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THE EVOCATIVE AND REPERTOIRE-ALTERING EFFECTS OF  
CONTINGENCY-SPECIFYING STIMULI

THESIS

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The effects of deadlines in contingency-specifying stimuli among nine 4 to 5 year old children were investigated. Each child was given verbal statements differing in the specified deadline, the delivery of the reinforcer, and the opportunity to respond. The results indicated: (a) statements not specifying deadlines or reinforcers failed to control the children's behavior reliably, (b) specifying deadlines, either immediate or delayed, and immediate reinforcers exerted reliable control over the children's behavior when the opportunity to respond was immediately available, and (c) specifying delayed deadlines or no deadlines and immediate or delayed reinforcers did not reliably control the children's behavior when the opportunity to respond was delayed.

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THE EVOCATIVE AND REPERTOIRE-ALTERING EFFECTS OF  
CONTINGENCY-SPECIFYING STIMULI

Rule-governed behavior has been the focus of much research and interpretation. Skinner (1969) stated that rules take the form of contingency-specifying stimuli (CSS). Elaborating on Skinner's point, Glenn (1987) suggested that rules are verbal stimuli that "specify at least two events (more usually, classes of events) and a relation between them (a contingency)" (p. 31). Such contingency-specifying stimuli may govern behavior in that "As a discriminative stimulus ( $S^D$ ), a rule is effective as part of a set of contingencies of reinforcement" (Skinner, 1969, p. 148). Many agree with Skinner that rules function as discriminative stimuli (Catania, 1989; Catania, 1984; Galizio, 1979; Hayes, 1986; Shimoff, Catania, & Matthews, 1981; Vaughan, 1985; Zuriff, 1985). A discriminative stimulus evokes a response because it has been correlated with the relation between a particular response and a higher probability of reinforcement (Michael, 1982).

Environmental events may be categorized as being either evocative or repertoire-altering in their effects. Evocative effects are immediate but momentary changes in the strength of behavioral relations; whereas, repertoire-

altering effects are enduring changes in the strength of behavioral relations (Michael, 1985). The evocative effects of discriminative stimuli are observable immediately following stimulus onset; that is, the previously reinforced response is more probable following the occurrence of an  $S^D$  (Michael, 1986). Discriminative stimuli have evocative effects; they do not alter the function of other stimuli. A repertoire-altering effect is an enduring change in behavior such as the change effected by reinforcement. This effect is not instantly observable, in most cases, since it can be observed only when the circumstances which preceded the event are again present (Michael, 1983).

Blakely and Schlinger (1987) agreed that rules control behavior as antecedent stimuli but they contended that rules do not evoke behavior as discriminative stimuli. Instead, CSSs alter the function of other stimuli and behavioral relations associated with those stimuli. A CSS, according to Blakely and Schlinger (1987), describes a contingency between antecedent stimuli, behavior, and consequences or a contingency between two or more of these components. Contingency-specifying stimuli, unlike discriminative stimuli, alter the function of other stimuli and the behavioral relations involving those stimuli. CSSs may alter the evocative function of discriminative stimuli, establishing operations, conditional stimuli, the



reinforcing or punishing effect of consequent stimuli, and stimuli that function in second-order respondent conditioning (Schlinger & Blakely, 1987).

This research concerns the function of CSSs that include deadline statements. As previously stated, CSSs may change the evocative function of behaviorally neutral stimuli. This may occur "either by bringing a response under the discriminative (evocative) control of a previously neutral stimulus or by strengthening or weakening an existing discriminative relation" (Schlinger & Blakely, 1987, p. 42). Schlinger and Blakely (1987) state that when a CSS and the  $S^D$  described by the CSS occur at the same time, the evocative effects of the  $S^D$  can be mistakenly assigned to the CSS. By separating these effects, the function-altering effects of CSSs may be distinguished from the commonly accepted discriminative effects. By separating the repertoire-altering effects of the CSS and the evocative effects of the stimulus whose function it alters, a demonstration that a CSS is not functioning as an  $S^D$  may be made. Discriminative stimuli do not establish or alter discriminative relations but are part of such relations (Schlinger & Blakely, 1987).

Recent research by Braam and Malott (1990) found that rules which specified a deadline were critical in the control of the behavior of small children. In particular,

rules which specified only response requirements and rules specifying no deadline with a 1-week delayed reinforcer did not reliably control behavior. However, rules specifying an immediate deadline with an immediate or delayed reinforcer exerted reliable control over behavior. The behavioral effects of delayed reinforcement were of little significance. Braam and Malott (1990) used the statement "Here are some toys to pick up, I don't care if you pick them up or not. Here's the rule: If you pick the toys up now, you can go to the Magic Box when you're finished", which specified an immediate deadline with the opportunity for immediate reinforcement. This was the condition that was most effective in controlling behavior. They speculated that the rule statement functions as an establishing operation that establishes a direct-acting contingency. They hypothesized noncompliance as a previously learned aversive condition which was established by the rule statement with compliance being reinforced by escape from the aversive condition. They proposed that this direct-acting contingency may also explain control by rules, which are not themselves direct-acting. That is, rule compliance is directly reinforced in that the learned aversive condition which is established by the rule statement is immediately terminated.

In analyzing these results, several questions arise. The immediate deadline conditions required temporal contiguity between the rule and the rule-following if reinforcement were possible. Perhaps one of the reasons that the children complied in this condition was that the rule had an evocative function as well as a repertoire-altering function. According to Braam and Malott (1990), the rule's specification of the deadline is the critical element in the control of behavior. But deadlines per se may not have been the critical element in their results. Instead, the deadline statement may have necessarily confounded the repertoire-altering and discriminative functions of the rule statement.

In Condition D-R (immediate deadline and immediate reinforcer) of Braam and Malott's (1990) study, the deadline statement reliably resulted in the target behavior. That is, according to the rule the child had to respond to the toys (pick them up) immediately, so it is difficult to determine how the stated deadline functioned. It may have served either an evocative role or a repertoire-altering role, or both. In its repertoire-altering role, the CSS's function would be to alter the function of the toys as discriminative for picking up. By requiring that a reinforceable response occur immediately after presentation of the CSS, the CSS could serve a double function. This

interpretation is based on Schlinger and Blakely's point (1987) that if the occasion for reinforceable responding occurs at the same time or immediately following a CSS, the behavior occurs immediately, thus, confusing the functions of the two events. By arranging conditions so that the occasion either could be or must be separated from the CSS, one may determine if the deadline has a critical function. That is, if the evocative effect of the deadline statement were separated from the repertoire-altering effect, a deadline may not prove critical to rule following. By manipulating the deadline itself (now versus a future time) and by removing the possibility of an evocative function of the CSS, the role of deadlines may be further examined.

In this study deadline statements that either did not require or did not allow immediate responding were presented so as to examine any possible confounding of evocative and repertoire-altering effects.

Braam and Malott (1990) investigated (a) rules describing neither a deadline nor a reinforcer, (b) "rules describing immediate deadlines with immediate delivery of reinforcers...", (c) rules describing no deadlines with one-week delays in the delivery of reinforcers..., and (d) rules describing immediate deadlines with one-week delays in the delivery of the reinforcers" (p. 69). In all conditions of Braam and Malott's study (1990) the opportunity to respond

was immediately available and the tasks included pick up and assembly tasks. The present study used statements describing the same conditions as in "a" and "b" above as well as statements describing delayed deadlines in which the delivery of the reinforcer was immediate, delayed, or none. The opportunity to respond was either immediate or delayed.

### Method

#### Subjects and Setting

Nine English-speaking children between the ages of 4 and 5 were selected. The children were attending the Child Development Laboratory at the University of North Texas. All children were recruited based on their completion of tasks through a screening process (completion of 50% or more of the tasks in a no deadline and no reinforcer condition constituted disqualification). Parental consent was obtained for each subject. The study was conducted in the usual classroom/activity setting at the Child Development Laboratory because it was familiar to all the children participating. The study was conducted during the worktime period (i.e., children play freely with toys, work puzzles, paint, draw, etc.) at the beginning of each school day. The children participated in the study five days a week.

#### Apparatus

The experimenter used a "Goodie Box" similar to the "Magic Box" described by Braam and Malott (1990). The

experimenter controlled access to the box which contained a variety of items (e.g., stickers, stampers, crayons, small toy cars and jets, small toy figurines, and various other toys) to be used in the study as reinforcers. For safety purposes the toys in the Goodie Box met or exceeded currently applicable government and voluntary toy industry standards.

As manipulanda, the experimenter used a variety of lab school toys which were approximately equal in size and volume. Under conditions in which the opportunity to respond was delayed the experimenter used toys that were highly discriminable. These were placed on the floor in the classroom where they were clearly visible for the pick up task. Toys of equal sizes and equal volumes were used to control for effort bias.

### Design

As in Braam and Malott (1990) a variation of a within-subjects, multielement design as explicated by Sidman (1960) was used (the statement components and opportunity to respond conditions constitute the various elements). The screening condition consisted of requests specifying neither a deadline (ND) nor a reinforcer (NR). Deadline statements were of two types: those specifying immediate deadlines (ID) and those specifying delayed deadlines (DD). Reinforcement conditions were immediate (IR-and so stated in

the rule), delayed (DR), or none (NR). The opportunity to respond was either immediately available (\*) or delayed by 20 minutes (\*\*) (see Table 1).

Nine children who were not screened out of the study in the initial condition proceeded to a series of sessions in which the deadline in the CSS was held constant (immediate or delayed) for 8 sessions and the reinforcement specified by the CSS was varied randomly (either immediate or none). In the next series of sessions, the deadline not used in the previous series (immediate or delayed) was given and again the reinforcement specified by the rule varied from session to session. In all of these sessions, the toys the child was to pick up were always available when the CSS was presented. As throughout the study, reinforcers were always delivered (or not) as specified in the CSS. Immediate reinforcer delivery and no reinforcer delivery sessions were randomly selected on a daily basis, with the provision that the last components presented would result in equalizing the number of (IR) and (DR) components.

In the latter part of the study (conditions DD-IR\*\*, DD-DR\*\*, ND-IR\*\*, and ND-DR\*\*) only five children participated because stability in performance (consistent differential responding in earlier conditions) was required in order to participate in this part of the study.

Table 1

Experimental Conditions

Condition	Deadline	Reinforcer	Opportunity to Respond
ND-NR*	none	none	immediate
ID-IR*	immediate	immediate	immediate
ID-NR*	immediate	none	immediate
DD-IR*	delayed	immediate	immediate
DD-NR*	delayed	none	immediate
DD-IR**	delayed	immediate	delayed
DD-DR**	delayed	delayed	delayed
ND-IR**	none	immediate	delayed
ND-DR**	none	delayed	delayed

Note: The condition abbreviations are used in the figures. ND=No deadline; ID=immediate deadline; DD=Delayed deadline; NR=No reinforcer; IR=Immediate reinforcer; DR=Delayed reinforcer; \*=Immediate opportunity to respond; \*\*=Delayed opportunity to respond.



In conditions DD-IR\*\*, DD-DR\*\*, NR-IR\*\*, and NR-DR\*\* each child was exposed to only two sessions of each type of instruction due to time limitations. The order in which the two types of instructions were presented was randomly selected (see Table 2).

Following the screening condition (ND-NR\*) the children were randomly assigned to the next experimental condition. Five of the nine children were exposed to conditions ID-IR\* and ID-NR\* first, followed by conditions DD-IR\* and DD-NR\*. If stability in performance was achieved the children were exposed to conditions DD-IR\*\*, DD-DR\*\*, ND-IR\*\*, and ND-DR\*\*. The other four children were exposed to conditions DD-IR\* and DD-NR\* first, followed by conditions ID-IR\* and ID-NR\*. If stability in performance was achieved the children were exposed to conditions DD-IR\*\*, DD-DR\*\*, ND-IR\*\*, and ND-DR\*\*. Stability was defined as picking up toys 100% of the time when the rule statement specified contingent opportunity to go to the Goodie Box (IR\*) and not picking them up when the rule statement specified there was no opportunity to go (NR\*). Four children who had not achieved stability after the first 16 sessions were again exposed to conditions ID-IR\*, ID-NR\*, DD-IR\*, and DD-NR\* and three of them achieved stability in performance. The presentation order of these additional sessions depended

Table 2

Presentation of Conditions

Number of Subjects		Condition			
Immediate opportunity to respond					
5	ID*	DD*	ID*	DD*	
	4 (IR)	4 (IR)	4 (IR)	4 (IR)	4 (IR)
	4 (NR)	4 (NR)	4 (NR)	4 (NR)	4 (NR)
4	DD*	ID*	DD*	ID*	
	4 (IR)	4 (IR)	4 (IR)	4 (IR)	4 (IR)
	4 (NR)	4 (NR)	4 (NR)	4 (NR)	4 (NR)
Delayed opportunity to respond					
5	DD-IR**	DD-DR**	ND-NR**	ND-DR**	
	2 sessions	2 sessions	2 sessions	2 sessions	

Note. Each immediate deadline (ID\*) condition and delayed deadline (DD\*) condition was comprised of 8 sessions; four with immediate reinforcement (IR\*) and four with no reinforcement (NR\*). IR and NR components were randomly selected within each deadline condition. Sessions for conditions DD-IR\*\*, DD-DR\*\*, ND-IR\*\*, and ND-DR\*\* were randomly selected. DR=delayed reinforcement. \*=sessions in which the opportunity to respond was available when the statement was presented. \*\*=sessions in which the opportunity to respond was available 20 minutes after the statement was presented. Subjects in the delayed opportunity to respond conditions (\*\*) were selected from the nine subjects in the immediate opportunity to respond conditions (\*).

upon the previous condition to which the child had been exposed. That is, if a child had been exposed to conditions ID-IR\* and ID-NR\* and did not demonstrate stability, he or she was then exposed to conditions DD-IR\* and DD-NR\* followed by return to conditions ID-IR\* and ID-NR\* until stability occurred, and they could enter the "delayed opportunity" condition. Children first exposed to conditions with delayed deadlines were next exposed to conditions with immediate deadlines followed by return to delayed deadlines until stability criterion was met.

#### Procedure

The experimenter used the same general procedure as Braam and Malott (1990) used. The experimenter approached each child while he or she was playing and/or engaged in a task and presented a rule statement. The experimenter gave the statement only if the child was alone. If others were around they were asked to leave, or the child participating in the study was taken aside before the statement was given. Adults were asked to limit their interactions with the children during times in which they were participating in the study. Once the experimenter gave the statement the experimenter walked away and did not interact further with a child except when the child received feedback and/or a trip to the Goodie Box. The experimenter remained at least 10

feet from the child following the presentation of the statement.

The experimenter and observer recorded the time that the statement was delivered, and in delayed opportunity sessions, they recorded the time that the toys were set out. Also recorded were the time that the child started the task, the time the task was completed, the time that the deadline occurred, and the latency between the end of the instruction and the child first touching the toys.

Condition ND-NR\*: This condition was used to screen out high completion (completion of 50% or more tasks) subjects because the use of such subjects would have mitigated against the experimenter's obtaining differential responding to statements specifying different deadlines and different delivery of reinforcers. During this condition the experimenter specified the response requirements (task of picking up toys), but did not specify a reinforcer or a deadline. For instance, "Vicki, would you pick up these toys?" The experimenter did not provide feedback or reinforcers during this condition. If the child did not pick up the original set of toys within 5 minutes, a noncompletion was marked. Only one request was given per daily session. Requests were given for four sessions. If a child completed the task specified by the experimenter 50%

or more of the time, then he or she was dropped from the study.

Conditions ID-IR\* and ID-NR\*: These two conditions were run concurrently and the particular condition in effect each day was randomly selected for each child. In these conditions the deadline stated was now and the reinforcer specified in the rule varied from session to session. The child was given 5 minutes following the statement to initiate the task. The statement selected was delivered to each child one time per session. Only one session was held for each child per day. Because there is a high likelihood that the children had a history of social approval for following requests and a history of social disapproval for not following such requests, the phrase, "I don't care if you pick up the toys or not", was included as an attempt to reduce social pressure that may have existed for responding to statements. This phrase was used in all experimental conditions except the screening condition ND-NR\*.

Condition ID-IR\*: During this condition the experimenter presented a statement that included a specified deadline (when to pick up the toys which was now in this condition) and a specified reinforcer (a trip to the Goodie Box) which occurred immediately following task completion. The toys were on the floor when the statement was presented so the opportunity to respond was always immediately

available. This condition consisted of the experimenter saying to each child, "(Child's name), here are some toys (specify toys) to pick up. I don't care if you pick them up or not. If you pick up the toys (specify toys) now, you can go to the Goodie Box when you're finished."

Following task completion the experimenter provided a reinforcer immediately (within 15 seconds). The following performance feedback was given: "(Child's name), you picked-up the toys (specify toys) right away, now you can go to the Goodie Box." If the child did not start picking up the toys within 5 minutes following the delivery of the statement the experimenter provided the following performance feedback: "(Child's name), you did not pick-up the toys (specify toys) right away, now you cannot go to the Goodie Box", and no reinforcer was delivered.

Condition ID-NR\*: In this condition the experimenter specified the deadline but told the child that there would be no trip to the Goodie Box for picking up the toys. This condition was used as a comparison condition to determine whether the descriptions of the contingencies or demand characteristics within the setting affected the child's behavior. The opportunity to respond was immediately available. This condition consisted of the experimenter saying to each child, "(Child's name), here are some toys (specify toys) to pick up. I don't care if you

pick them up or not. If you pick up the toys (specify toys) now, you will not go to the Goodie box when you're finished."

No reinforcer was delivered by the experimenter but the following performance feedback was given: "(Child's name), you picked up (or did not pick up) the toys (specify toys) right away, remember you cannot go to the Goodie Box."

Conditions DD-IR\* and DD-NR\*: These conditions followed the same procedures as conditions ID-IR\* and ID-NR\* with the only difference being the specified deadline. These two conditions were run concurrently and the particular condition in effect each day was randomly selected for each child. In these conditions the deadline statement specified the task to be completed before outside playtime, and the reinforcer varied from session to session. The deadline occurred approximately 20 minutes following the statement. The statement selected was presented to each child one time per session.

Condition DD-IR\*: This condition consisted of the experimenter saying to each child, "(Child's name), here are some toys to pick up. I don't care if you pick them up or not. If you pick up the toys before outside playtime, you can go to the Goodie Box when you're finished."

The experimenter provided performance feedback and a reinforcer immediately (within 15 seconds) following task

completion. The experimenter said, "(Child's name), you picked up the toys (specify toys) before outside playtime, now you can go to the Goodie Box." If the child did not pick up the toys before outside playtime the experimenter provided the following performance feedback: "(Child's name), you did not pick up the toys (specify toys) before outside playtime, now you cannot go to the Goodie Box." The experimenter did not deliver a reinforcer.

Condition DD-NR\*: This condition consisted of the experimenter saying to each child, "(Child's name), here are some toys (specify toys) to pick up. I don't care if you pick them up or not. If you pick up the toys (specify toys) before outside playtime, you will not go to the Goodie box when you're finished."

During this condition the experimenter provided the following performance feedback: "(Child's name), you picked up (or did not) the toys (specify toys) before outside playtime, remember you cannot go to the Goodie Box." No reinforcer was delivered.

In the previous conditions the subjects could respond immediately after the presentation of a statement. The statement could have an evocative function although the delayed deadline did not require immediate responding. In the next part of the study, the statement was precluded from having an evocative function by delaying the opportunity to



do the task. While precluding the evocative function of the CSS, the deadline statement was manipulated to ascertain its effects with immediate and delayed reinforcement. These conditions were given to only those subjects who had exhibited stability in their performance during previous conditions. Subjects who picked up toys 100% of times when the opportunity to go to the Goodie Box was present and did not pick them up when there was no opportunity to go were considered stable. These percentages exclude the first three data points for S8 and the first four for S4 since some children took longer to come in contact with the contingencies. However, following these first few points S4 and S8 responded differentially consistently. Five of nine subjects stabilized.

In the next conditions the opportunity to respond was delayed (pick up the toys) approximately 20 minutes after the CSS was presented, the CSS specified a deadline or no deadline and an immediate (within 15 seconds) or a delayed (1 day) reinforcer. Toys were placed on the floor in the classroom approximately 20 minutes after the experimenter presented the statement to the subject. In these conditions the subject could either go to the Goodie Box immediately (within 15 seconds) following completion of the task or go to the Goodie Box the next day if the task was completed by the specified deadline. Conditions lasted two sessions

each. Condition presentation order for conditions DD-IR\*\*, DD-DR\*\*, ND-NR\*\*, and ND-DR\*\* was randomly selected. The same general procedure was used. The toys used were highly discriminable and were unlike those previously in the classroom.

Condition DD-IR\*\*: In this condition children were given a statement specifying the delayed opportunity to respond, the delayed deadline, and an immediate reinforcer (within 15 seconds) upon completion of the task. Daily statements consisted of: "(Child's name), I'm going to put out some toys (specify toys) for you to pick up later. I do not care if you pick them up or not. If you pick up the toys (specify toys) before outside playtime, you can go to the Goodie Box when you're finished." The following performance feedback was given regardless of whether the child picked up or did not pick up the toys: "(Child's name), I said that I was going to put out some toys for you to pick up later. You picked up (or did not pick up) the toys (specify toys) before outside playtime, now you can (or cannot) go to the Goodie Box. If the child did pick up the toys he or she was immediately given a trip to the Goodie Box.

Condition DD-DR\*\*: This condition was exactly the same as condition DD-IR\*\* except that the trip to the Goodie Box was delayed 1 day. During this condition each child was

given the statement: "(Child's name), I'm going to put out some toys (specify toys) for you to pick up later. I don't care if you pick them up or not. If you pick up the toys (specify toys) before outside playtime, you can go to the Goodie Box tomorrow". Performance feedback was given 1 day following the completion of the task. The following performance feedback was delivered at the beginning of the next school day: "(Child's name), yesterday, I said I was going to put out some toys (specify toys) for you to pick up later. You picked up (or did not pick up) the toys (specify toys) before outside playtime. So, today you can (or cannot) go to the Goodie Box.

Condition ND-IR\*\*: In this condition each child was given a statement specifying the delayed opportunity to respond, an immediate reinforcer upon completion of the task, but no deadline. The experimenter told each child the following: "(Child's name), I'm going to put out some toys (specify toys) for you to pick up later. I do not care if you pick them up or not. If you pick up the toys (specify toys), you can go to the Goodie Box when you're finished." The following performance feedback was given regardless of whether the child did or did not pick up the toys:

"(Child's name), I said that I was going to put out some toys for you to pick up later. You picked up (or did not pick up) the toys (specify toys), now you can (or cannot) go

to the Goodie Box. If the child picked up the toys he or she was immediately given a trip to the Goodie Box. The child had the opportunity to pick up toys until the session ended. The session ended approximately 45 minutes following the placement of toys on the floor.

Condition ND-DR\*\*: This condition was exactly the same as condition ND-IR\*\* except that reinforcer deliveries were delayed 1 day. Each child was told: "(Child's name), I'm going to put out some toys (specify toys) for you to pick up later. I don't care if you pick them up or not. If you pick up the toys (specify toys), you can go to the Goodie Box tomorrow." The following performance feedback was given 1 day following the completion of the task at the beginning of the next school day: "(Child's name), yesterday, I said I was going to put out some toys (specify toys) for you to pick up later. You picked up (or did not pick up) the toys (specify toys). So, today you can (or cannot) go to the Goodie Box.

#### Interobserver Agreement and Observation Method

The experimenter and a graduate student from the Center for Behavior Analysis served as the observers. The second observer was not blind with respect to the experimental conditions. Observers were positioned so as to require independent data collection, and agreement between these

observers was checked at the end of each experimental session.

The experimenter used the following scoring criteria for all conditions: (a) a "completion" was scored for each session in which the task was completed, (b) a "break" was recorded when a child left a task before completion but returned and completed it, (c) a "working" was scored if a child spent any time during a session working on the task but did not complete it, and (d) a "noncompletion" was recorded for a task which was not completed. If one of the toys was left on the floor a "working" or "noncompletion" was scored. Individual data were collected on each child's task completion.

A completion was scored for a session if the child: (1) started and completed the task following the statement given by the experimenter, (2) worked steadily on the task if a friend was helping him pick up, (3) took a break but restarted and completed the task before any deadline expired, (4) did not leave any of the specified toys on the floor.

For condition ND-NR\* task initiation and completion within 5 minutes following the delivery of the statement was required for completion. Restarting a task and completion of the task had to occur within 5 minutes to be considered a completion.

For conditions ID-IR\*, ID-NR\*, DD-IR\*, DD-NR\*, DD-IR\*\*, and DD-DR\*\* the task had to be started and completed before the specified deadline occurred. If a break was taken the child had to return to and complete the task before the specified deadline occurred.

For conditions ND-IR\*\* and ND-DR\*\* the task had to be started and completed before the experimenter left the Child Development Laboratory (approximately 65 minutes following the statement). If a break was taken the child had to return to and complete the task before the experimenter left the Child Development Laboratory. The toys were removed by the experimenter before leaving, thus removing the opportunity for unreinforced behavior to occur.

The experimenter recorded any verbal responses made by the child following the delivery of the statement. The graduate student aiding the experimenter also recorded any of the child's verbal responses following the delivery of the statement and any comments made by the child after the experimenter left the child. The activity that the child was engaged in at the time the experimenter gave the statement as well as the toys that were to be picked-up were also recorded by the experimenter and the observer.

A total of 284 agreement trials were conducted during all conditions. Interobserver agreement was calculated by dividing the sum of observer agreements of the occurrence or

nonoccurrence and noncompletion by the sum of observer agreements and disagreements of occurrence or nonoccurrence of completion multiplied by 100. The percent of agreement for task completion was 98.9% over all sessions. The differences in the recorded times by the experimenter and observer over all timed events was within plus or minus 5.12 seconds of each other.

### Results

Conditions ND-NR\*, ID-IR\*, ID-NR\* in the present study replicated conditions ND-NR, D-R (immediate deadline and immediate reinforcement), and D-NR (immediate deadline and no reinforcement) of Braam and Malott's (1990) study. Conditions DD-IR\* and DD-NR\* in this study also replicated conditions D-R and D-NR of their study. Results from conditions ND-IR\*\*, ND-DR\*\*, DD-IR\*\*, and DD-DR\*\* contrasted with Braam and Malott's (1990) findings in conditions ND-DR (no deadline and delayed reinforcement) and D-DR (immediate deadline and delayed reinforcement).

Regardless of whether a deadline was specified as immediate or as occurring later (within 20 minutes) following the instruction, most of the children did the task immediately if the opportunity to do the task was immediately available (60%). Most of the children did the task by the deadline if they were told that they could go to the Goodie Box if they picked up the toys (93.6%). If they

were told that they would not get anything for picking up the toys, the majority of the children did not pick up the toys, immediate or delayed deadline (26.4%). In the beginning of the study a few children picked up toys when a deadline was given regardless of whether they could go to the Goodie Box. However, by the end of the study most of these children only picked up the toys when the chance to go to the Goodie Box was available. The accurate specification of immediate reinforcement appeared to have a stronger effect than accurate specification of the deadline.

If a deadline was given but the opportunity to do the task was delayed, then in general the children were not likely to pick up the toys (15%) even though they were always given the opportunity to go to the Goodie Box and in the past they usually picked up toys when they were given the opportunity to go to the Goodie Box. When given deadlines and delayed opportunity to respond, the children were slightly more likely to pick up the toys when they could go to the Goodie Box immediately after finishing the task (20%) than when they could go to the Goodie Box later (tomorrow) (10%). If no deadline was given and the opportunity to respond was delayed, children were more likely than not to pick up toys if and only if the reinforcer had been specified as immediate (60%).



In all conditions the toys which were specified to be picked up were recorded to determine if there was any preference for picking up certain toys. None of the children demonstrated preference for picking up any of the toys. The total proportion of task initiations to completions was 144 to 143. On only one occasion was a task initiated but not completed. On three separate occasions a task was initiated, stopped, restarted, and completed. The average time to initiate a task was 10.8 seconds when the opportunity to respond was immediately available. The average time to complete a task (immediate opportunity to respond) once it was initiated was 16 seconds. The average time to initiate a task after it became available was 18 minutes 42 seconds when the opportunity to respond was delayed. The average time to complete a task (delayed opportunity to respond) once it was initiated was 25 seconds.

Condition ND-NR\*

This condition proved to be an effective screening condition. If children had completed the tasks at a high level in the request condition (no deadline and no reinforcer) this would have mitigated against the experimenter's obtaining differential responding to statements specifying different deadlines and different delivery of reinforcers. Subjects who completed 50% or more

of the tasks specified in statements (requests or mands) specifying the response, but no deadline or outcome, were dropped from the study. As a result three subjects were dropped from the study. Another subject was dropped from the study due to aggressive behavior. The nine remaining subjects averaged 5.6% task completion in the screening condition (see Figure 1). Of the nine subjects only two (S8, S9) completed 25% of the tasks. The other seven completed 0% of the tasks (see Table 3).

#### Conditions ID-IR\* and ID-NR\*

When the opportunity to respond was immediately available, the specified deadline was now, and the delivery of the reinforcer was immediate (condition ID-IR\*) the children averaged 91.9% task completion. During the comparison trials in which no opportunity to receive a reinforcer (condition ID-NR\*) was available, the average completion was only 28.3% of the tasks (see Figure 1). Individual performances reflected that of the group (see Table 3).

Children responded differentially to the two alternating statements almost immediately. That is, when given an immediate deadline, the children picked up toys when the opportunity to go to the Goodie Box was available but did not do so when they were told that they would not be able to go. Out of 124 sessions in which delivery of a

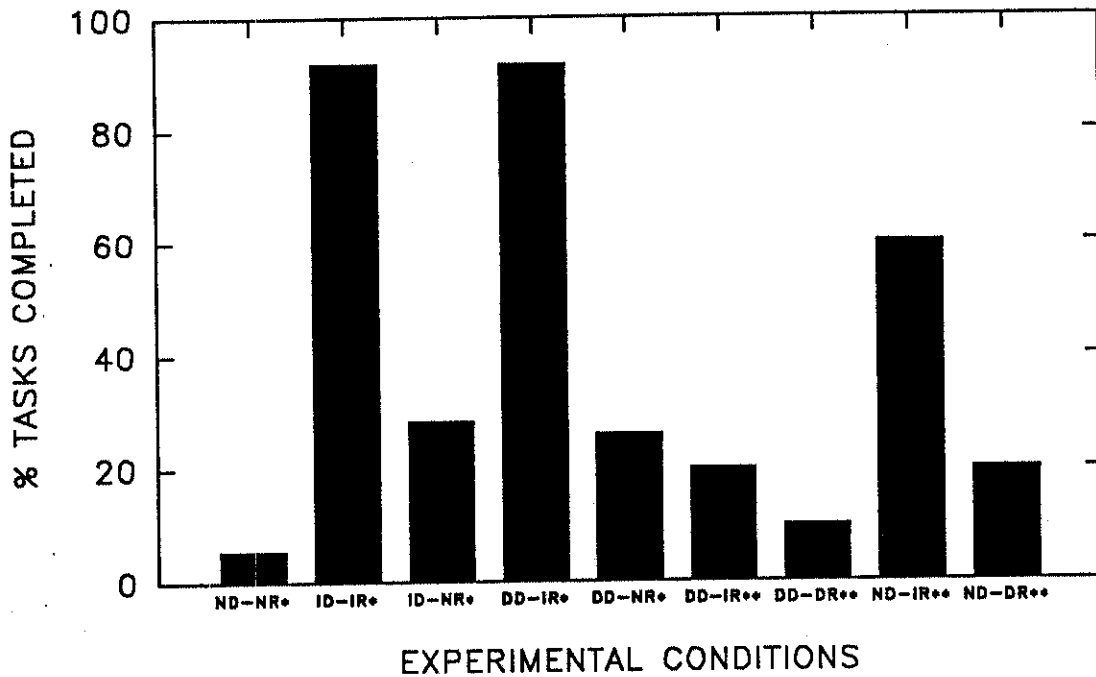


Figure 1. Group mean performance for all conditions. (ND=no deadline; ID=immediate deadline; DD=delayed deadline; NR=no reinforcer; IR=immediate reinforcer; DR=delayed reinforcer; \*=immediate opportunity to respond; \*\*=delayed opportunity to respond).

Table 3

Individual Task Completion with Immediate Opportunity to Respond

Subject	Experimental Condition				
	ND-NR*	ID-IR*	ID-NR*	DD-IR*	DD-NR*
S2	0% (0/4)	100% (6/6)	0% (0/6)	100% (4/4)	0% (0/4)
S3	0% (0/4)	100% (6/6)	0% (0/6)	100% (4/4)	0% (0/4)
S4	0% (0/4)	100% (8/8)	25% (2/8)	100% (4/4)	0% (0/4)
S5	0% (0/4)	100% (8/8)	50% (4/8)	100% (8/8)	25% (2/8)
S6	0% (0/4)	87.5% (7/8)	25% (2/8)	62.5% (5/8)	50% (4/8)
S7	0% (0/4)	87.5% (7/8)	37.5% (3/8)	87.5% (7/8)	25% (2/8)
S8	25% (1/4)	83.3% (5/6)	0% (0/6)	100% (4/4)	0% (0/4)
S9	25% (1/4)	100% (4/4)	0% (0/4)	100% (4/4)	0% (0/4)
S10	0% (0/4)	100% (8/8)	75% (6/8)	100% (4/4)	100% (4/4)

Note. The data in parentheses are (tasks completed/total tasks). \*=the opportunity to respond was available when the statement was presented. ND=No deadline; ID=immediate deadline; DD=Delayed deadline; NR=No reinforcer; and IR=Immediate reinforcer.

reinforcer was either available or not, children, as a group, completed 59 of 62 of the tasks when they were told that the opportunity to go to the Goodie Box was available and 17 of 62 tasks when told the opportunity was not available. S2 and S3 responded differentially during the first two sessions and S4 and S8 began differentially responding a few trials later. S10 usually picked up the toys regardless of the instructions presented.

As shown in Table 4 the time between statement delivery and task initiation ranged between 1 and 95 seconds across all subjects. However, the 95-second interval was recorded when a child was painting and took time to take off an apron before picking up the toys. Other than this extreme time interval the tasks were initiated in under 29 seconds (see Table 4).

#### Conditions DD-IR\* and DD-NR\*

As shown in Figure 1 when the opportunity to respond and the delivery of the reinforcer were both immediate but the deadline was delayed (condition DD-IR\*), subjects, as a group, completed 91.7% of the tasks. During the comparison trials in which no opportunity to receive a reinforcer was available (condition DD-NR\*) children averaged only 26% task completion. The individual data paralleled the results of the group data (see Table 3).

Table 4

Individual Times for Task Initiation Following Statement  
Presentation with Immediate Opportunity to Respond

Subject	Experimental Condition				
	ID-IR*	ID-NR*	DD-IR*	DD-NR*	
S2	23	95	-----	3 7	-----
	17	4	-----	6 7	-----
	3	15	-----	-----	-----
S3	15	15	-----	14 7	-----
	1	1	-----	13 11	-----
	9	11	-----	-----	-----
S4	4	5	6	2 15	-----
	5	5	7	16 11	-----
	5	6	-----	-----	-----
	12	1	-----	-----	-----
S5	4	5	7	12 6	38
	15	25	10	5 18	15
	6	5	4	17 40	-----
	14	7	-----	15 8	-----
S6	2	12	22	17 11	7 17
	6	8	9	15 1	9 6
	5	8	-----	8	-----
	9		-----	-----	-----
S7	25	4	20 22	22 2	9 15
	7	6	15	6 11	-----
	5	7	-----	15 18	-----
	20		-----	12	-----
S8	8	1	-----	5 8	-----
	5	29	-----	1 5	-----
	11	1	-----	-----	-----
S9	13	4	-----	1 15	-----
	9	5	-----	14 5	-----
S10	4	4	12 7	2 5	9 3
	1	6	5 10	3 22	17 7
	15	5	4 5	-----	-----
	7	25	-----	-----	-----

Note. All data are presented in seconds. \*=the opportunity to respond was available when the statement was presented.  
ID=immediate deadline; DD=delayed deadline; NR=no reinforcer; and IR=immediate reinforcer.

Subjects responded (44 of 96 sessions) differentially to the two alternating statements almost immediately. That is, out of 96 sessions in which the reinforcer was available or not, children completed 44 of 48 of the tasks when the opportunity to go to the Goodie Box was available and 12 of 48 tasks when it was not. S9 began responding differentially on the first two trials and S5 and S7 responded differentially to the statements within a few trials. S10 usually picked up toys regardless of the instructions. However, S5 and S7 differentially responded in conditions DD-IR\* and DD-NR\* but when conditions ID-IR\* and ID-NR\* were begun differential responding deteriorated. When condition DD-IR\* and DD-NR\* was reintroduced differential responding reappeared for S5. For S7, however, differential responding did not reappear until condition ID-IR\* and ID-NR\* was reintroduced.

As shown in Figure 2, the different deadlines (ID\* and DD\*) had little effect on the children's responding. Although the deadline was approximately 20 minutes after the experimenter delivered the statement, the children almost always completed the task immediately upon hearing the statement. The interval between statement presentation and task initiation ranged from 2 to 40 seconds across all children (see Table 4). The 40 seconds was recorded when a

child wandered around the room looking for the toys before finally picking them up.

Other than this extreme value, 40 seconds, the children initiated picking up the toys in under 38 seconds when the deadline was delayed with most (38 of 56) occurring in less than 15 seconds. When the deadline was immediate children, as a group, completed most tasks (59 of 79) in less than 15 seconds (see Figure 2).

In the remaining conditions, the opportunity to pick up the toys was separated temporally from the statement specifying the contingencies. In these conditions, the statement could not have an evocative function because the opportunity to behave was not available. While precluding the evocative function, the elements in the CSS were manipulated to ascertain the effects of immediate and delayed reinforcement and deadlines versus no deadlines.

#### Conditions DD-IR\*\* and DD-DR\*\*

When children were given a statement that specified a delayed opportunity to pick up toys, a delayed deadline, and immediate (condition DD-IR\*\*) or delayed (condition DD-DR\*\*) reinforcer upon task completion they rarely picked up toys, even though they had picked up toys in the past when they had had an immediate opportunity to do so, whether the rule statement specified an immediate (condition ID-IR\*) or



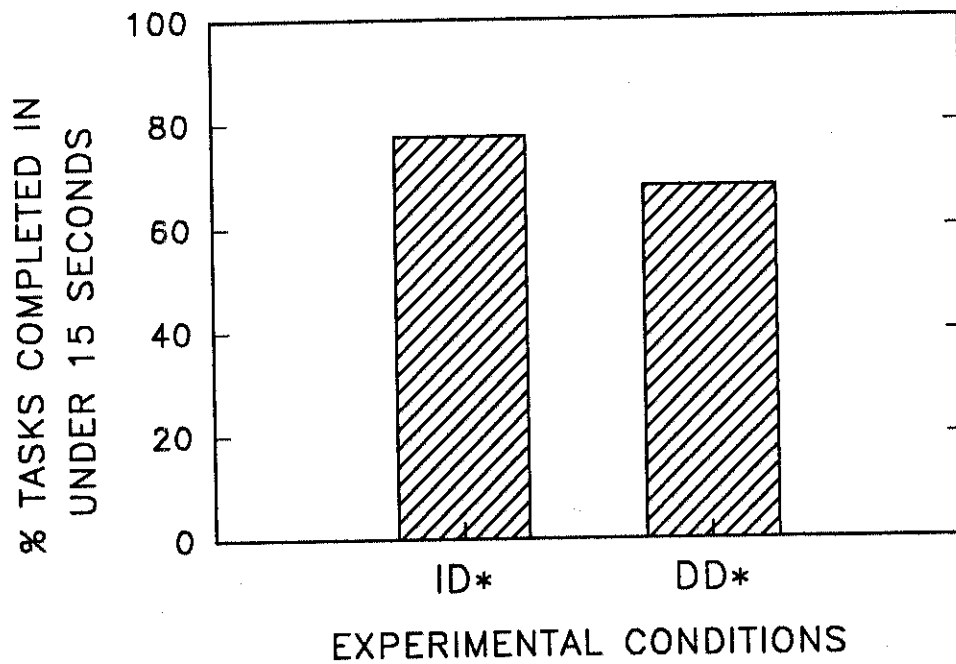


Figure 2. Group performance of tasks completed in under 15 seconds in immediate deadline (ID) and delayed deadline (DD) conditions. \*=the opportunity to respond was available when the statement was presented.

delayed reinforcer (condition DD-IR\*). Out of five children in these conditions, three of them, S3, S4, and S9, picked up the toys at least once when the reinforcer was immediately available, but only S3 did so when the reinforcer was delayed 1 day. S8 never picked up any of toys when the opportunity to respond was delayed regardless of whether the reinforcer was immediate or delayed (see Table 5).

As shown in Figure 1, during condition DD-IR\*\*, when the reinforcer was immediately available only 20% of the tasks were completed by the children as a group. When the reinforcer was delayed by 1 day (condition DD-DR\*\*) the group completed only 10% of the tasks.

As shown in Table 6 when deadline conditions were specified the time between when the toys were set out and task initiation ranged from 20 seconds to 7 minutes and 51 seconds in the delayed opportunity conditions across 5 subjects. The time between task initiation and the occurrence of the deadline ranged from 27 minutes and 9 seconds to 36 minutes and 28 seconds (see Table 6).

#### Condition ND-IR\*\* and Condition ND-DR\*\*

When children were given a statement that specified a delayed opportunity to pick up toys, no deadline, and an immediate or delayed reinforcer upon task completion they were less likely to pick up toys than in earlier conditions

Table 5

Individual Task Completion with Delayed Opportunity to Respond

Subject	Experimental Condition			
	ND-IR**	ND-DR**	DD-IR**	DD-DR**
S2	100%	0%	0%	0%
	(2/2)	(0/2)	(0/2)	(2/2)
S3	50%	50%	0%	50%
	(1/2)	(1/2)	(0/2)	(1/2)
S4	50%	0%	50%	0%
	(1/2)	(0/2)	(1/2)	(0/2)
S8	0%	0%	0%	0%
	(0/2)	(0/2)	(0/2)	(0/2)
S9	100%	50%	50%	0%
	(2/2)	(1/2)	(1/2)	(0/2)

Note: The data in parentheses are (tasks completed/total tasks). ND=No deadline; ID= immediate deadline; DD=Delayed deadline; NR=No reinforcer; IR= Immediate reinforcer; DR=Delayed reinforcer; \*\*=the opportunity to respond was available 20 minutes after the statement was presented.

Table 6

Individual Task Initiation Time Ranges with the Delayed Opportunity to Respond

Subject	Experimental Condition			
	DD-IR**	DD-DR**	ND-IR**	ND-DR**
Time between Toys Set Out and Task Initiation				
S2	-----	-----	8 min 31s	-----
	-----	-----	29 min 18s	-----
S3	-----	7 min 51s	34s	31 min 11s
S4	20s	-----	19 min 44s	-----
S5	-----	-----	-----	-----
S9	23 min 31s	-----	52s	40 min 23s
	-----	-----	21 min 59s	-----
Time between Task Initiation and Deadline Expiration				
S2	-----	-----	31 min 7s	-----
	-----	-----	32 min 8s	-----
S3	-----	38 min 28s	29 min 4s	20 min 14s
S4	27 min 9s	-----	35 min 41s	-----
S8	-----	-----	-----	-----
S9	27 min 19s	-----	26 min 48s	28 min 47s
	-----	-----	36 min 22s	-----

Note. ND=no deadline; ID=immediate deadline; DD=delayed deadline; NR=no reinforcer; IR=immediate reinforcer; DR=delayed reinforcer; \*\*=delayed opportunity to respond. min=minutes and s=seconds.

in which reinforcers were specified in the statements and there was a deadline (conditions ID-IR\* and DD-IR\*). When the opportunity to respond was delayed, the children picked up the toys more often when there was no deadline (condition ND-IR\*\*) than when a deadline was included (condition DD-IR\*\*) when an immediate reinforcer was provided. Out of five children, four (S2, S3, S4, and S9) picked up the toys at least once when the reinforcer was immediately available, but only S3 and S9 did so when the reinforcer was delayed 1 day. S8 failed to pick up the toys when no deadline was specified, the delivery of the reinforcer was immediate or delayed, and the opportunity to respond was delayed (see Table 3 and Table 5).

When the reinforcer was immediately available (condition ND-IR\*\*), 60% of the tasks with no deadline were completed by the children as a group. During condition ND-DR\*\* when the reinforcer was delayed, only 20% of the tasks with no deadline were completed (see Figure 1).

When there was no deadline specified, the time between when the toys were set out and task initiation ranged from 34 seconds to 29 minutes and 18 seconds across 5 subjects (see Table 6).

#### Discussion

Braam and Malott (1990) found that rule statements containing a deadline controlled rule following in young

children more reliably than rule statements with no deadline. The deadline stated in the rule was "now", thus requiring immediate following of the rule if reinforcement was to be obtained. Braam and Malott (1990) suggested that the deadline statement itself was critical and they provided a theoretical rationale for the deadline condition's control over rule following in preschoolers. Braam and Malott (1990) explained the control exerted by the deadline in terms of the learned aversive properties of deadline statements. They hypothesized that the deadline statement established noncompliance as a learned aversive condition and compliance was reinforced by escape from the aversive condition. That is, rule compliance is directly reinforced in that the learned aversive condition which is established by the rule statement is immediately terminated.

Conditions ND-NR\*, ID-IR\*, ID-NR\*, DD-IR\*, and DD-NR\* of this study replicated some of the conditions in Braam and Malott's study (1990) and confirmed that rule following occurred reliably if rule statements specified both an immediate reinforcer and a deadline and the opportunity to respond was available when the rule was presented. Present results extended their findings to cases in which the deadline was delayed, as long as the opportunity to respond was immediately available and reinforcement was specified and delivered. Whether the deadline was specified as "now"

(and the children given 5 minutes) or whether the specified deadline allowed 20 minutes for delayed responding, the children reliably responded within seconds after the rule was presented. Thus, the deadline component of the statement appears to have functioned as an evocative stimulus whether the statement required immediate responding or not in conditions ID-IR\*, ID-NR\*, DD-IR\*, and DD-NR\*. Therefore, the stated deadline could have functioned as an evocative stimulus, and the CSS and the evocative function of the deadline statement as an  $S^D$  were confounded.

When a deadline and reinforcement were specified but the opportunity to do the task was delayed (conditions DD-IR\*\* and DD-DR\*\*), the children reliably failed to pick up the toys even though they were always given the opportunity to go to the Goodie Box; and in the past (conditions ID-IR\* and DD-IR\*) they usually picked up toys when they were given the opportunity to go to the Goodie Box. This was in contrast to the findings of Braam and Malott (1990) who found that deadlines, per se, were a critical component in the rule statements to which the children in their study responded. The difference in responding appears to hinge on the opportunity to respond. However, the possibility of a sequence effect existed because children were always exposed initially to conditions in which the opportunity to respond was immediately available.

When the opportunity to do the task was delayed and there was no deadline specified, children picked up toys most often if the specified reinforcer was immediate (rather than delayed 1 day). That is, when the deadline statement was delivered so it could function only as a function-altering stimulus, the deadline was not critical to rule following. The children's behavior was "governed" by the rule with some reliability only when the statement specified immediate reinforcement and did not specify a deadline. This contrasted with the findings of Braam and Malott (1990) in two ways. First, they found that rule statements specifying immediate and delayed reinforcement did not differ with respect to their effect on task completion. Second, they found that rule statements that specified no deadline were less likely to result in responding than did rule statements that did specify a deadline. Again the component that appears to account for the difference is availability of the task concurrent (or not) with the presentation of the CSS (rule statement).

#### Condition ND-NR\*

A request (ND-NR\*) specifies the response requirements and only implies a contingency. It is a simple mand. Because the contingency is implied the children used in this study may not have developed the repertoire necessary to infer a contingency relation. Another way of viewing the



results obtained in condition ND-NR\* is that children who did not respond to the mands had acquired a repertoire of discriminated responding to instruction-givers---some of whom reinforced instruction following and some who did not. Having had no history with the experimenter, children in the study did not follow instructions specifying no contingencies. However construed, the results suggest that generalized control by simple mands (specifying response requirements) did not reliably control behavior of most of these 4 to 5 year old children. Only three children were dropped from the study due to a high completion percentage suggesting that behavioral histories establishing (undiscriminated) control by requests (ND-NR\*) vary among children of this age.

Conditions ID-IR\*, ID-NR\*, DD-IR\*, and DD-NR\*

Results from the present study supported Braam and Malott's (1990) conclusions that statements specifying responses, deadlines, and immediate reinforcers reliably controlled behavior when the opportunity to respond was immediately available. In conditions ID-IR\*, ID-NR\*, DD-IR\*, and DD-NR\* when children picked up toys, they did so within seconds after the CSS was presented. The function of the CSS appears confounded with the concurrent function of the toys as discriminative for picking up. The specification of a delayed deadline did not result in

responding that differed from responses to rule statements specifying immediate deadlines. The procedure in these conditions did not adequately separate the function-altering effects of CSSs from the discriminative effects commonly assumed.

The experimenter took precautions to eliminate potential social consequences by telling the statement to the child while he or she was alone or by taking the child off to the side to give the statement. Teacher interactions were limited during sessions in which the child was participating in the study. Also the experimenter ignored all the children's attempts to interact following the presentation of the statement. Although attempts were made to eliminate potential social consequences, children occasionally helped each other pick up the toys. Since this occurred on only three occasions and occurred following the initial phase (i.e., conditions ID-IR\* and ID-NR\* for some children and conditions DD-IR\* and DD-NR\* for others), such social consequences are unlikely to have had dramatic influence over the other children's behavior. Therefore, the children's differential responding was unlikely to have been due to these different social consequences.

However, some children (S5, S6, and S7) responded somewhat indiscriminately to CSS's with and without specified reinforcers. This is likely to be due to a strong

history of instructional control. That is, these children complied in varying degrees with instructions, regardless of the content of the instruction. Near the end of the study they began responding only to instructions when an immediate reinforcer was specified. Therefore, the effect of the contingencies on the differential responding to the different CSS's took considerable time for those three children.

In the middle part of the study some of the children in the study (S2, S5 and other children in the classroom not involved in the study) began making their own Goodie Box with toys that other children were not playing with. They placed toys on the floor around the room and gave statements to other children similar to the ones that the experimenter was giving. For instance, "If you pick up the toys, you can (or will not) go to the Goodie Box." This occurred on four different occasions. It occurred for two out of three consecutive days and on the first day following a weekend. It did not occur again until seven sessions later. This may have influenced other children's differential responding during the latter part of the study because some children S5 and S6 began to respond differentially during the final condition in which the opportunity to respond was immediately available (conditions DD-IR\* and DD-NR\* for S5 and conditions ID-IR\* and ID-NR\* for S6).

During the study several other children asked the target child what the experimenter had said to him or her. Perhaps these social interactions influenced the target child's performance in the study. Maybe these interactions increased the likelihood that a child would differentially respond or maintained the child's responding.

The deadline and immediate reinforcer statements (conditions ID-IR\* and DD-IR\*) reliably controlled behavior yet the deadline and no reinforcer statements (conditions ID-NR\* and DD-NR\*) and the condition ND-NR\* did not. Consistent with Braam and Malott's (1990) study, control over responding appeared to occur if a reinforcer was specified and responding failed to occur if the absence of reinforcement was specified. Children responded differentially to the alternating statements almost immediately regardless of which deadline was imposed (see Table 3). S2, S3, S9 started on the first trial and S5 and S7 started a few trials after introduction of these two statements. However, S5 and S6 differentially responded in conditions DD-IR\* or DD-NR\* but when they were introduced to conditions ID-IR\* or ID-NR\* differential responding deteriorated. When conditions DD-IR\* or DD-NR\* were reintroduced, differential responding reappeared for S5. For S6, however, differential responding did not reappear until the conditions ID-IR\* or ID-NR\* were reintroduced.

This seems to suggest that these children have a behavioral history for following statements when the word "now" is included. S10 completed 10 out of 12 tasks when no reinforcer was available and 12 out of 12 tasks when the reinforcer was immediately available. Children either immediately completed the task when the reinforcer was immediately available or did not when there was no reinforcer delivered. Results are consistent with Braam and Malott (1990) in their hypothesis that since children began responding differentially almost immediately that the actual contingencies of reinforcement described by the statement did not have a sufficient opportunity to reinforce compliance. Thus, the establishment of generalized control by classes of statements describing direct-acting contingencies likely existed prior to the study.

In all conditions the toys which were specified to be picked up were recorded to determine if there was any preference for picking up certain toys. None of the children demonstrated such preference.

Conditions DD-IR\*\*, DD-DR\*\*, NR-IR\*\*, and NR-DR\*\*

During the previous conditions children were completing the tasks immediately following the statement regardless of whether the deadline was "now" or some time later. These conditions were introduced to better assess the function of the deadline when the possibility of its functioning

evocatively were precluded. This was accomplished by delaying the opportunity to respond to the statement, precluding immediate compliance with the statement. Statements which specified a deadline and a reinforcer, either immediate or delayed, did not reliably control the behavior of 4 to 5 year old children when the opportunity to respond was delayed. The only condition in which responding occurred when the opportunity to respond was delayed was that in which the statement specified no deadline but specified immediate reinforcement for responding. In that condition ND-IR\*\*, 60% task completion and 4 of 5 children responding may be interpreted as suggesting the children were capable of responding in accordance with a CSS that cannot function evocatively. Responding in the condition with the delayed opportunity, no deadline, and immediate reinforcer seems to suggest that the toys, not the statement, evoked the behavior. When a child did do the delayed task, the child picked up the toys upon spotting the toys specified in the statement. The child did not wait until immediately before the deadline. In those instances where the child did pick up the toys, the toys seemed to evoke the behavior. Consistent with Schlinger and Blakely (1987) the rule statement appeared to establish the toys as an S<sup>D</sup>; the rule itself could not evoke behavior. However, because the highest percentage of completion obtained was

60%, further experimental analysis is required. The results here merely suggest the possibility of a CSS altering the function of a stimulus under certain conditions.

Conceivably, there are occasions on which the CSS cannot change the function of the stimuli or there may be a point at which the CSS's function-altering characteristic deteriorates (e.g., when the time delay is too great). It seems likely that this point could be altered so that the stimulus stated in the CSS evoked behavior at longer delays.

The results suggest that rules specifying a deadline, regardless of whether it is immediate or delayed, and specifying an immediate reinforcer reliably control the behavior of 4 to 5 year olds if the opportunity to respond is immediately available. However, if the opportunity to respond is delayed then such rules do not reliably control behavior. Braam and Malott (1990) explained the control exerted by rules describing reinforcers that are too delayed to directly reinforce responses in terms of their function as establishing operations, specifically, the rule was said to establish noncompliance with the rule as a learned aversive condition. By complying with the rule the aversive condition was reduced or terminated.

Results from this study indicated that if the opportunity to respond to the rule was delayed then the children were less likely to pick up the toys than if the

opportunity was immediately available. One might hypothesize that the deadline did establish noncompliance as a learned aversive condition. If so, the aversive condition might be expected to increase during the time compliance was not possible. If this were true, one might expect at least as much compliance when the opportunity to comply became available. The present results do not support increasing aversiveness of noncompliance. On the other hand, one might hypothesize that the aversive condition dissipated once the rule was no longer present. In this case, it might be difficult to account for the fact that the only "delayed opportunity" condition that resulted in significant compliance was the condition in which there was no deadline.

Many children reported forgetting, which suggests no aversive condition. However, the consequence for not completing the task may not have been aversive enough to create any sort of aversive condition. For instance, in the everyday world if we do not complete a homework assignment by the deadline a negative consequence ensues. If we don't file our taxes by April 15, the IRS penalizes us financially-another avoidance contingency. For deadlines to effectively control behavior a history of negative reinforcement may be required. Further research could be conducted to examine the use of aversive consequences and deadlines.



In summary, statements specifying deadlines (delayed or immediate) and immediate reinforcers reliably controlled the behavior of 4 and 5 year old children when the opportunity to respond was immediately available. If the opportunity to respond was delayed then such statements did not reliably control behavior of these children. Thus, deadlines, per se, seem unlikely to be critical components of rules that are followed.

## REFERENCES

- Braam, C., & Malott, R. W. (1990). "I'll do it when the snow melts": The effects of deadlines and delayed outcomes on rule-governed behavior in preschool children. Manuscript submitted for publication.
- Braam, C., & Malott, R. W. (1990). "I'll do it when the snow melts": The effects of deadlines and delayed outcomes on rule-governed behavior in preschool children. The Analysis of Verbal Behavior, 8, 67-76.
- Blakely, E., & Schlinger, H. (1987). Rules: Function-altering contingency-specifying stimuli. The Behavior Analyst, 10, 183-187.
- Catania, A. C. (1984). Learning. Englewood Cliffs, NJ: Prentice-Hall.
- Catania, A. C. (1989). Rules as classes of verbal behavior: A reply to Glenn. The Analysis of Verbal Behavior, 7, 49-50.
- Galizio, M. (1979). Contingency-shaped and rule-governed behavior: Instructional control of human loss avoidance. Journal of the Experimental Analysis of Behavior, 31, 53-70.
- Glenn, S.S. (1987). Rules as environmental events. The Analysis of Verbal Behavior, 5, 29-32.

- Hayes, S. C. (1986). The case of the silent dog-Verbal reports and the analysis of rules: A review of Ericsson and Simon's protocol analysis: Verbal reports as data. Journal of the Experimental Analysis of Behavior, 45, 351-363.
- Michael, J. (1982). Distinguishing between discriminative and motivational functions of stimuli. Journal of the Experimental Analysis of Behavior, 37, 149-155.
- Michael, J. (1983). Evocative and repertoire-altering effects of an environmental event. The Analysis of Verbal Behavior, 2, 19-21.
- Michael, J. (1986). Repertoire-altering effects of remote contingencies. The Analysis of Verbal Behavior, 4, 10-18.
- Schlinger, H., & Blakely, E. (1987). Function-altering effects of contingency-specifying stimuli. The Behavior Analyst, 10, 41-45.
- Shimoff, E., Catania, A. C., & Matthews, B. A. (1981). Uninstructed human responding: Sensitivity of low-rate performance to schedule contingencies. Journal of the Experimental Analysis of Behavior, 36, 207-220.
- Sidman, M. (1960). Tactics of Scientific Research. Boston: Authors Cooperative.

- Skinner, B. F. (1969). Contingencies of reinforcement: A theoretical analysis. New York: Appleton-Century Crofts.
- Vaughan, M. E. (1985). Repeated Acquisition in the analysis of rule-governed behavior. Journal of the Experimental Analysis of Behavior, 44, 175-184.
- Zuriff, G. E. (1985). Behaviorism: A conceptual reconstruction. New York: Columbia University Press.