JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2002, **35,** 171–181 NUMBER 2 (SUMMER 2002)

THE EFFECTS OF MAGNITUDE AND QUALITY OF REINFORCEMENT ON CHOICE RESPONDING DURING PLAY ACTIVITIES

HANNAH HOCH
THE GRADUATE CENTER, CUNY

JENNIFER J. MCCOMAS AND LEANN JOHNSON
THE UNIVERSITY OF MINNESOTA

NICKY FARANDA
QUEENS COLLEGE

AND

SHAYNA L. GUENTHER
ALPINE LEARNING GROUP, INC.

Three boys with autism participated in a study of the effects of magnitude and quality of reinforcement on choice responding. Two concurrent response alternatives were arranged: (a) to play in an area where a peer or sibling was located, or (b) to play in an area where there was no peer or sibling. During one condition, the magnitude (i.e., duration of access to toys) or quality (level of preference) of reinforcement provided for both responses was equal. During the other condition, the magnitude or quality of reinforcement was relatively greater for choosing the play area where the peer or sibling was located than the area where the peer or sibling was not located. Results showed that after repeated exposure to the unequal magnitude or quality condition, the participant increasingly allocated his responses to the play area where the peer or sibling was located. For 2 participants, this pattern of responding was maintained in the subsequent equal magnitude or quality condition. Overall, the analysis suggests that the dimensions of magnitude and quality of reinforcement can be arranged to influence choice responding in favor of playing near a peer or sibling rather than playing alone.

DESCRIPTORS: reinforcer magnitude, quality, concurrent schedules, response allocation, choice responding, autism

The variables that influence choice responding are generally studied in a concurrent-schedules arrangement in which two or more simultaneously available response alternatives are each correlated with an independent schedule of reinforcement. This concurrent arrangement of schedules provides a sensitive method of assessing an individual's relative preferences (Fisher & Mazur, 1997) with respect to the influence of particular dimensions of reinforcement on choice responding (Leslie, 1996). According to the matching law (Herrnstein, 1970), the distribution of behavior across concurrently available response alternatives is a function of the relative reinforcement produced by each response. Reinforcement is often arranged according to rate but can also be ar-

We wish to acknowledge the contributions to this study made by Daphna El-Roy and express our sincere and deep appreciation to her, the participants, Abe's mother, the staff of the Genesis School and the Alpine Learning Group, Inc.

Correspondence should be addressed to Jennifer J. McComas, Department of Educational Psychology, The University of Minnesota, 224 Burton Hall, 178 Pillsbury Dr. S. E., Minneapolis, Minnesota 55455.

ranged along other dimensions, including magnitude and quality of reinforcement. Thus, enrichment of one or more dimensions of reinforcement for a given response alternative can increase the likelihood of that response relative to another.

Manipulations of magnitude of reinforcement have been shown to produce shifts in response allocation to the response alternative that provides the greater magnitude of reinforcement, relative to that concurrently available for other alternatives (Catania, 1963). Magnitude of reinforcement can take the form of intensity, number, or duration. Carr, Bailey, Ecott, Lucker, and Weil (1998) examined magnitude effects in the form of number of stimuli presented on suppression of an arbitrary response. Results demonstrated differentially greater suppressive effects of a noncontingent schedule that arranged a greater magnitude than one that arranged a lower magnitude. Lerman, Kelley, Van Camp, and Roane (1999) examined the effects of magnitude of reinforcement on positively reinforced screaming of an adult woman with severe mental retardation. In that study, two separate concurrent schedules were arranged, both of which arranged extinction for screaming. In one arrangement, a mand produced 10-s access to the functional reinforcer (toys) and in the other, the mand produced 60-s access to toys. The results demonstrated equivocal manding across the two schedule arrangements, but fewer occurrences of screaming in the schedule in which mands produced the greater magnitude of reinforcement.

Manipulation of quality of reinforcement (e.g., stimulus preference) has also been shown to be an effective method of biasing responding. With all other dimensions of reinforcement held constant, an individual will allocate responding to the response alternative that produces the higher quality reinforcement (Hollard & Davison, 1971). These findings have encouraged applied researchers to examine the influence of various dimensions of reinforcement and the matching law in clinical and educational settings. Several investigations have been conducted with students diagnosed with severe emotional, behavioral, and learning disorders on the effects of response effort and reinforcement rate, quality, and delay on allocation to concurrently available academic tasks (Dixon & Cummings, 2001; Mace, Neef, Shade, & Mauro, 1996; Neef & Lutz, 2001; Neef, Mace, & Shade, 1993; Neef, Mace, Shea, & Shade, 1992; Neef, Shade, & Miller, 1994). Among the dimensions studied was quality of reinforcement, defined as stimuli that were reliably selected as highly preferred in stimulus preference assessments. High- and low-quality designations were based on daily assessment of student preferences. The findings of this series of experiments indicated that, in general, students allocated their time to those tasks that required the lowest response effort and resulted in the shortest delay to and greatest rate and quality of reinforcement. Duration (magnitude) and quality of reinforcement have also been combined to effectively bias responding among concurrently available response options (Peck et al., 1996). Although the separate effects of magnitude and quality of reinforcement were not determined, the findings indicated that magnitude and quality of reinforcement could be arranged to bias responding toward appropriate responses and away from severe forms of aberrant behavior.

The number of studies of the influence of various dimensions of reinforcement in concurrent schedules in applied situations remains relatively small compared to the large body of basic research on this topic. Specifically, there remains a paucity of applied research on the effects of magnitude and quality of reinforcement in concurrent schedules on behavior in social situations. For example, one characteristic of many children diagnosed with autism is that they avoid social interactions in favor of solitary play. Little is known about how to increase the reinforcing value of social interaction for these children. However, if one or more dimensions of reinforcement could be arranged to bias the choice responding of children from solitary play to play in an area where a peer is located, a systematic line of research could follow that examines the efficacy of such arrangements for improving social initiations and social interactions. The purpose of the present investigation was to examine the influence of magnitude and quality of reinforcement on choice responding related to playing alone or playing in an area that contained a peer.

METHOD

Participants

Three boys who had been diagnosed with autism participated in this project. Robbie, 9 years old, and Yitzchak, 10 years old, attended small (25 students) private schools for children with autism. Both had expressive language abilities and some social initiation skills, but rarely, if ever, approached or played with peers. Abe was 11 years old and received public school special education services for children with moderate to severe developmental disabilities. He had no vocal language but used picture exchange symbols and a vocal output device to communicate. His vocabulary was estimated at over 1,000 words. He had some social initiation skills and a history of aggression toward his infant brother when they were in close proximity (e.g., on the couch, in the back seat of the car); he rarely approached or played with his infant brother.

Settings

Sessions with Robbie were conducted in his school; experimental sessions were conducted in an empty classroom and natural-setting probes were conducted in his classroom. A peer who was Robbie's age, was in Robbie's class, and exhibited similar abilities and interests served as the peer during the experimental sessions; classmates served as peers in the natural-setting probes. Sessions with Abe were conducted in his living room with his brother, mother, and at least one experimenter present. Sessions with Yitzchak were conducted in his classroom with three peers who were in Yitzchak's class and who displayed similar abilities and interests.

Materials

For Robbie, two identical sets of a marbles game, LiteBrite™, Don't Spill the Beans™, and Topple™ were used. For Abe, two identical sets of audiocassette tapes, Slime™, Play Dough™, and Slinky™ were used. For Yitzchak, two identical sets of books, games, toy blocks, coloring activities, puzzles, and the game Perfection™ were used.

Target Behavior

Response allocation was the primary dependent variable. It was defined as the participant walking to one of the two designated play areas after the instruction, "go play." The choice of peer or sibling was scored when the participant independently walked to the area where his peer or sibling was located.

Data Collection, Measurement, and Design

With all participants, event data on choice responding to the play area where the peer or sibling was located was recorded in each session and calculated as a percentage by dividing the number of times the participant chose that area by the total number of choices he made during a session and multiplying by 100%. A stopwatch was used to record duration (number of seconds of access to the play area and toy). An event-based recording procedure was used to record delivery of the prechoice instruction ("go play"), and the type of reinforcer (specified toy). All of the sessions were scored by trained observers in the experimental setting. Point-by-point interobserver agreement data were collected and computed for 33% to 36% of the sessions of each condition from videotape (Robbie and Abe) or in the experimental setting (Yitzchak) by independent observers. Across all sessions, mean agreement on the dependent variable was 91% (range, 85% to 100%) for Robbie, 97% (range, 80% to 100%) for Abe, and 97% (range, 80% to 100%) for Yitzchak. Across all sessions, mean agreement scores on the independent variables were 98% (range, 97% to 100%) for Robbie and 100% for Abe and Yitzchak. For all 3 participants, a simultaneous treatments design (Barlow & Hersen, 1984) was implemented to demonstrate the effects of a specified dimension of reinforcement on choice responding. In addition, with Yitzchak, an ABAB reversal was embedded within a multiple baseline design across peers (Manny, Jack, and Truman).

Procedures: All Participants

Preference assessments. Preexperimental preference assessments (Piazza, Fisher, Hagopian, Bowman, & Toole, 1996) were conducted first with the participants and then with their peers to identify high- and low-preference items; a preference assessment was not conducted with Abe's infant brother. To begin, the participant's teacher (Robbie and Yitzchak) or parent (Abe) nominated 12 items. Each item was paired with every other item once, and each pair was presented for 5 s. The four items selected least frequently were identified as less preferred. The six items selected most frequently were used in the preference assessment with the peers. The three items approached most frequently by each peer were designated as highly preferred. A mini preference assessment using the highly preferred items was conducted prior to each session with each participant to determine which items would be used during that day's session (DeLeon et al., 2001). Specifically, the first item the participant selected was designated as highly preferred, and one of the three items identified as least preferred during the preexperimental preference assessment served as the less preferred item for that day (for Abe and Yitzchak; low-preference items were not used in Robbie's analysis).

General. Experimenters conducted one to six sessions per day, approximately 2 days per week. For Abe, one session was conducted every 2 weeks following Session 16. Each session was comprised of five choice trials (three for Yitzchak). For all sessions, two play areas were arranged and located approximately 1 m apart. The location of the two play areas (each designated by a different color cloth) and the location of the peer or sibling were counterbalanced across left and right sides in all sessions. Prior to every session, the participant was directed to play with the toy in both play areas for the duration of time indicated by the condition to ensure that he was exposed to both contingencies. The location of the play area in which the participant was first directed to play during presession contingency exposure was counterbalanced across all sessions. After the participant had been exposed to both contingencies, the session began with the instructor leading him to the center of the room and saying, "go play." If he did not move, the instruction was repeated. If he still did not move, the experimenter gestured to both play areas and repeated the instruction. No participant ever refused to choose a play area. On very rare occasions, a participant wandered away from the play areas; he did not move to the other play area but was instead moving away from the experimental arrangement. On these occasions, he was verbally prompted to "sit down, please," at which time he always returned to the play area he had left. The only consequence for choosing a play area was the opportunity to play with the toy (and the peer or sibling) in that area; no other reinforcers were delivered. After the specified period of time, the participant was led back to the center of the room and was instructed to wait. After 15 s passed, "go play" was repeated. During sessions, the peer was actively engaged in playing with the toys and never attempted to leave the play area. Abe's mother held his infant brother on her lap when he tried to wander away from the experimental arrangement.

Procedures of Experiment 1: Magnitude (Robbie)

Identical highly preferred toys were located in each play area, with a peer in one area.

Equal magnitude. Choice of either play area with identical highly preferred toys produced 50-s access to the selected play area. The location of the peer was counterbalanced across sessions.

Unequal magnitude (paired). Choice of the play area where the peer was located produced 90-s access; choice of the area where the peer was not located produced 10-s access. The location of the peer was counterbalanced across sessions and was always paired with 90-s access.

Natural-setting probes. Sessions were conducted in Robbie's classroom with different peers than the one who participated in the experimental sessions. Procedures were identical to those described above.

Procedures of Experiment 2: Quality (Abe)

One toy was located in each play area, with Abe's brother in one play area.

Unequal quality. Choice of either the area with the highly preferred stimulus or the area with the less preferred stimulus produced 50-s access to the selected area. In the first unequal quality (unpaired) condition, the location of Abe's brother was counterbalanced across sessions. In the second unequal quality (paired) condition, the location of Abe's brother was counterbalanced across sessions and was always paired with the highly preferred toy.

Equal quality (low). Choice of either area containing identical low-preference toys produced 50-s access to the selected area. The location of Abe's brother was counterbalanced across sessions.

Equal quality (high). Choice of either area containing identical highly preferred toys produced 50-s access to the selected area. The location of Abe's brother was counterbalanced across sessions.

Procedures of Experiment 3: Quality and Magnitude (Yitzchak)

One toy was located in each play area, with a peer in one play area.

Equal quality and magnitude. Choice of either area containing identical highly preferred toys resulted in 50-s access to the selected area. The location of the peer was counterbalanced across all equal quality sessions.

Unequal magnitude. Unequal magnitude was implemented with only one peer (Manny) whose location was counterbalanced across sessions. Choice of the area where Manny was located produced 120-s access for the first three sessions and 90-s access thereafter. Choice of the play area that did not contain Manny resulted in 20-s access for the first three sessions and 10-s access thereafter. Identical highly preferred toys were located in both play areas. Because magnitude did not appear to influence Yitzchak's choice responding, only the effects of quality were examined with the second and third peers (Jack and Truman).

Unequal quality (paired). Choice of the play area where the highly preferred toy and the peer were located produced 50-s access; choice of the area that contained the less preferred toy and where the peer was not located produced 50-s access. The location of the peer was counterbalanced across sessions, and the peer was always paired with the greater quality of reinforcement.

RESULTS

The results of the analysis of magnitude of reinforcement with Robbie are depicted in Figure 1. During the first condition, with his peer's location counterbalanced and equal magnitudes of reinforcement arranged for each alternative, Robbie appeared to choose according to the location of his peer. Specifically, he never chose to play where his peer was located. By contrast, in the unequal magnitude condition, with repeated exposure to greater magnitude of reinforcement associated with the area where his peer was located, Robbie increasingly chose the area that contained his peer. In 11 of the 19 total sessions (including the last four consecutive sessions) of the second condition, Robbie allocated 100% of his responses to the area where his peer was located. In the final equal magnitude condition, Robbie continued to allocate his choice responses to the area where the peer was located. Results of the natural-setting probes (middle panel of Figure 1) were nearly identical to those in the experimental sessions for each condition. Although a reversal was not obtained on choice of peer location, these results suggest that Robbie initially chose to avoid the play areas where his peer was located, but that after several pairings of his peer with the greater magnitude of reinforcement, Robbie chose according to the location of his peer, regardless of the magnitude of reinforcement.

The results of the analysis of quality of reinforcement with Abe are depicted in the bottom panel of Figure 1. In the first condition in which the location of his brother was counterbalanced across high- and low-preference items, Abe exclusively selected the highly preferred items, regardless of where his brother was located. In the following condition in which the location of his brother was counterbalanced across two identical less preferred items, Abe chose the area with his brother less than 50% of the time. In the next condition in which the choice was between high- and low-preference toys and his brother was always paired with the highly preferred toy, Abe chose the area with the highly preferred toy (and his brother) exclusively after the first session. In the subsequent condition in which Abe's choice was between two identical highly preferred toys and the location of his brother was counterbalanced across areas, Abe chose the location with his brother on 80% of the opportunities in all but the first session. Finally, when Abe's choice was between two identical less preferred toys and the location of his brother was counterbalanced across areas, Abe continued to choose almost exclusively the area where his brother was located. These results indicate that although Abe initially chose according to his preference for the toys, after consistent pairing of his brother with a highly preferred toy, Abe chose according to the location of his brother.

The results of the analysis of magnitude and quality of reinforcement with Yitzchak are shown in Figure 2. In the first condition that offered choices of equal magnitude and identical highly preferred toys, Yitzchak never chose the area where his peer was located. Similarly, in the next condition, access to six and then nine times the magnitude of reinforcement did not result in Yitzchak choosing the area with his peer (Manny). It was not until the third condition, in which quality was manipulated, that Yitzchak chose to play in the area where his peer was located. Specifically, Yitzchak almost exclusively chose the area where his peer and the highly preferred toy were located rather than the area where the less preferred toy was located. In the reversal to equal quality, when the

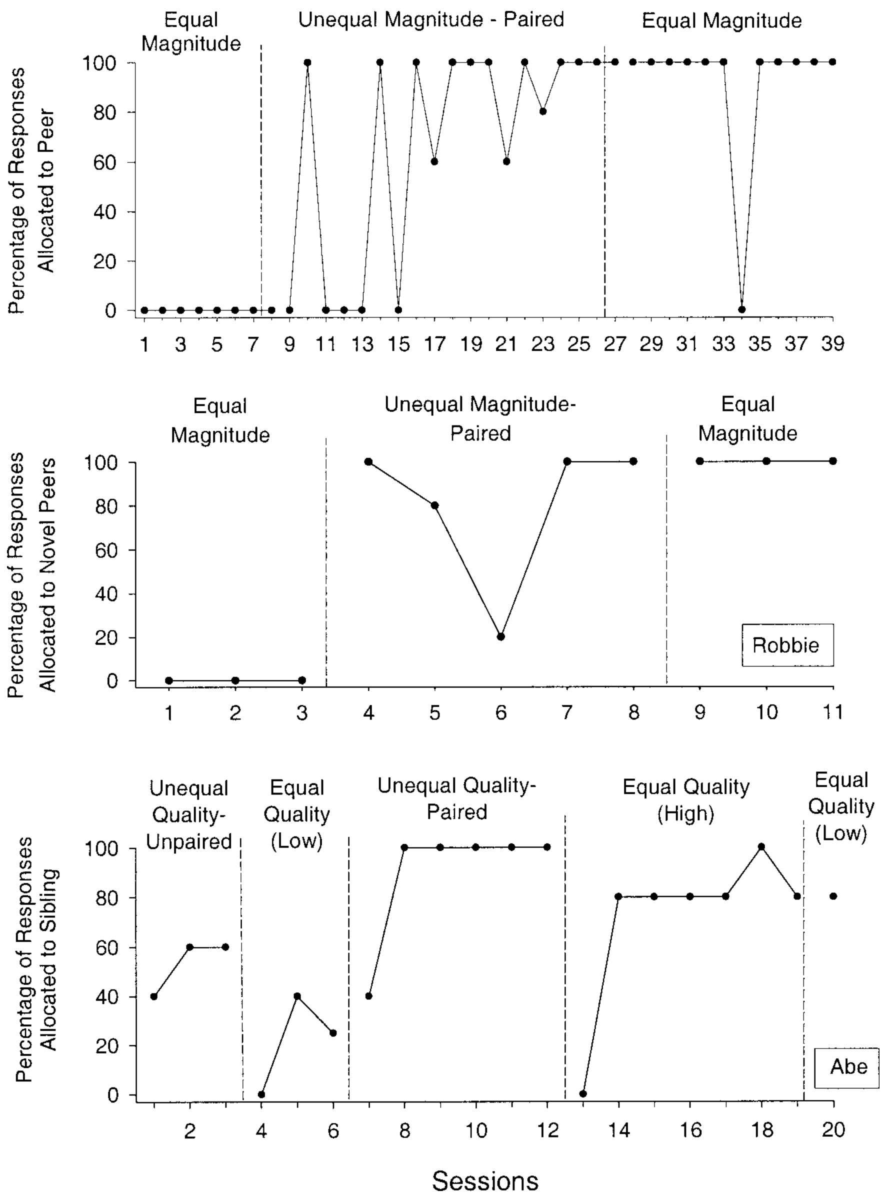

Figure 1. Percentage of responses allocated to the play area with the peer across experimental sessions (top panel) and in natural-setting probes with different peers in the classroom (middle panel) for the analysis of magnitude of reinforcement with Robbie and the percentage of responses allocated to the play area with the sibling across experimental sessions for the analysis of quality of reinforcement with Abe (bottom panel).

location of Yitzchak's peer was counterbalanced across areas that offered 50-s access to identical highly preferred toys, Yitzchak virtually never chose the area where his peer was located. In the final condition in which his peer and the highly preferred toy were again always paired, Yitzchak exclusively chose the area where his peer was located. Yitzchak's response patterns were replicated across two other peers, Jack and Truman. These results suggest that unlike Robbie and Abe who, in the end, chose according to the

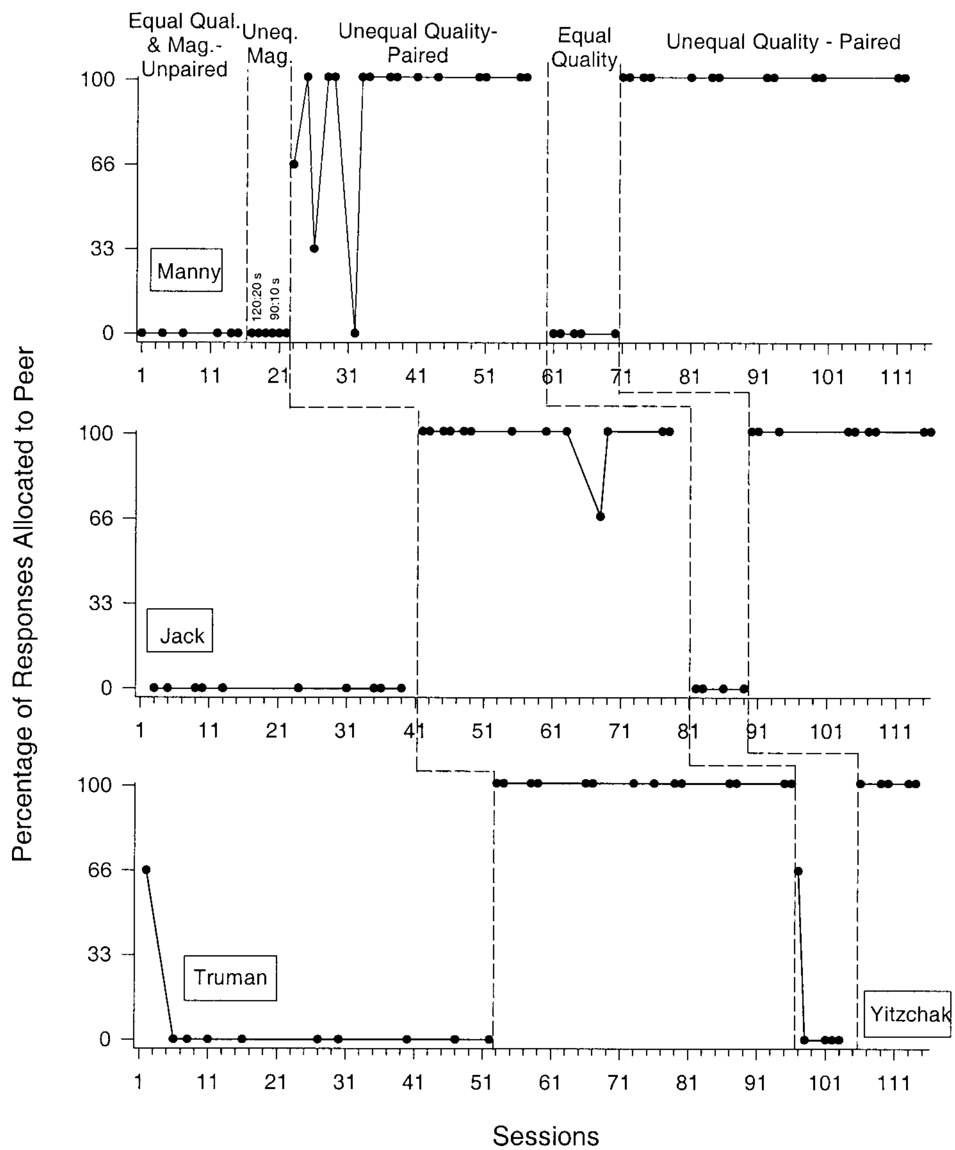

Figure 2. Percentage of responses allocated to the play area with the peer across experimental sessions for the analysis of magnitude and quality of reinforcement with Yitzchak across three of his peers, Manny (top panel), Jack (middle panel), and Truman (bottom panel).

location of their peer or sibling, Yitzchak's choice of play area appeared to be guided only by quality of reinforcement.

DISCUSSION

The results of this analysis suggest that dimensions of reinforcement, specifically magnitude and quality, can be arranged to influence choice responding in favor of playing in an area where a peer or sibling is located rather than playing alone. Simultaneous treatments designs with all 3 participants showed that choice responding was influenced by manipulations in specific dimensions of reinforcement. Specifically, the likelihood of choosing to play in an area where a peer or sibling was located increased when the peer or sibling was associated with access to either a greater magnitude or higher quality of reinforcement. Two of the participants continued to choose to play where the peer was located when equivalent magnitude or quality of reinforcement was arranged for both response options. The 3rd participant reliably chose the area where the peer was located as long as the quality of reinforcement favored that choice. Further, the results indicated that the effects of magnitude and quality of reinforcement were observed in classroom and home settings with multiple peers as well as with a sibling. This is of clinical interest because it represents a potential method of teaching children who exclusively elect to play alone to approach and play in the company of peers or siblings. Future research is warranted to examine the influence of various dimensions of reinforcement on interactive play among children who have a history of avoiding social interaction, such as is characteristic of many children with autism and related disorders.

There are at least two plausible conceptual explanations for our findings. One possibility is that the reinforcement manipulations facilitated a change in stimulus function of the peer or sibling for Robbie and Abe. It is possible that peers represent divided access to activities (i.e., having to share), thus functioning as a negative stimulus. With repeated exposure to the peer and the play items, it is possible that Robbie and Abe learned that the peer or sibling was not a negative stimulus but rather a neutral stimulus (at least), and therefore no longer displayed avoidance behavior. However, if the peer represented some other enduring aversive property (e.g., unpredictability or disruption of play routines), manipulation of a particular dimension of reinforcement might function to change behavior only as long as the reinforcer is present. This appeared to be the case with Yitzchak. It is possible that our manipulations failed to produce sustained behavior change for Yitzchak. However, from a clinical perspective, we have identified a stimulus arrangement that functions to increase the likelihood that Yitzchak will choose to be with a peer rather than alone; this arrangement can be utilized when necessary, as in the example of the high-quality reinforcer contingent on task completion.

Alternatively, it is possible that the differentially greater magnitude or quality of reinforcement functioned to establish the peer or sibling as a conditioned reinforcer for Robbie and Abe. The pairing hypothesis, or reinforcement density hypothesis, states that conditioned reinforcement is determined by the rate (or other dimension such as magnitude) of primary reinforcement in its presence (Fantino, 1977). Thus, the peer or sibling may have become a conditioned reinforcer via repeated pairings of the peer or sibling with a differentially greater magnitude or quality of reinforcement. The establishment of the peer or sibling as a conditioned reinforcer is suggested by Robbie's and Abe's choice of the location with the peer or sibling even when that location no longer produced differentially greater reinforcement.

A number of limitations to this investigation should be noted. First, the primary dependent variable was choice; interactive play was not specifically targeted. Analyses of the effects of dimensions of reinforcement on interactive play and other social behaviors are warranted. Second, the underlying reason for peer or sibling avoidance was not documented or addressed. Third, we did not conduct an analysis that would yield definitive information regarding why 2 of the participants continued to choose the location with the peer when equivalent reinforcement was resumed for both response options. Systematic analysis of the necessary and sufficient conditions for establishing peers as conditioned reinforcers is warranted. Further, other dimensions of reinforcement should be considered if neither magnitude nor preference produces desired effects. Finally, in none of the analyses was a choice between a play area with a peer present and a play area with no peer present offered without any toys present. Thus, for all 3 participants, it is unknown whether they would approach a peer during playtime in the absence of play items. If the peer were chosen in the absence of the primary reinforcer, it would suggest that the peer was a neutral or positive stimulus rather than a conditioned reinforcer because the absence of a correlation between primary and conditioned reinforcement is known to erode the reinforcing properties of a conditioned reinforcer. It should be noted that our findings were fairly idiosyncratic across participants. Considering this, studies that explore specific conditions under which response allocation is affected by specified dimensions of reinforcement and, more specifically, the conditions under which particular variables exert particular influences would potentially advance our understanding of the dynamic nature of behavior–environment relations.

REFERENCES

Barlow, D. H., & Hersen, M. (1984). *Single-case experimental designs.* New York: Pergamon Press.

Carr, J. E., Bailey, J. S., Ecott, C. L., Lucker, K. D., & Weil, T. M. (1998). On the effects of noncontingent delivery of differing magnitudes of reinforcement. *Journal of Applied Behavior Analysis, 31,* 313–321.

Catania, A. C. (1963). Concurrent performances: A baseline for the study of reinforcement magnitude. *Journal of the Experimental Analysis of Behavior, 6,* 299–300.

DeLeon, I. G., Fisher, W. W., Rodriguez-Catter, V., Maglieri, K., Herman, K., & Marhefka, J. (2001). Examination of relative reinforcement effects of stimuli identified through pretreatment and daily brief preference assessments. *Journal of Applied Behavior Analysis, 34,* 463–473.

Dixon, M. R., & Cummings, A. (2001). Self-control in children with autism: Response allocation during delays to reinforcement. *Journal of Applied Behavior Analysis, 34,* 491–495.

Fantino, E. (1977). Conditioned reinforcement: Choice and information. In W. K. Honig & J. E. R. Staddon (Eds.), *Handbook of operant behavior* (pp. 313–339). Englewood Cliffs, NJ: Prentice Hall.

Fisher, W. W., & Mazur, J. E. (1997). Basic and applied research on choice responding. *Journal of Applied Behavior Analysis, 27,* 585–596.

Herrnstein, R. J. (1970). On the law of effect. *Journal of the Experimental Analysis of Behavior, 13,* 243–266.

Hollard, V., & Davison, M. C. (1971). Preference for qualitatively different reinforcers. *Journal of the Experimental Analysis of Behavior, 16,* 375–380.

Lerman, D. C., Kelley, M. E., Van Camp, C. M., & Roane, H. S. (1999). Effects of reinforcement magnitude on spontaneous recovery. *Journal of Applied Behavior Analysis, 32,* 197–200.

Leslie, J. C. (1996). *Principles of behavior analysis.* Amsterdam: Overseas Publication Association.

Mace, F. C., Neef, N. A., Shade, D., & Mauro, B. C. (1996). Effects of problem difficulty and reinforcer quality on time allocated to concurrent arithmetic problems. *Journal of Applied Behavior Analysis, 29,* 11–24.

Neef, N. A., & Lutz, M. N. (2001). A brief computer-based assessment of reinforcer dimensions affecting choice. *Journal of Applied Behavior Analysis, 34,* 57–60.

Neef, N. A., Mace, F. C., & Shade, D. (1993). Impulsivity in students with serious emotional disturbance: The interactive effects of reinforcer rate, delay, and quantity. *Journal of Applied Behavior Analysis, 26,* 37–52.

Neef, N. A., Mace, F. C., Shea, M. C., & Shade, D. (1992). Effects of reinforcement rate and reinforcement quality on time allocation: Extensions of matching theory to educational settings. *Journal of Applied Behavior Analysis, 25,* 691–699.

Neef, N. A., Shade, D., & Miller, M. S. (1994). Assessing influential dimensions of reinforcers on choice in students with severe emotional disturbance. *Journal of Applied Behavior Analysis, 22,* 575–583.

Peck, S. M., Wacker, D. P., Berg, W. K., Cooper, L. J., Brown, K. A., Richman, D., et al. (1996). Choice-making treatment of young children's severe behavior problems. *Journal of Applied Behavior Analysis, 29,* 263–290.

Piazza, C. C., Fisher, W. W., Hagopian, L. P., Bowman, L. G., & Toole, L. (1996). Using a choice assessment to predict reinforcer effectiveness. *Journal of Applied Behavior Analysis, 29,* 1–9.

Received July 13, 2001
Final acceptance February 21, 2002
Action Editor, Robert Stromer

STUDY QUESTIONS

1. How did the authors operationalize magnitude and quality of reinforcement?

2. Describe the dependent variable. Given the context of the study, what additional measures may have provided valuable information about participant behavior?

3. How were the toys to be used by participants and peers selected?

4. Briefly describe what transpired during experimental sessions.

5. Summarize the results observed for each of the participants.

6. What explanations did the authors provide to account for Robbie's and Abe's results?

7. What were the major limitations of the current study?

8. The authors manipulated magnitude and quality of reinforcement. How might other dimensions of reinforcement be manipulated in the context of this study?

Questions prepared by Pamela Neidert and Stephen North, The University of Florida