Audience Control and the Emission of Stereotypy and Social Verbal Exchanges in Children With Autism and Developmental Disabilities

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Abstract

In 2 experiments, using a within-subjects alternating-conditions design, we measured our participants' stereotypic and verbal behavior under 2 audience conditions. Our participants were 8 children, ages 10 and 11 years, diagnosed with autism and related developmental disabilities. We measured the percentage of intervals with occurrences of stereotypy (Experiment 1) and the number of verbal operants emitted per minute (Experiment 2) in the presence of 2 types of audiences: members of the participants' own special education class and typically developing peers from general education classes. Results from both experiments demonstrated that participants emitted a lower percentage of intervals with stereotypy and higher rates of social verbal operants in the presence of their typically developing peers than in their self-contained special education classrooms.

Keywords Audience control · Inclusion · Stereotypy · Verbal operants

The question of whether to include children with developmental disabilities, including autism, in general education (GE) settings is of great importance to parents and educators alike. A large body of research has demonstrated that peers can serve as effective models for children with disabilities, provided that they demonstrate the necessary observing responses and subsequent duplication or emulation of the model's behavior to match the contingency observed (Alquraini & Gut, 2012; Bandura, 1977; Browder, Schoen, & Lentz, 1986; Catania, 2013; DeQuinzio & Taylor, 2015; Fryling, Johnston, & Hayes, 2011; MacDonald & Ahearn, 2015; Ogelman & Seçer, 2012; Rafferty, Piscitelli, & Boettcher, 2003; Taylor & DeQuinzio, 2012). Research has demonstrated the effects of peer models on social behaviors, as well as on the learning of new responses (Charlop, Schreibman, & Tryon, 1983; Egel, Richman, & Koegel, 1981; Greer, Singer-Dudek, & Gautreaux, 2006; Jones & Schwartz, 2004; Lanter & Singer-Dudek, 2020; Lee, Odom, & Loftin, 2007; Lord & Hopkins, 1986; Singer-Dudek, Choi, & Lyons, 2013; Strain & Timm, 1974). Often children with developmental disabilities are included with their typically developing peers in order to

provide opportunities to learn or improve social behaviors, but it is uncertain whether educators are making these decisions based on empirical measures of children's readiness to be included.

It is not enough that peers simply model appropriate behavior. In order for children to benefit socially from inclusive settings, interactions with peers must be mutually reinforcing for both the child with the disability and the peer. The presence of individuals who have previously reinforced the learner's speaker behavior may occasion previously reinforced responses. Conversely, the presence of other individuals who have delivered punishers in the past may suppress the learner's speaker behavior. The contextual stimulus control exerted by certain individuals in the environment is known as *audience control* (Skinner, 1957). Audience control is established when the individuals in the environment acquire contextual stimulus control through their history of reinforcement or punishment for certain response classes and subclasses (Michael, Palmer, & Sundberg, 2011; Skinner, 1957; Spradlin, 1985).

An audience may be described as a reinforcing (supportive and friendly) audience or a punishing (evaluative, unfriendly, or threatening) audience (Blascovich, Mendes, Hunter, & Salomon, 1999; Butler & Baumeister, 1998; Feinberg & Aiello, 2010; Seta & Seta, 1995; Spradlin, 1985; Taylor et al., 2010). Individuals are under the control of the audience as a discriminative stimulus when their behavior corresponds

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to the contingencies mediated by the audience present in the environment. When a behavior has been previously reinforced by an audience, it will likely occur again in the presence of that audience; if a behavior has been punished, it will likely not occur in the presence of a similar audience. For example, a teen may use a different volume, tone, and vocabulary when speaking to friends than when speaking to parents or teachers, as peers are likely to reinforce behaviors that parents and teachers do not.

Research has shown that the mere presence of an audience (e.g., passive or blindfolded individuals) can exert stimulus control, thereby improving the performance of mastered or dominant responses in adult participants (Cottrell, Wack, Sekerak, & Rittle, 1968; Rajecki, Ickes, Corcoran, & Lerner, 1977). Several studies have demonstrated that performance can be weakened in the presence of reinforcing/supportive audiences but is often improved in the presence of an evaluative one (Blascovich et al., 1999; Butler & Baumeister, 1998; Feinberg & Aiello, 2010; Seta & Seta, 1995; Taylor et al., 2010). Cottrell et al. (1968) and Rajecki et al. (1977) found that dominant (mastered) responses were enhanced by the presence of an audience, but the mere presence of others did not affect performance. Presumably, the audience present was an evaluative one. Seta and Seta (1995) found similar results in their study, in which participants performed a previously mastered task in front of two types of audiences: one that was aware of their prior success with the task and one that was unaware. Participants demonstrated improved performance in front of the audience that was unaware of their prior success (e.g., an evaluative audience), whereas their performance was poorer in the presence of an audience who was aware of their prior success (e.g., a friendly audience). Feinberg and Aiello (2010) also found that performance was enhanced by the presence of an evaluative audience; however, they also found that the presence of a “threatening” audience resulted in impeded performance. In all of these studies, it is likely that the evaluative, “unfriendly” audience served as a discriminative stimulus for punishment for imperfect performance, whereas the familiar or “friendly” audience functioned as a discriminative stimulus for reinforcement regardless of performance. It is important to note that all of the aforementioned studies involved adult participants.

Other studies have demonstrated that children can be taught particular repertoires (e.g., tacts) under convergent multiple control, resulting in differential responding according to contextual, motivational, and audience variables (Dixon, Blevins, Belisle, & Bethel, 2019; Michael et al., 2011; Schaffler & Greer, 2006; Spradlin, 1985; Stocco, Thompson, & Hart, 2014). Rosenberg, Spradlin, and Mabel

(1961) found that rates of verbal exchanges between pairs of adolescent males with developmental disabilities were greater when the pairs consisted of members with similar verbal repertoires (reinforcing audience) than when their verbal repertoires were more disparate. This was true even when a pair consisted of two members whose verbal repertoires were limited. Donley and Greer (1993) found that children with developmental disabilities emitted more conversational exchanges with one another when the teacher was absent from the room than when she was present. When the teacher entered or left the room, the stimulus control for the children’s behavior changed accordingly. It is likely, in this case, that the teacher functioned as a punishing audience.

When children’s behavior is not under the stimulus control of the audience, it is likely because those audience members do not act as discriminative stimuli that evoke socially acceptable behaviors or suppress unacceptable behaviors. In some cases, the child may not contact the contingencies associated with audience reactions to his or her behavior because the audience’s responses do not function as conditioned reinforcers or punishers. The emission of socially inappropriate or unacceptable behaviors in inclusive settings may result in the child being avoided, ridiculed, and/or ignored or barred from social groups. One common type of behavior that can lead to these responses on the part of the peers is stereotypy. Stereotypy is defined as repetitive, kinesthetic behaviors that serve no function for the individual outside of the sensory reinforcement from the emission of the behavior itself (Greer, Becker, Saxe, & Mirabella, 1985; Hanley, Iwata, Thompson, & Lindberg, 2000; Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002; Vaughan & Michael, 1982). Another potential limiting factor to successful inclusion involves social and verbal interactions between students with developmental disabilities and their peers. If peers do not occasion either listener or speaker responses, students with disabilities will likely lose opportunities to initiate or reciprocate verbal exchanges in the future.

Of the research studies cited here, none have examined the audience effects of the presence of GE students on the behaviors of children with disabilities. Further, none have focused on the emission of stereotypy in the presence of different types of audiences. In the following experiments, we measured whether our participants’ behaviors were under the audience control of their GE peers. In the first experiment, we sought to systematically test whether our participants’ emission of stereotypy would vary according to the audience present. In the second experiment, we sought to determine whether our participants’ rate of verbal operant emissions would vary according to the audience present. In both experiments, the two audience conditions were (a) the presence of other students with autism and related developmental disabilities only and (b) the presence of typically developing peers.

Experiment 1

Method

Participants and Setting Four participants were selected from a self-contained special education (SE) class housed in a public elementary school serving children in Grades 3–5 located in a suburb of a major metropolitan area. The class consisted of six students, one teacher, and two teaching assistants. Tom was a 10-year-old male diagnosed with autism. Rose was a 10-year-old female diagnosed with autism. Richard was a 10-year-old male diagnosed with an emotional disability. Miles was a 10-year-old male diagnosed with autism. All four participants engaged in speaker/listener exchanges with others, were under joint stimulus control for reader/writer behavior, and demonstrated bidirectional naming and observational learning. All participants received instruction in GE classes on subjects for which they were on grade level and for all nonacademic subjects. All other instruction took place in the SE classroom.

Data were collected while participants were either in their self-contained SE classroom or in a variety of settings throughout the school, including a GE classroom, school cafeteria, gymnasium, and choir room. Audience members present consisted of either SE students only or GE students. In SE settings, participants were solely with other students from their self-contained class (6 students in total) or they were combined with another SE class (14 SE students in total). During probe sessions conducted in the GE classroom, approximately 24 GE students were present, along with one other student from the participant's SE class. The cafeteria setting had over 100 GE students at a time, along with the 14 SE students. Participants either sat alone with their SE class or with members of their mainstream GE class (approximately 24 students) during lunch.

Dependent Variable The dependent variable was the percentage of 5-s intervals during which the participants emitted any instance of stereotypy during 5-min probe sessions across settings. We measured the participants' behaviors during academic instruction in the SE classroom, academic instruction in the GE classroom, during specials when they were with their SE class only and when they were included with a GE class, and during free time and lunch in the presence of the peers from the SE class or the GE audience.

For Tom, stereotypy was defined as body rocking, head tossing, galloping, and laying on the floor and rocking. For Rose, stereotypy was defined as finger picking, twitching her face, raising her hands close to her ears and the back of her head while making exaggerated mouth movements, and lifting both legs while bending her knees. For Richard, stereotypy was defined as emitting nonlexical vocalizations and backward head tossing. For Miles, stereotypy was defined as

hand flapping, finger twitching, and emitting facial gestures with either behavior.

We measured the participants' emission of stereotypy in 5-min sessions, divided into 60 continuous 5-s intervals, using partial-interval recording. Any occurrence of stereotypy was recorded as an "S," and no occurrence of stereotypy during the whole 5-s interval was recorded as a plus. The total number of intervals where stereotypy was observed was tallied, divided by 60, and multiplied by 100 to yield the percentage of intervals of stereotypy.

Independent Variable The independent variable was the audience members present throughout different school settings. Settings included classroom settings, as well as the school cafeteria, playground, gymnasium, and choir room, where either the SE or GE students were present. In the SE setting, there were a higher teacher-to-student ratio and peers with a diagnosis of autism or related disorders who emitted stereotypy and other stereotypical behaviors. In the GE setting, there were only one or two students with a developmental disability diagnosis present at any time; the other peers generally emitted socially acceptable behaviors.

Design and Data Collection Procedures We used a within-subjects alternating-conditions design to test the effects of different audiences on the frequency of stereotypy across settings. We determined which setting we would observe each day by drawing a piece of paper out of a basket containing multiple pieces of paper with either SE or GE written on them and collected data in the corresponding setting that matched the participants' daily schedule. For example, if GE was chosen and the participants had choir with the GE students that day, we collected data in the choir room. If SE was chosen and they had physical education class with members of the other SE class, we collected data in the gymnasium.

Interobserver Agreement Interobserver agreement (IOA) was obtained by having an independent observer collect data simultaneously with but independently of the primary researcher. One independent observer functioned as a teaching assistant in the SE classroom, and the other was the head teacher for the neighboring SE classroom. Prior to the experiment, both independent observers had been trained to deliver instruction and consequate student behavior using the Teacher Performance Rate Accuracy system for measuring the efficacy of behavior-analytic teaching practices (Ingham & Greer, 1992; Ross, Singer-Dudek, & Greer, 2005). Both were experienced in observing and recording student behaviors. The primary researcher trained both observers on the definitions of the behaviors and how to record them. Agreement was calculated by dividing the number of interval-by-interval agreements by the total number of agreements plus disagreements and multiplying by 100.

For Tom, IOA was obtained for 28% of probe sessions with a mean of 99.4%, ranging from 97% to 100% agreement. For Rose, IOA was obtained for 32% of probe sessions with a mean of 95.8%, ranging from 88% to 100% agreement. For Richard, IOA was conducted for 35% of probe sessions, with a mean of 94.8%, ranging from 88% to 100%. For Miles, IOA was conducted for 22% of probe sessions, with a mean of 97% and ranging from 90% to 100%.

Results

Figure 1 displays the mean percentage of intervals during which each participant emitted stereotypy across all settings in the presence of the SE and GE audiences. Figures 2 and 3 display the percentage of intervals during which the participants emitted stereotypy across the two audience conditions. Tom engaged in a relatively low percentage of intervals of stereotypy in GE settings ($M = 1.38\%$, range 0%–7%) compared to the SE setting ($M = 27.6\%$, range 13%–55%). Rose's mean percentage of intervals of stereotypy in GE settings was only 0.3% (range 0%–2%), whereas her percentage of intervals of stereotypy in the SE setting, although variable, was much higher ($M = 29.75\%$, range 5%–58%). Richard demonstrated a relatively low percentage of intervals of stereotypy in both settings, but his mean in the SE setting was higher ($M = 5.5\%$, range 0%–18%) than his mean percentage in the GE settings ($M = 0.06\%$, range 0%–3%). Miles's mean percentage of intervals of stereotypy was consistently higher in the SE setting ($M = 15.8\%$, range 3%–57%) than in GE settings ($M = 1.09\%$, range 0%–5%).

Results of the 5-min probe sessions across two audiences demonstrate a functional relation between the percentage of intervals of stereotypy and the type of audience present. All

participants consistently emitted stereotypy more frequently in the presence of their SE peers than when they were with GE peers. When in the presence of an audience of GE peers, the percentage of intervals during which stereotypical behaviors were observed was low to near zero. Richard emitted a low percentage of intervals in both settings; however, the mean percentage of intervals of stereotypy in the presence of SE peers was higher.

These data alone do not tell us whether our participants subsequently benefitted from their inclusion in the GE environment by having more opportunities to interact with their typically developing peers. In Experiment 2, we measured the number of verbal operants emitted by a different set of participants across two similar conditions: the presence of (a) peers from the participants' SE class and (b) GE students.

Experiment 2

Method

Participants and Setting Four upper elementary-aged participants participated in this study. Adam was 11 years old and had an educational diagnosis of autism. He was an emergent reader, emitted speaker/listener exchanges with others, and demonstrated basic listener literacy, speaker-as-own-listener behavior, say-do correspondence, and bidirectional naming. Jordan was 10 years old and had an educational diagnosis of autism. He was an emergent reader/writer, emitted speaker/listener exchanges with others, and demonstrated bidirectional naming. Ricky was 10 years old and had an educational diagnosis of autism. He emitted independent mands and speaker/listener exchanges with others, and he demonstrated speaker-

Fig. 1. Mean percentage of intervals with occurrences of stereotypy across GE and SE audiences for Tom, Rose, Richard, and Miles in Experiment 1

Fig. 2. Percentage of intervals with stereotypy across GE and SE settings for Tom and Rose in Experiment 1

as-own-listener behavior and say-do correspondence. Evan was 11 years old and had an educational diagnosis of an emotional disability. He emitted speaker/listener exchanges with others, as well as reader/writer behavior, and he demonstrated bidirectional naming and observational learning. All diagnoses were taken from the participants' individualized education plans.

The participants attended a self-contained SE class housed within a public elementary school for children in Grades 3–5 located in a suburb of a major metropolitan area. The class contained eight children, one teacher, and three teaching assistants. All participants attended physical education along with a GE class two times per week, but they also had opportunities to participate in their own physical education class with their SE classmates two times per week.

The study was conducted in the school's gymnasium, under two audience conditions. The first was when the

participants were included with another GE class from the school, and the second was when only the members of the SE class were present. During the GE class, 21 children and 3 adults were present; 8 children and 3 adults were present during the SE class. The participants were accustomed to having their teachers or teaching assistants accompany them to physical education class, so the presence of the observers during the probe sessions was not novel; the adults were present in both environments. The setup of the gymnasium was a standard gym layout: There were high ceilings; a large, spacious center floor; and four large basketball hoops located in the center of each wall.

Dependent Variables We calculated the rate of verbal operants emitted in a 5-min interval during a 30-min physical education class when either of the two different audiences was present. We measured the total number of participants' discrete

Fig. 3. Percentage of intervals with stereotypy across GE and SE settings for Richard and Miles in Experiment 1

speaker responses emitted in the 5-min interval, then divided that number by 5 to yield the number per minute. We did not differentiate whether the participants initiated or responded to the speaker behavior of others. If a peer initiated the verbal exchange, we waited until the participant responded and then counted the participant's speaker response. Speaker/listener exchanges between the participant and a peer that extended beyond a single speaker response from the participant were counted as one occurrence, no matter how many exchanges occurred, provided that no more than 3 s elapsed without either child speaking. A new occurrence was recorded once the participant emitted another speaker operant.

Independent Variables The independent variables were the different audience contingencies during the physical education class. We measured the verbal operant emissions under

two different audience conditions—the presence or absence of typically developing peers. In the SE condition, the participants were alone with students from their own class, and during the GE condition, four students from the SE class were present along with the peers from a GE class.

Design and Data Collection Procedures We used a within-subjects alternating-conditions design to test for the effects of different audience contingencies on the participants' number of verbal operants. For each session, the audience condition was picked out of a basket to allow for the nonsystematic alternation of sessions.

Interobserver Agreement The classroom teacher served as the primary experimenter. Due to her experience in the classroom, the experimenter was skilled in observing and recording data

on participants' behaviors. A teaching assistant from the participants' classroom served as the second observer and was trained by the experimenter on all dependent variable definitions. The experimenter and second observer independently observed one participant at a time for a 5-min interval and recorded the number of speaker operant emissions that occurred during the entire observational session.

IOA was collected for 100% of the sessions for all four participants. We calculated IOA by dividing the number of agreed-upon verbal operants by the total number of agreements plus disagreements and multiplying by 100. The mean agreement for Adam was 96% with a range from 87% to 99%. For Jordan, we obtained a mean agreement of 98% with a range from 95% to 100%. For Ricky, the mean agreement was 95.5% with a range from 93% to 100%. We obtained a mean agreement of 97% for Evan, with a range from 88% to 99%.

Results

Our results demonstrate a functional relation between the type of audience present and the rate of verbal behavior. Figure 4 displays the mean number of verbal operants emitted per minute across the SE and GE settings for all four participants. The results show that all participants emitted higher rates of verbal operants in the presence of their GE peers than with their SE classmates.

Figures 5 and 6 display the number of verbal operants per minute emitted by participants during physical education class with either their classmates from their self-contained SE class or their GE peers. Adam's mean rate of verbal operant emissions was 4.88 in the GE setting (range 0–6 verbal operants per minute), and he emitted no verbal operants in the SE

setting. Jordan's mean rate of verbal operants in the GE setting was 3.66 (range 1–5.67), whereas in the SE setting Jordan's mean was 0.14 verbal operants per minute (range 0–1). Ricky emitted a mean of 3.11 verbal operants per minute in the GE setting (range 0–4.66), and his mean rate of verbal operant emissions in the SE setting was 0.57 (range 0–1). Evan's mean rate of verbal operants emitted in the GE setting was 4.33 (range 3–8), whereas in the SE setting his mean number of verbal operants per minute was 0.35 (range 0–1).

Discussion

The results from both experiments reveal that our participants' behaviors were under the contextual stimulus control of the audience. In Experiment 1, the mean percentage of intervals during which our participants emitted stereotypical behaviors in the presence of their SE classmates ranged from 16% to 53%, whereas in GE settings the means were no higher than 1.4% for any of the participants. Their stereotype was almost undetectable in GE settings. We surmise that this was due not to the fact that the peers served as appropriate peer models, although that may have certainly been the case, but because the GE peers had acquired stimulus control as a punishing audience due to their history of disapproval or avoidance. Meanwhile, in SE settings, our participants emitted considerably more stereotypy, as did many of the other SE students. It is likely that the audience in the SE setting functioned as a reinforcing or supportive audience; the participants had not contacted punishment contingencies for emitting stereotypy in the SE setting.

An additional yet important anecdotal observation from Experiment 1 was the request by the participants to have it

Fig. 4. Mean number of verbal operant emissions per minute across GE and SE audiences for Adam, Jordan, Ricky, and Evan in Experiment 2. The arrow indicates zero responses

Fig. 5. Number of verbal operants emitted per minute in the presence of GE and SE audiences for Adam and Jordan in Experiment 2

be their turn to attend the GE class. This suggests that the interaction with the typically developing peers functioned as a reinforcer, thereby selecting out behaviors that were likely to be reinforced while suppressing those that were likely to be punished. It is possible that the participants had access to social reinforcement in the GE settings that was not available in the SE classroom. This led us to Experiment 2, where we measured and compared social verbal emissions across the two audience conditions.

Experiment 2 revealed that our participants emitted high rates of verbal operants to and in the presence of the GE peers. Conversely, they emitted low rates of verbal operants in the presence of their SE classmates, and, in many cases, they emitted no speaker behavior at all. The SE classmates also

emitted low rates of verbal operants, so it is likely that there were few opportunities for reinforcement in the SE setting. It is possible that a lack of a history of reinforcement from classmates may have led to the extinction of verbal operant emissions in the SE setting.

These findings are different from Rosenberg et al.'s (1961), who found that participants emitted more conversational exchanges when their verbal levels were similar, even when their verbal levels were low. On the other hand, one explanation for the high rates of verbal emissions during sessions where GE peers were present is that the participants' verbal behavior was reinforced. In this case, the GE peers served as not only a reinforcing audience but also a listening audience that occasioned verbal behavior emissions. The peers reinforced

Fig. 6. Number of verbal operants emitted per minute in the presence of GE and SE audiences for Ricky and Evan in Experiment 2

the participants' speaker behavior, thereby creating a history of reinforcement leading to convergent stimulus control for verbal behavior that the SE audience lacked (Michael et al., 2011; Skinner, 1957).

One limitation to Experiment 2 is that we did not differentiate between speaker operants that were initiated by the participants and responses that our participants emitted to initiations made by their peers. Future studies should measure both overtures and reciprocations, in order to yield a clearer picture of participants' social verbal behaviors. Longer observational sessions (10–15 min) may also be warranted.

Our findings from both experiments are by no means definitive, nor are our conclusions about the reinforcement or punishment contingencies contacted in GE settings supported by empirical evidence. However, what we have demonstrated is that for participants like ours, the suppression of stereotypy and other socially inappropriate behaviors or the opportunity to engage in mutually reinforcing social verbal exchanges with typically developing peers is an indication that our participants were rightly included in GE settings. Future studies should systematically measure socially significant outcomes for those whose behaviors are observed to be under audience

control. Future research may also focus on establishing reinforcement during speaker-listener exchanges, using procedures such as those used by Reilly-Lawson and Walsh (2007), and testing the effects of such newly conditioned reinforcers on social verbal emissions in the presence of different audiences.

We propose that the presence of such audience-specific control over behaviors such as stereotypy or social verbal interactions may be an indication of a child's readiness to be included in a GE setting. The procedures we employed in the present studies were noninvasive and were conducted as part of the participants' regular school day. Such measures should be easy to obtain for children in self-contained educational settings who are being considered for inclusive or mainstream educational placements. Demonstration of audience control could be considered as an empirical criterion for children's potential to benefit from being included with GE peers.

Compliance with Ethical Standards

Conflict of Interest No potential conflict of interest is reported by the authors.

Ethical Approval All procedures used in this study involving human participants were approved by the appropriate institutional ethics committee and have been performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent All data reported in this study were collected in natural settings during participants' daily activities. Collection and reporting of such data on student behaviors were consented to by their parents/legal guardians as part of their educational program.

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Implications for Practice • Provides procedures for measuring audience control

- Highlights the importance of determining whether the behaviors of children with autism or related disabilities are under audience control
- Highlights the importance of measuring the social behaviors of children with autism in different environmental contexts
- Provides implications for educational placement for children with autism whose behaviors are under the stimulus control of the audience

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