



Contriving motivating operations to evoke mands for information in preschoolers with autism

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Abstract

Four preschoolers with autism participated in the study. Stimulus preference assessments were conducted to identify high and low preferred items, which were then hidden or given to an adult in order to contrive motivation for the information about the location of the items. The first experiment involved the manipulation of motivating operations to evoke the mand “Where is it?” Upon successful acquisition of this initial mand for information, students participated in a second experiment involving the manipulation of a motivating operation to evoke the mand “Who has it?” All participants successfully acquired the ability to mand for information.

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1. Introduction

Typically developing children tend to emit high rates of question asking behavior, or mands for information. Children with autism typically have trouble acquiring mands for information. This may be because the establishing operations controlling these mands are not strong enough to evoke the mand for information. In other words, the information is not “valuable” enough to motivate the individual to ask the question to obtain it. Thus, an effective method of teaching mands for information may include manipulation of the establishing operation in order to increase the probability that a mand will occur. Previous research has been conducted with individuals with disabilities in which question asking behavior was taught (Taylor & Harris, 1995; Twardosz & Baer, 1973; Williams, Donley, & Keller, 2000). Many of the previous studies

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have manipulated a motivating operation in order to teach a mand, such as “What is that?” or “Can I have it?” However, these studies did not contrive motivating operations in order to teach a mand for information involving where, why, or who.

Sundberg, Loeb, Hale, and Eigenheer (2002) conducted two experiments in which children with autism were taught to mand for information involving the location of an item. Participants were given access to a preferred item in a container, then the container was given back without the item. When the participant manded using “Where (item?),” the location of the item was provided (a can, box, or bag). Once they were able to successfully mand using “Where,” a second experiment was conducted in which the item was given to an adult, and the participants were taught to mand “Who has it?” The present study is a systematic replication of the study by Sundberg et al. (2002) utilizing a different population (preschoolers with autism), a naturalistic experimental preparation that more fully approximates the environment where the target skill will be used, and with the addition of a stimulus preference assessment.

2. Method

2.1. General procedures

2.1.1. Participants and setting

Four males aged 3–5 years, enrolled in a self-contained intensive behavioral intervention program for participants with ASD on a university campus, served as participants in the two experiments. Stewart, age 4; Braden, age 4; Gavin, age 3; and Dillon, age 5, had received independent diagnoses of Autistic Spectrum Disorder by outside agencies or physicians. Stewart, Braden, and Gavin participated in Experiment 1 and Stewart, Braden, and Dillon participated in Experiment 2. All participants attended the university-based preschool for 20 h per week, during which they received instruction on a 1:1 basis with university undergraduate and graduate students serving as instructors. All participants used speech as their primary form of communication. Stewart, Braden, and Dillon possessed extensive vocabularies, even participating in short conversational exchanges with adults and peers. They could mand for a variety of activities and items that served as reinforcers. Dillon demonstrated the ability to mand using “where” and was thus excluded from Experiment 1. Both Braden and Stewart did mand using “what”, but at extremely low frequencies. Gavin was able to tact approximately 75 items, and frequently spontaneously manded for a variety of items using one or two word vocalizations; Gavin never manded for information.

2.1.2. Materials

Sessions were conducted at the university preschool, in the individualized instructional cubicles and in the general classroom area. All other children and instructors were present at the time of the sessions. For Gavin, the materials consisted of a toy box in his individualized instructional cubicle, a 2' wooden shelf in the classroom area, and his own backpack, as well as a variety of toys to be assessed for reinforcer effectiveness. For Stewart and Braden, the materials consisted of any existing furniture in the classroom (tables, desks, plastic tubs, etc.) and a variety of toys assessed for reinforcer effectiveness.

2.1.3. Experimental design

A multiple baseline across participants design was used in both experiments. Additionally, a multielement component was included in the treatment phases of both experiments to compare the effects of high- and low-preference stimuli.

2.1.4. Stimulus selection and baseline

At the beginning of each session, a brief stimulus preference assessment was conducted based on the procedure developed by Carr, Nicolson, and Higbee (2000). The procedure was altered slightly by conducting the preference selection procedure only once instead of three times. Different items were selected for the preference assessment each day; all items were toys that the participants could reliably vocally tact. The first and last items selected were then used in baseline or the intervention for that day's sessions.

2.2. Experiment 1: where

2.2.1. Dependent and independent variables

The dependent variable consisted of the percentage of correct mands "where" for 10 training trials for each session (five trials each per session for the highly preferred item and the least preferred item). The independent variable consisted of the manipulation of the motivating operation (MO), a prompt and prompt fading procedure, and verbal information involving the location of the missing item.

Prior to conducting baseline sessions, a probe was conducted to see if all three participants could go to three designated locations when instructed. Each was told "Go to the (toy box, shelf, or backpack)." Stewart and Braden demonstrated the ability to go to those designated locations with 100% accuracy. Gavin was not able to go to the designated locations, so preteaching occurred until he demonstrated the ability to follow the instructions (mastery criteria was set at 100% accuracy for three consecutive trials, for 3 consecutive days). After preteaching was complete, baseline sessions began. Baseline consisted of the participant being given noncontingent access to the highly preferred item in their instructional cubicle for no more than 30 s. The participant was then taken out of the cubicle for a brief interval (approximately 1 min). During this time, an instructor would place the item in one of the three designated places (in the toy box, on a shelf, or in the participant's backpack). The participant was then told, "Get (item)." Any vocal behavior from the child was recorded. If the participant manded "Where (item)?" the instructor would vocally provide the location of the item. If the student did not respond after 30 s, the participant was brought back to the cubicle and the next trial began with access to the item once more. Five trials were conducted first with the highly preferred item, then with the least preferred item. Three baseline sessions were conducted for Stewart, four for Braden and Gavin.

2.2.2. Intervention

Intervention sessions were identical to baseline with the following procedural additions. If the participant did not mand "Where (item)?" within 30 s, he was verbally prompted, "Say 'Where (item)?'". The participant then repeated "Where (item)?" and the instructor responded by providing the location of the missing item. She/he would say, "It's (in your backpack, on the shelf, in the toy box)." The participant would then go to the designated location and retrieve the item. Upon returning to the instructional cubicle, he was allowed to interact with the item for 30 s, when the whole procedure would begin once more. If the participant did not appear interested in or engage with the item, the instructor used the second item selected from the brief stimulus preference assessment on the next trial. Five trials were conducted for the highly preferred item and the least preferred item. A generalization probe was conducted in the homes of Stewart and Brendan after the intervention phase.

2.2.3. *Response definition and reliability*

Correct responses were recorded only if the participant emitted the entire phrase “Where?” and the name of the item. If only one word was emitted or latency of response was greater than 30 s, the response was considered incorrect. If a response was unintelligible or the participant manded for an item other than the item that was currently missing, the response was considered incorrect.

Interobserver agreement was measured for 67% of Stewart’s sessions, 80% of Braden’s sessions, and 88% of Gavin’s baseline and treatment sessions. Agreement was calculated by dividing the number of agreements (both scorers recording a trial as either correct or incorrect) by the number of agreements plus disagreements. The agreement score for Stewart and Braden was 100%, and 99% for Gavin, with a range of 90–100%.

2.2.4. *Results*

The results of Experiment 1 are presented in Fig. 1. During baseline when Stewart and Braden were told to “Get (item)”, they engaged in intense searching behavior (wandering or running around the classroom, looking under tables, in other cubicles, etc.). On occasion, they both emitted mands using “where” and were provided with the location of the item. However, the mands continued to decrease and were once more replaced by searching behavior and vocalizations such as “You get it” or other incorrect responses. During baseline Gavin echoed “Get (item)” repeatedly, but never manded for information using “where”.

Following intervention, both Stewart and Braden were able to successfully mand for information regarding the location of the items. Stewart and Braden both met the criterion of

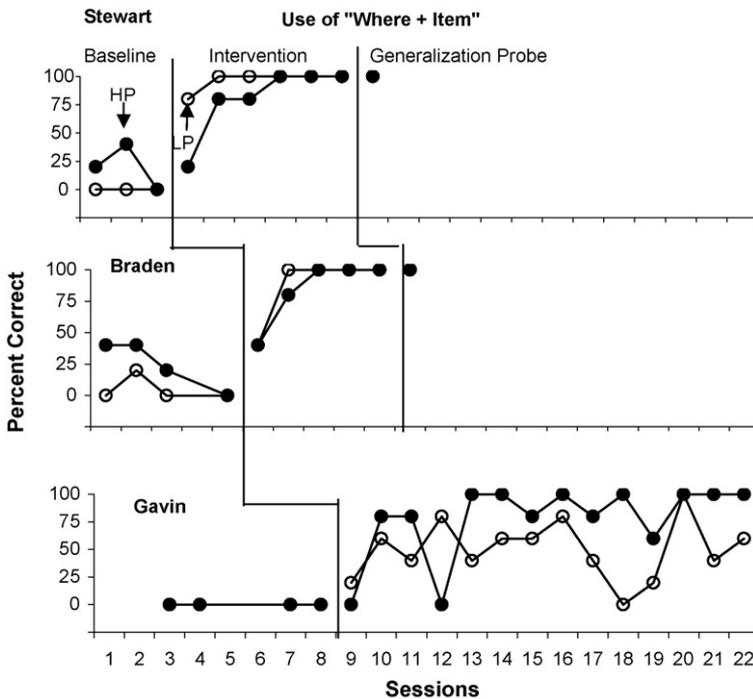


Fig. 1. Results of Experiment 1 (“Where”) for Stewart (upper panel), Braden (middle panel), and Gavin (lower panel). Data are presented as the percentage of correct mands using “where”. HP, high-preference item; LP, low-preference item. The arrow in the treatment phase for Gavin indicates the session where the experimenter.

100% for three consecutive sessions in just four sessions. Gavin's performance was much more variable, requiring 14 sessions to meet the mastery criterion.

2.2.4.1. Generalization probe. After Stewart and Braden met the mastery criterion for percentage of mands "where" at the preschool, a generalization probe was conducted in the homes to see if each would mand for information in a different environment. Parents of both participants conducted the procedure. Both Stewart and Braden performed at 100%.

2.3. Experiment 2

2.3.1. Dependent and independent variables

Dependent variables consisted of correct percent of requests using "who?" Independent variables consisted of the manipulation of motivating operation, an echoic prompt and fading procedure, and verbal information as to who was holding the missing item.

2.3.2. Stimulus selection and baseline

Stimuli were selected through the use of a stimulus preference assessment, as in Experiment 1. An initial probe was conducted to assess if the participants could expressively identify all of the instructors in the preschool by name. Baseline consisted of the same procedure as in Experiment 1, with the addition of a second component. Each participant was given access to a highly preferred item in the instructional cubicle. They were then distracted or briefly removed from the cubicle. They were then given the instruction "Get (item)." When the participant asked "Where (item)", the experimenter would respond with the statement: "I gave it to somebody." Any verbal responses made by participants were then recorded. If the participant did not mand using "Where" an echoic prompt was provided. No information was provided involving which adult possessed the item as none of the participants used the mand "who" during any baseline session. This procedure was conducted for five trials each of the highly preferred and least preferred items. Three to eight sessions were conducted, varying for each participant.

2.3.3. Intervention

Intervention was similar to the baseline procedure, with an addition of a prompt and information regarding which adult possessed the item. If the participant did not respond with the mand for information using "who", he was instructed using an echoic prompt "Say 'Who has it?'" Ten trials per session were conducted, five for each of the two items (highly preferred and low preferred). Five trials with the high preferred item were used initially to keep motivation at high levels followed immediately by five trials with the low preferred item.

2.3.4. Response definition and reliability

In order to be considered a correct response, the participant had to mand using the word "Who?" He could add any socially acceptable variation (e.g., "Who has it, who you give it to, etc.). As in the first experiment, the response had to occur within 30 s of the experimenter's response "I gave it to somebody" or the response was considered incorrect.

Interobserver agreement was measured for 67% of Stewart's sessions, 100% of Braden's sessions, and 80% of Dillon's sessions. IOA for Stewart and Dillon was 100%. Mean IOA for Braden was 95%, with a range of 50–100%.

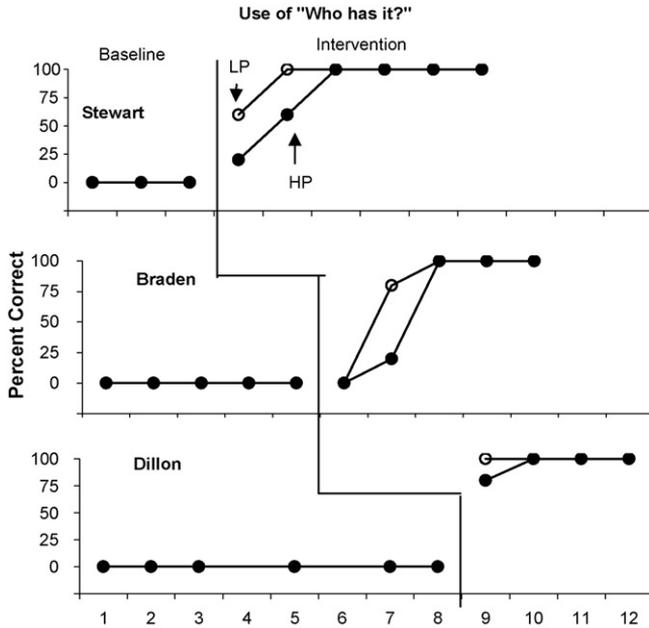


Fig. 2. Results of Experiment 2 (“Who”) for Stewart (upper panel), Braden (middle panel), and Dillon (lower panel). Data are presented as the percentage of correct mands using “who”. HP, high-preference item; LP, low-preference item.

2.3.5. Results

Results of Experiment 2 are presented in Fig. 2. All three participants exhibited zero mands for information involving “who” during baseline. Following intervention, all three participants successfully met the mastery criterion of manding “Who” for 100% of trials for three consecutive sessions within five sessions.

3. Discussion

The results of these experiments demonstrate that preschoolers with autism are capable of learning to mand for information with the manipulation of motivating operations and a simple prompting procedure. These results are consistent with those reported by Sundberg et al. (2002). The rationale for utilizing motivating operation manipulations is to ensure that mand behavior comes under the control of the appropriate conditions. If alternative sources of reinforcement are used, such as tokens or tangibles, the mand for information may actually come under discriminative control instead of the control of the motivating operation. If the behavior is under inappropriate control, it may be less likely to generalize to novel situations.

It is interesting to note that mands were emitted at high rates for both the low and highly preferred items. The purpose of including a systematic preference assessment to select high- and low-preference items was to investigate if there would be a difference in mand acquisition based on level of preference for each item. For Stewart and Braden, however, there was no significant difference in rate of response when high- or low-preference stimuli were used as both participants acquired mands for both items. In fact, both showed slightly faster acquisition on the least preferred item. This initial difference in acquisition rates, however, could be attributed to an artifact of the procedure as the first five trials conducted each day were with the highly preferred

item to maintain high levels of motivation. During the first two sessions, Stewart and Braden required prompts during the first five trials (high-preference item). When the last five trials (low-preference item) were subsequently conducted, they both manded for information independently. Thus, the response pattern observed could have been a result of the participants acquiring the response during the high-preference trials and then continuing this performance with the low-preference trials rather than a function of differing levels of motivation. There are at least two potential reasons why participants did not respond differentially to the high- and low-preference items. First, it could be that despite the fact that the preference assessment indicated differing levels of preference for the two items, both could have had sufficient reinforcing value to maintain responding. A second possible explanation could be that the procedure itself took on reinforcing properties (i.e., became a “game”) and thus receiving the information about the location of the item was sufficiently reinforcing to maintain responding. In other words, the “information” became conditioned reinforcement. To test the first hypothesis, we conducted a probe session with Stewart where we deliberately included an item in the preference assessment with which he had no reinforcement history and that would not likely function as a reinforcer (a blank video tape). As would be expected, the item was ranked last in the preference assessment. We then ran five trials each with the highest ranked item from the preference assessment and the video tape. Stewart manded equally well for both items, suggesting that the information he obtained by manding was the likely reinforcer maintaining responding. The fact that some of the participants frequently asked to participate in the intervention on many days adds further anecdotal evidence to support this hypothesis.

It is also interesting to note that with all participants in Experiment 1 there was generalization across many items. Not only did all of the participants acquire the mand quickly, but each began manding for a variety of items throughout the morning, as well as during the intervention (manding for items that were not present). Stewart and Braden easily demonstrated mands for information in the home environment as well. Stewart was also able to instruct his parent on how to mand for information, taking on the role of instructor.

Several limitations in the current research are worth noting. The fact that all items in the stimulus preference assessment were associated with a history of reinforcement could have influenced the motivating operations in place. It would be interesting to implement stimulus preference assessments using items that the participants did not find to be even mildly reinforcing, as was done in our probe with Stewart, to truly assess whether a motivating operation was in place. Another limitation was the fact that the highest ranked item was always used first. This procedure was intended to keep motivation high and engage the participants in the procedure, but future studies should alternate high and low preference trials. This procedure may have influenced participant responding, as when participants required a prompt in the first few sessions it was always with a highly preferred item. By the time trials were run involving the lowest preferred item in the first few sessions, the participants had acquired the response and were manding independently. This possible artifact of the procedure could easily be remedied by alternating high and low preferred trials. Another limitation is the lack of generalization probe for Experiment 2 and absence of long-term follow up to assess whether these skills maintained. Future researchers may wish to collect more extensive generalization and follow-up data.

Future researchers may also investigate procedures to investigate other mands for information, such as “Why” and “How.” In summary, the motivating operation as an independent variable appears to be a powerful teaching tool for children with autism and can be effective in teaching language skills in many environments.

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