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Manipulating establishing operations to promote initiations toward peers in children with autism

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Abstract

This study examined the effects of manipulating establishing operations on the frequency of initiations of three children with autism toward peers with autism. The EO targeted was deprivation of preferred edibles, and the target initiation was a mand for the preferred snack. A reversal design was used to assess the effects of the EO conditions on frequency of initiations. Results indicated that when the EO was absent, no spontaneous initiations toward the peer occurred. Two participants required training sessions with an adult to transfer initiations toward peers. Once the EO had been established and was present, the participants initiated mands for the snack. Results are discussed in terms of implications for the use of establishing operations in language training for children with autism.

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1. Introduction

Children with autism rarely initiate interactions with their peers with autism. As a result, specific teaching procedures are required to teach individuals with autism to respond to and initiate interactions with others. Interventions outlined in the literature have primarily focused on the use of stimulus control procedures to increase social interactions.

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Examples include the use of textual stimuli to promote simple conversation (Krantz & McClannahan, 1993), the use of vibrating pager prompts to increase initiations in typical classes (Taylor & Levin, 1998), and the use of various prompting procedures such as time delay (Charlop, Schreibman, & Thibodeau, 1985). More recently, researchers have begun examining the effects of manipulations of motivational variables on language production (Sundberg, 2004). There is, however, a paucity of research examining the manipulation of motivational variables to increase the initiations of children with autism toward their peers with autism.

Sundberg (2004) advocated for the systematic manipulation of establishing operations to increase language skills of children with autism. An establishing operation (EO) is defined by Michael (1988) as an environmental event “that affects an organism by momentarily altering (a) the reinforcing effectiveness of other events and (b) the frequency of occurrence of that part of the organism’s repertoire relevant to those events as consequences” (p. 192). For example, someone is more likely to ask for “water” after eating a bag of salty chips. Sundberg (1993, 2004) suggested that in order to use the EO in language training, the behavior analyst must either capture or contrive the reinforcing effectiveness of an event.

One response that is likely to occur when an EO is in effect is a mand. Skinner (1957) defined the mand as “a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation” (pp. 35–36). Prior research indicates that individuals with disabilities can be taught to initiate a mand for desired items. For example, in a review Shafer (1994) noted three strategies to increase manding in individuals with disabilities: incidental teaching, choice-making, and interrupted behavior chains. Halle, Marshall, and Spradlin (1979) demonstrated that mands could be taught to mentally retarded individuals by withholding a meal tray for 15 s to evoke a mand for the meal. Hall and Sundberg (1987) taught mands by manipulating *conditioned* establishing operations. Individuals who were both deaf and developmentally disabled were taught to complete a series of responses that led to a reinforcer (e.g., making soup). Experimenters systematically removed items needed to complete the response (e.g., removing the water needed to make soup), and taught the individual to mand for the missing items. Similarly, Duker, Kraaykamp, and Visser (1994) studied the effects of presenting incomplete activities (e.g., puzzles) on the rate of manding toward adults for missing items. Farmer-Dougan (1994) incorporated peers in their study demonstrating the effects of a peer-delivered incidental teaching procedure on the rate of requesting items needed to complete an activity. In that study, adults with disabilities living in a group residence were responsible for contriving an establishing operation by removing an item needed by the participant to complete an activity (e.g., preparing lunch). The peer was trained to withhold an item, wait for an initiation from the participant, and then provide a verbal prompt for an elaboration.

To date no research exists examining the effects of manipulating establishing operations on the initiations of children with autism toward their peers with autism. The purpose of this study was to assess the effects of manipulating the establishing operation of deprivation of preferred snacks on the frequency of mands of children with autism toward their peers with autism.

2. Method

2.1. Participants

Three male children diagnosed with autism participated in this study. Chris, age 12, used a voice output communication system (DynaMyte) to perform language tasks such as answering questions (e.g., “Where do you live?”, “How old are you?”), labeling various objects and pictures, and manding for preferred items with adults. Billy, age 4, had vocal ability and could engage in a variety of language tasks such as answering questions, reciprocating comments, and manding for information and preferred items with adults. Robert, aged 10, also had vocal ability and was able to reciprocate comments, answer questions, and mand for information and preferred items with adults. None of the participants was observed to initiate requests for preferred items with peers. The peers in this study also had autism and were within a 2-year age range of the participant with whom they were paired.

2.2. Setting

Baseline and intervention sessions were conducted at the participants’ school, in the participants’ classrooms. The classrooms contained typical teaching materials such as desks, chairs and toys. Other students and teachers were present in the room. Follow up probes were conducted in various rooms throughout the school (e.g., kitchen, other classrooms).

2.3. Materials

Preferred snacks for both the participant and the peer were identified prior to the study via free operant preference assessments. Those items determined to be preferred were restricted during the school day to increase the likelihood that they would be highly desirable. Preferences were also assessed prior to each session by presenting a sample of snacks and noting the choices made by the participants.

The voice output augmentative communication system used by Chris to communicate mands was the DynaMyte, a product of DynaVox System Software. The device is activated via a touch screen similar to that of a computer. The system presented text representing stimulus items (e.g., the word “Chip”). In order to activate the system, Chris was required to press the text representing the mand (e.g., he pressed each text stimulus for “John, I want chips please”), which generated an audible, synthesized vocal presentation of the message.

2.4. Target behavior and independent variables

The target behavior in this study was the number of independent mands directed toward the peer for the preferred item. In order for an independent mand to be scored, the participant had to look at the individual possessing the preferred item and make a request. Billy and Robert used vocal requests (e.g., “I want pretzel”, “I want popcorn, please”) and Chris requested using the voice output communication system. Motoric mands (e.g.,

reaching toward an item, or pointing) were not included in the definition. The independent variable was deprivation of snack items as indicated by a peer having access to all the snack items during the snack period.

2.5. Data collection and measurement

Data on independent mands were collected using a count-within interval procedure, and expressed as the total number of independent mands per snack period. Snack time was ended following 5 min without a mand and when snack was consumed, or when the participant made 10 mands.

2.6. Design and interobserver agreement

A reversal design was used to assess the effects of the establishing operation (deprivation of preferred items) on the frequency of mands of participants toward their peers. IOA data were collected in vivo by trained observers, were calculated using exact interval-by-interval comparisons for 33% of all sessions, and averaged 95%.

2.7. Procedures

2.7.1. General

During all sessions, the participant sat at a table in his classroom with a peer sitting next to or across from him. A teacher responsible for recording data was positioned approximately 10–15 ft from the participant. During sessions with Chris, his voice output communication device (the DynaMyte) was located next to him on the table. Prior to each session, the participants were offered a choice of three snacks that had been identified as preferred through pre-baseline preference assessments.

2.7.2. EO absent

During this condition, the selected snack items were presented on separate plates positioned directly in front of both the participant and the peer. Equal amounts of food were placed on each plate. The teacher presented the instruction, “Have a snack”. Both participants ate only the snacks on their own plates, and the teacher noted any verbal or nonverbal initiations made by the participant toward his peer. The session was terminated when 5 min elapsed, or when the snack was consumed.

2.7.3. EO present

During this condition, only the peer had access to the snack items. If the participant made an appropriate mand toward the peer for the snack item, the peer was prompted (if necessary) to hand a small portion of the snack to participant and to say “Here you go”. All prompts for the peer were quickly faded across sessions and eventually were no longer required.

2.7.4. EO with adult

During the initial sessions of the EO present condition, both Chris and Robert were observed to make initiations in the form of gestures toward their peers (e.g., pointing at

peer, touching the peer's arm), but did not vocally initiate (in the case of Robert) or use the communication device (in the case of Chris) for the snack item. Therefore, intervention sessions (EO present) were conducted with teachers to be sure participants could mand for these items with adults (i.e., their teachers). During these sessions, the teacher sat next to the participant and had the preferred snack item on a plate; the participant had nothing. The teacher consumed the snack located on her plate. If the participant made an appropriate mand (e.g., said "I want a chip" or used the voice output device), the teacher said "Sure" or "Here you go" and gave the participant a portion of the snack. If the participant initiated by gesturing (e.g., pointed at the snack) the teacher waited 15 s to determine if the participant would initiate the mand. If a mand was not made, the teacher modeled the response. Once the participants manded at least 10 times per snack session, peers were reintroduced in the EO present sessions.

During Billy's initial EO present sessions, teachers noted high rates of requests toward adults located around the classroom (indicating Billy was able to mand toward adults at a high rate). As a result, teachers modeled the response toward the peer in lieu of running separate training sessions with an adult. Prompts were provided using a least to most prompting hierarchy and were faded within the sessions.

2.7.5. *Follow up*

During follow-up intervention sessions with Billy, toys were used to assess transfer of the mand response. During these sessions, the teacher presented Billy and a peer with a toy item, such as a felt board, that required various pieces for proper use. During the EO sessions, only the peer had access to the toy pieces (e.g., items to be placed on the felt board). If Billy made an attempt to take a piece before asking, or made a gesture toward the peer, the teacher provided least to most prompting for the participant to mand for the toy (e.g., the teacher modeled "Emma, can I have the cow please?"). All prompts were faded within each session until Billy was manding for the items independently.

3. Results

The reversal design indicated that when the EO was absent in baseline, none of the participants made initiations toward peers. Fig. 1 illustrates the results for Chris, Robert, and Billy. During initial EO-present sessions with peers, none of the participants readily initiated mands toward peers. Chris and Robert gestured toward the peer but did not appropriately mand for the item, and Billy was observed to initiate mands toward adults located around the room rather than toward the peer. To determine if Chris and Robert were able to initiate mands with adults, EO sessions were conducted with their teachers. Using a delay procedure, Chris readily initiated the mands with adults but required an additional EO adult session to transfer responding to the peer. Robert on the other hand, did not readily initiate the mand with an adult using the delay procedure and required several sessions of prompted initiations. However, once the peer was reintroduced into the EO present sessions the participants initiated mands toward their peers. For all participants, the reversal to no EO conditions reduced mands to zero, suggesting that the EO was responsible for the increased initiations toward peers.

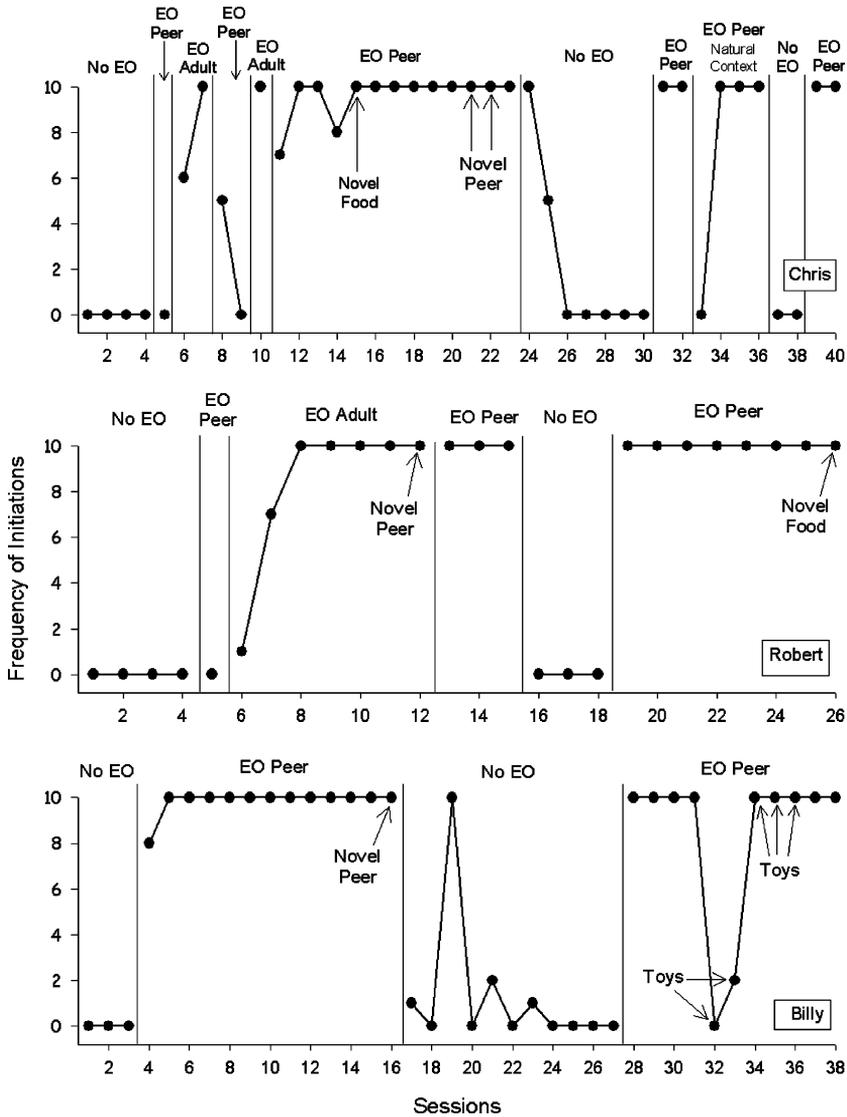


Fig. 1. The frequency of mands across sessions for Chris (top panel), Robert (middle panel), and Billy (bottom panel).

Because Billy, the third participant, manded toward adults in the EO peer sessions, the teacher chose to prompt one response during the first EO with peer session rather than run separate sessions with an adult. No other prompts were necessary in this condition and mands toward peers maintained at 10 per session. When the EO was absent, Billy on occasion asked for the snack even though he had it on his plate. Anecdotal reports indicated that during those sessions Billy repeatedly requested a specifically colored candy from his peer, thus indicating an EO was in fact present during those sessions. During subsequent

sessions, mands reduced to zero. Once the EO was present again, Billy's mands toward the peer increased to 10 per session. When responding was assessed in the transfer to toy items, teacher prompts were required during the first 2 sessions, but were quickly faded and maintained at 10 per session during the 5 remaining sessions.

4. Discussion

The results of this study indicate that children with autism can learn to mand for preferred items from their peers with autism. Further, anecdotal data on peer behavior suggest that all the peers with autism also learned to respond to the mands of the participants. It is worth noting that even though participants had previously demonstrated the skill of requesting items from teachers, none did so readily in the initial EO peer condition, suggesting both a failure to generalize manding to peers and the need for systematic teaching in this area. Following the brief training sessions with adults (in the case of Chris and Robert) or one or two prompts from adults (in the case of Billy), each participant quickly began to initiate the mand with a peer. Additionally, all three participants were able to mand with novel peers, to mand for novel food items (in the case of Chris and Robert) and for toys (in the case of Billy).

Several anecdotal reports from teachers are of note. For example, following the EO peer sessions, Billy was observed to make requests from peers in a variety of less structured settings, including a typical preschool setting and at home with his brother. Chris was similarly able to demonstrate the response in more natural contexts (i.e., he manded for snack from a peer who was seated at the counter in the kitchen).

There are several limitations of this study. For one, experimental control of the EO was not established until after some training of the mand toward peers. The response, although seemingly well established with adults, was not readily demonstrated with peers. Future studies may want to assure that the initiation is established (at least toward adults) before manipulating the EO as an independent variable in studies with peers.

While this was a first step toward teaching participants to attend to and make requests toward their peers with autism, the type of initiation taught in this study was a mand for food items and did not necessarily represent a "social" interaction. In future studies researchers may want to build upon the teaching procedure to include more socially relevant responses: the participant could be taught to initiate a comment about the snack prior to asking for it, for example, or the item for which the participant mands could involve a shared activity such as playing basketball or a video game.

Another limitation of this study is that the children did not learn to discriminate when it was or was not appropriate to initiate. For example, when Billy returned to his typical preschool, he was observed to ask for toys from his friends even though toys were readily available. Additionally, peers at the typical preschool sometimes refused Billy's request (i.e., said "no"!), a response Billy did not always receive favorably (e.g., he persisted in asking despite the peer's refusal). In future studies it may be desirable to teach children to make more accurate discriminations of when and when not to initiate, and respond appropriately when the request is denied (e.g., teach the child to present a different request, ask someone else, or cease asking). Furthermore, the items of interest (snack items) in this

study were visibly present during the EO present conditions; as a result, it is likely that the response (e.g., the request “I want chips please”) was multiply controlled (e.g., both by deprivation and by the visual presence of the item). Thus, the response may have been part tact and part mand, not necessarily a “pure mand”. However, the data indicated that mands decreased once participants had access to these items—indicating that the response may have served primarily as a mand. In future studies it may be worthwhile to extend the procedures of the current study by blocking visual access to the items during the EO present session, thereby reducing the influence of supplementary stimulation.

In summary, this study supports the manipulation of establishing operations to increase initiations of children with autism toward their peers with autism. The initial response of teaching children with autism to ask for preferred items from their peers may have collateral benefits such as conditioning peers as reinforcers, and thereby increasing the likelihood that children with autism may approach their peers more often. Further, once the simple response of requesting is established, it is likely that additional and more socially relevant responses can be taught via the manipulation of establishing operations.

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References

- Charlop, M. H., Schreibman, L., & Thibodeau, M. G. (1985). Increasing spontaneous verbal responding in autistic children using a time delay procedure. *Journal of Applied Behavior Analysis*, *18*, 155–166.
- Duker, P., Kraaykamp, M., & Visser, E. (1994). A stimulus control procedure to increase requesting with individuals who are severely/profoundly intellectually disabled. *Journal of Intellectual Disability Research*, *38*, 177–186.
- Farmer-Dougan, V. (1994). Increasing requests by adults with developmental disabilities using incidental teaching by peers. *Journal of Applied Behavior Analysis*, *27*, 533–544.
- Hall, G., & Sundberg, M. L. (1987). Teaching mands by manipulating conditioned establishing operations. *The Analysis of Verbal Behavior*, *5*, 41–53.
- Halle, J. W., Marshall, A. M., & Spradlin, J. E. (1979). Time delay: A technique to increase language use and facilitate generalization in retarded children. *Journal of Applied Behavior Analysis*, *12*, 431–439.
- Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to initiate to peers: Effects of a script-fading procedure. *Journal of Applied Behavior Analysis*, *26*, 121–132.
- Michael, J. (1988). The establishing operation and the mand. *The analysis of Verbal Behavior*, *6*, 3–9.
- Shafer, E. (1994). A review of interventions to teach a mand repertoire. *The Analysis of Verbal Behavior*, *12*, 53–66.
- Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.
- Sundberg, M. L. (1993). The application of establishing operations. *The Behavior Analyst*, *16*, 211–214.
- Sundberg, M. L. (2004). A behavioral analysis of motivation and its relation to mand training. In L. W. Williams (Ed.), *Developmental disabilities: Etiology, assessment, intervention, and integration*. Reno, NV: Context Press.
- Taylor, B. A., & Levin, L. (1998). Teaching a student with autism to make verbal initiations: Effects of a tactile prompt. *Journal of Applied Behavior Analysis*, *31*, 651–654.