage of independent tacting for all three participants across baseline, training, and maintenance

Lisa

The tacting targets selected for Lisa were "snake" and "crocodile". She never independently tacted either target during 13 sessions of baseline. After two sessions of training, Lisa tacted "snake" at 100% independence for three consecutive sessions, achieving mastery criterion, with an average of 60% independent. After two sessions of training, Lisa independently tacted "crocodile" at 100% independence, however this returned to 0% during session five of training, returning to 100% for session six of training. She averaged 40% independent responding for "crocodile" during five

sessions of training. Due to the conclusion of the preschool program, Lisa was not able to reach mastery criterion for "crocodile". Additionally, due to this time constraint no maintenance data were collected for either target. That said, visual analyses of Lisa's data for the target "snake" provide clear indications of experimental effect in terms of stability, magnitude, and immediacy. Visual analyses for the target "crocodile" are less convincing given the lack of stable responding. In regards to effect size, the calculation of the percentage of non-overlapping data indicates the treatment is highly effective, with 95% non-overlapping data across baseline, treatment, and maintenance for the target "snake". Percentage of non-overlapping data is not an appropriate analysis for "crocodile", as mastery criterion was not achieved for this target.

Discussion

The purpose of this study was to evaluate the acquisition of tacting, for preschoolers with autism who use an iPad® based speech-generating device (SGD) to communicate, using a group learning scenario. All three participants acquired the ability to tact at least one of the targeted stimuli, in a group learning setting, using the iPad® as a SGD. These results add support to the existing literature base on the use of new technology for verbal behavior training. Additionally, the inclusion of a five-second-time delay with full physical prompting provides continued evidence for the use of time delay prompting in verbal behavior training. Thus, this evaluation extends the literature in a meaningful way.

The use of "circle-time" as the instructional environment, as well as a commonly read storybook for young children, allowed for this evaluation to occur in a naturalistic manner. These factors are of utmost importance to the current climate of early intervention for preschool aged children with autism for two reasons. First, there has been a marked lack of literature in terms of verbal behavior training using new handheld technology as a speech-generating device (SGD) beyond the mand repertoire (Lorah et al. 2014a). Therefore, this study extends the literature base for the use of such technology as a SGD.

Second, those studies that have looked beyond the mand (i.e., Lorah et al. 2014a, 2014b) and many of those studies that have investigated the acquisition of a mand repertoire (i.e., Lorah et al. 2014a, 2014b) have relied on the use of artificial learning environments, such as a discrete-trial format for instructional purposes. We have seen a shift in instructional practice from an artificial learning environment to the natural environment for many important skills within the scope of early intervention for autism treatment (Schreibman et al. 2015). This continued shift must be supported by a synonymous shift within the literature. This study helps to facilitate such a movement. Additionally, the incorporation of a group-learning environment is a unique inclusion in terms of verbal behavior training and is one that warrants mentioning in terms of naturalistic teaching procedures.

The use of the gestural "point" prompt on the part of the teacher to occasion the tact warrants consideration. That is, according to Skinner (1957), a tact is verbal behavior that is evoked by a nonverbal discriminative stimulus and followed by generalized conditioned reinforcement. Given our use of the verbal behavior (i.e., the gesture), in addition to the nonverbal stimulus, we are not able to determine if the verbal behavior on the part of the participants were in fact pure tacts. Additionally, in an attempt to ensure the verbal behavior of the participants was followed by generalized conditioned reinforcement, contingent social praise was used. While it is possible for us to

determine the use of such a consequence was reinforcement (as the behavior increased), it is not possible for us to determine if it was a generalized reinforcer. However, while these two aspects of our research design remain worthy of consideration, they are consistent with common circle or story time procedures for children as well as tact training procedures for the targeted population.

Practical time constraints produced the greatest limitations of this investigation; however, time constraints are a common occurrence for research occurring in naturalistic settings. Given the conclusion of the preschool program, one participant (Lisa) was not able to achieve mastery criterion for both tacting targets. Thus, for this participant we are limited in terms of the strength of experimental effect. Additionally, for Lisa, the collection of maintenance data were not possible. This is an additional limitation forced by time constraints. An additional consideration is the variability of the data for Rachel. One possible factor leading to that variability is the total opportunities for responding presented within each session. In order words, given that each target was only presented once, per session, per participant, the possible percentage of correct responding was equal to either zero or 100%. On three occasions during maintenance Rachel did not independently tact "penguin" and therefore there is some variability in maintenance data for Rachel.

Further limitations include the lack of generalization data. It would be meaningful to determine if the training effects would have generalized to additional stimuli, environments, and instructors. Finally, this evaluation did not include a measure of social validity to determine the meaningfulness of such training to community stakeholders such as the parents and/or guardians of the participants. Future investigations should seek to extend this research taking into account both generalization and social validity.

In addition to those implications for future research addressed, it is important for the research community to continue to evaluate how these new technologies can be used in the acquisition of verbal behavior, beyond the mand repertoire, for children with autism and related disabilities. Additionally, research on verbal behavior incorporating handheld SGDs with interventions occurring in the natural environment should continue to be explored, as the importance of natural environment teaching, combined with discrete-trial teaching may produce a more complete language repertoire in young children with autism (Sundberg and Michael 2001).

Despite the limitations described and considerations for future research, the results of this study indicate that the iPad® and application Proloquo2Go™ as a SGD were effective for the acquisition of tacting (labeling) pictures within a common storybook as part of a group circle time, for young children with autism or developmental disability.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in compliance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participant's legal guardians included in the study.

Conflict of Interest Elizabeth R. Lorah declares no conflict of interest.
Ashley Parnell declares no conflict of interest.

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