*EFFECTS OF A MOTIVATING OPERATION MANIPULATION ON THE
MAINTENANCE OF MANDS*

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We assessed the maintenance of newly acquired mands under presession reinforcer access (reinforcer efficacy abolished) and no presession reinforcer access (reinforcer efficacy established) conditions with 3 children with autism spectrum disorder. Results suggested that the no presession access condition established the value of the reinforcer and evoked responding relative to the presession access condition. Results are discussed in the context of implications for assessing maintenance of previously acquired skills.

Key words: motivating operation, mand, autism spectrum disorder

Teaching mands to access preferred stimuli is among the first communicative behaviors targeted for instruction for children with autism spectrum disorder (ASD; Sigafoos, Arthur-Kelly, & Butterfield, 2006). *Mands* are controlled by antecedent states (e.g., levels of deprivation or aversive stimulation) and reinforcing consequences (Skinner, 1957). By definition, mands are much more likely to occur during periods of deprivation. It follows that interventions to teach

mand responding should reflect consideration of motivating operations in addition to the consequences that are available contingent on mands (Shafer, 1994).

Several interventions have incorporated motivational variables to teach mands, including incidental teaching, enhanced milieu teaching, choice making, and interrupted behavior chain protocols (Sigafoos et al., 2006). In all of these mand training strategies, the primary focus is on incorporating motivating variables to enhance the acquisition of new mand responses. However, one of the critical instructional challenges facing educators of children with autism is the frequent failure to maintain newly acquired skills (Carr, 1980).

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The purpose of the current study was to assess the effects of a motivating operation manipulation on the emission of previously acquired mands. This method is an initial attempt to examine how a motivating operation intervention may be used to examine maintenance of newly trained mand responses.

METHOD

Participants, Settings, and Target Behaviors

Participants included Cameron (7-year-old boy), Terri (5-year-old girl), and Sharon (4-year-old girl). All had been diagnosed with ASD and attended a private school for children with language and learning disabilities. Sessions were conducted in a resource room that was used for individual instruction. Each student's individual education plan included goals to increase the number of items for which they verbally requested and the complexity of their mands (i.e., complete sentences). The target mands chosen for Cameron, Sharon, and Terri, respectively, were "Can I have numbers?," "Can I have blocks?," and "Can I have crayons?"

Response Measurement and Interobserver Agreement

Data collectors recorded correct and incorrect responses on a trial-by-trial basis. A trial was scored as correct contingent on the participant emitting the target phrase (described above) within 10 s of the visual presentation of the stimulus. The trial was scored as incorrect if a participant did not respond within 10 s or emitted a response other than the target behavior. Therapists calculated the percentage of correct responses during the 10-trial sessions by dividing the number of correct responses by the sum of the number of correct and incorrect responses and multiplying by 100%. Interobserver agreement was conducted using a trial-by-trial method for 42% of all sessions. Two observers simultaneously but independently scored correct or incorrect responding for each

trial of a session. The number of trials with agreement between observers (correct and incorrect responding) was divided by the total number of trials for that session and the ratio was converted to a percentage. Agreement was 100% for all three participants.

Procedure

The targeted mand for each participant was probed prior to teaching (baseline) and then after teaching trials (maintenance). In addition, baseline and maintenance sessions were conducted under pre-session access (i.e., the participants had access to the preferred item until they actively rejected the item immediately prior to maintenance sessions) and no access (i.e., they did not have access to the preferred item for 24 hr prior to maintenance sessions) to assess the influence of these pre-session conditions on manding.

Preassessment preference assessment. A multiple-stimulus without replacement (MSWO) preference assessment was conducted to identify a most preferred toy for each participant to be used during mand training (DeLeon & Iwata, 1996). Five toys were identified as preferred for each participant through teacher interviews. During MSWO assessments, the therapist presented all five items and asked the participant to choose one. After the participant manipulated the selected item briefly, the therapist removed the item from the array, redistributed the remaining items, and instructed the participant to choose one from those that remained. This procedure continued until all five items had been selected or until the participant made no selection within 30 s from the beginning of the trial. MSWO assessments were implemented a total of five times with each participant. Toys identified as preferred were magnetic letters for Cameron, wooden blocks for Sharon, and crayons for Terri.

Baseline and maintenance. The targeted mand for each participant was assessed before teaching (baseline) and then after teaching trials (maintenance). The procedures during the baseline and maintenance conditions were identical.

During each 10-trial session, the therapist held the preferred item in front of the participant, but just out of reach. The therapist waited 10 s to provide an opportunity for an independent emission of the target mand. If the participant did not emit the mand within 10 s, the therapist removed the toy from sight and a new trial was initiated after 5 s. If the participant emitted the target mand, the therapist provided 10-s access to the item. After 10 s, the therapist removed the item and initiated the next trial. A total of six sessions were conducted during baseline and each maintenance phase. Three of these sessions in baseline and maintenance conditions were conducted after pre-session access to the toy, and the other three sessions were conducted with no pre-session access to the toy (see below).

Teaching trials. Therapists trained the target mand using a progressive prompt-delay procedure (beginning with 0-s delay and fading to 3 s). The therapist terminated the teaching trials contingent on emission of an independent target mand (i.e., the response occurred when the preferred toy was presented but prior to the vocal prompt) on three consecutive occasions. Following the teaching trials, maintenance was assessed under pre-session reinforcer access versus no reinforcer access conditions. Each participant received additional teaching trials between tests for maintenance.

Pre-session reinforcer access. Access to the preferred item was provided immediately prior to baseline and maintenance sessions. The participant had continuous access to the item until he or she rejected the item three times (a behavioral indicator of satiation). For example, the therapist sat opposite Sharon at a table and presented her with blocks. If she rejected (i.e., dropped) the blocks, the therapist physically re-presented the blocks and told her to continue playing with the blocks. Once Sharon rejected the blocks a third time, a baseline or maintenance session was conducted. For a detailed description of this pre-session access protocol, see O'Reilly et al. (2009).

No pre-session reinforcer access. The participant did not have access to the preferred item for a minimum of 24 hr prior to baseline and maintenance sessions.

Follow-up. Follow-up sessions (identical to baseline and maintenance sessions) were conducted at 5 and 6 months following the study for both Cameron and Terri. Follow-up sessions were conducted under both the pre-session reinforcer access and no reinforcer access conditions. Sharon was unavailable for follow-up assessment.

Design

Each participant was exposed to the pre-session reinforcer access and the no reinforcer access conditions in an alternating treatments design (Barlow, Nock, & Hersen, 2009).

RESULTS AND DISCUSSION

Results are presented in Figure 1. None of the participants engaged in the target mands during baseline. Mands occurred after teaching trials for all participants. Terri received additional training to examine whether it might produce higher levels of maintenance. During maintenance sessions, mands predominantly occurred under the no reinforcer access condition for all participants. Cameron continued to mand under the no reinforcer access condition during follow-up sessions at 5 and 6 months. Terri did not mand during follow-up sessions.

Results of this preliminary investigation demonstrate the influence of motivating operations on manding during maintenance sessions for these participants. Target mands occurred primarily during maintenance sessions when participants had limited prior access to the relevant items. Limiting access to the toys prior to maintenance sessions presumably produced an evocative and reinforcer-establishing effect. Low levels of manding occurred during maintenance sessions when the children had continuous prior access to the items. Access to the reinforcer immediately prior to maintenance

Figure 1. Percentage of trials with correct responding during baseline and maintenance sessions under pre-session reinforcer access and no pre-session reinforcer access conditions for Cameron, Terri, and Sharon.

sessions presumably produced an abative and reinforcer-abolishing effect.

The current findings extend recent research on the examination of motivating operations in the assessment and treatment of children with ASD. Recent research has demonstrated the utility of pre-session reinforcer access for the treatment of problem behavior maintained by positive reinforcement in the form of access to tangible items. For example, play interventions and classroom instruction can be enhanced and problem behavior diminished or eliminated when participants are given pre-session access to the tangible items that maintain problem behavior prior to play or leisure interventions or classroom instruction (Lang et al., 2009; O'Reilly et al., 2008; Rispoli et al., 2011). The current study extends these previous findings by showing that pre-session deprivation (no access) may enhance the evocative effectiveness and reinforcing value of stimuli, thereby increasing the probability of manding during maintenance probes.

Our findings may have implications for the manner in which maintenance probes should be conducted in applied research. In clinical contexts, it is likely that little consideration is given to the recent availability of relevant reinforcers during maintenance probes. It is clear from the current findings that motivating operations can have a profound influence on responding during maintenance assessment. Clinicians, teachers, and researchers should consider the influence of motivating operations when assessing maintenance of responding. For example, teachers might assess maintenance of mands when the establishing operation is present (e.g., the student is deprived relatively of a target toy, activity, etc.). Related to the current findings, it seems reasonable to suggest that motivating operations might have similar effects on probes for generalization of responding across a variety

of parameters (e.g., settings and persons). Future research should explore the influence of motivating operations on the generalization of responding.

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