*REDUCING THE LATENCY OF A CHILD'S RESPONDING TO
INSTRUCTIONS BY MEANS OF A TOKEN SYSTEM¹*

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The response latency of following directions by an 8-yr-old boy from a class for emotionally disturbed children was modified by the contingent application of a token system. To demonstrate reinforcer effectiveness, a multiple baseline approach was used. Measures were obtained for the time elapsed between the presentation of verbal directions and five performances: (1) entering the experimental room, (2) putting toys away, (3) beginning academic work, (4) putting toys away again, and (5) returning to the classroom and completing preparations for leaving school. These five measures were placed on the token system at three different times. The results demonstrated that four of the five performances were clearly affected by the token system as their response latency for following directions decreased substantially.

The pupil who fails to respond rapidly to the teacher's directions often presents a serious problem in management of the class. The teacher's attention becomes divided and she must spread her efforts over several places at once. Sometimes, the dawdling behavior of one pupil interferes with the progress of the entire class as the teacher finds herself either prodding the student continually or waiting for him to catch up. It would, therefore, be desirable if effective procedures for decreasing the latency between directions and the student's response could be found. One reasonable tactic to accomplish this would be to find effective reinforcers and present them immediately following appropriate compliance with instructions, accomplished within a pre-specified time limitation.

Several studies have explored the issue of instruction following. Shutte and Hopkins (1970) manipulated teacher attention contingent upon instruction-following. They found that attention by the teacher contingent upon compliance did increase the percentage of instructions followed. A similar study was con-

ducted by O'Leary, Becker, Evans, and Saudargas (1969). They investigated the effectiveness of giving rules with and without praise for rule following. Their findings indicated that praise for rule-following was not an effective contingency for their population, so they added a token reinforcement phase. The addition of tokens did increase rule following by reducing disruptive behavior. Zimmerman, Zimmerman, and Russell (1969) also used token reinforcement to generate and increase instruction-following by mildly retarded students. Physical guidance, fading, and food and social reinforcement were used to teach two mentally retarded students to follow instructions in a study reported by Whitman, Zakaras, and Chardos (1971).

Some of the studies related to instruction-following emphasize the identification of reinforcers that are sufficiently potent effectively to increase its rate. (Shutte and Hopkins, 1970; O'Leary *et al.*, 1969). Others are concerned with shaping instruction-following, as in the Whitman *et al.*, (1971) and the Baer, Peterson, and Sherman (1967) studies. In those latter instances, generalized instruction-following was essentially absent from the individual's repertoire. In the present study, the core of the problem appeared to be of a different nature. The subject demonstrated his ability to follow in-

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structions but he rarely managed to respond rapidly enough. Simple reinforcement of instruction-following was discounted as a potential procedure because his rate was so low. Consequently, opportunities for reinforcement would be too infrequent. Yet, shaping the response class through guided successive approximations was also rejected as not necessary. The problem was conceived of as the elimination of excessive dawdling; its solution the reduction of the latency between the delivery of an instruction and compliance with it.

The present model here may suggest applications to other behavior modification programs. Academic performance could be facilitated by shortening the length of time required to complete mathematical problems accurately. One could conceive of the application of a similar procedure in other social areas, as well, such as in generating more "cooperative" behavior by partners in a marriage counselling situation, or in carrying out supervisory activities and others.

METHOD

Subject

A boy, 8.3 yr of age, who had failed to complete the first grade, served. Although he could read, write, and do arithmetic at a satisfactory first-grade level, he was removed from his class and placed in a special education classroom because it was reported that he would not follow directions within a reasonable amount of time. For example, the teacher may have given directions to put things away. It would take him an extraordinarily long time to comply. He was especially slow in coming in from recess and in stopping or putting away those things that he liked to do. The teacher reported that he walked through the corridors and down the stairs very slowly. He was a highly verbal child and seemed to be stimulated by social events and communications.

Experimental Space and Materials

The experimental room was a small room containing three student-size desks and a larger

desk and bookshelves. The reinforcement materials were kept in a small adjacent room. The materials for the work session included a stopwatch, a desk, a Ginn *Do and Learn Book*, arithmetic worksheets, plastic tokens, and daily record sheets.

Materials that were used for the play periods were watercolor paints, balls, blocks, paper, Playdoh, xylophone, crayons, magic markers, checkers, Bingo, chalk and chalkboard, and candy purchased at a nearby candy machine. Additional backup reinforcers included a play watch, rubber animals, small trucks, puzzles, balloons, a harmonica, and playing cards.

Procedure

The experimenter met with the subject outside the classroom three times a week for half-hour sessions. There were 17 sessions.

Each half-hour session consisted of the following steps:

1. obtaining the subject from class and going to experimental room
2. 5 min of play time
3. directions given to put items away and to be seated at desk in preparation for work
4. directions given for work materials and instruction to start work
5. work period
6. directions to put work materials away
7. 5 min of play time
8. directions given to put play items away and to prepare to go back
9. going to the classroom and getting prepared to go home

Adaptation. Before instituting the formal experimental sessions, three informal half-hour sessions were held. This gave the subject an opportunity to adapt to the experimenter and to the experimental room. At that time, he was also familiarized with the stopwatch, reinforcement materials, the workbook, and arithmetic worksheets. It would have been desirable to have worked within the natural setting of the

classroom, but the teacher requested that the experimenter work elsewhere. The plan was to develop an effective procedure in another location, then to offer the procedure to the teacher for her eventual use in the classroom.

Experimental design. A multiple baseline (Baer, Wolf, and Risley, 1968) was used to provide experimental control. The number of baseline measures for each step varied from three to 11. The token contingency was first put into effect for Steps 8 and 9 on the fourth session and Steps 1 and 3 on the ninth session. Tokens were put into effect for Step 4 on the twelfth session.

Measurement. Response latencies for Steps 1, 3, 4, 8, and 9 were the dependent variables. The timing of step one began as soon as the experimenter went to the subject's classroom and told him it was time to come with her, and ended when one of the subject's feet crossed the threshold of the experimental room. For Steps 3 and 8 it began as soon as the subject was told to put his toys away and continued until all toys were put away properly. Timing terminated for Step 3 when subject was seated at his desk and Step 8 when he was standing at the doorway ready to leave. For Step 4, the timing began after the directions were given and the subject was told to start. It ended after subject had written the first letter of his name. Timing for Step 9 began after subject was told to go back to the classroom, to get his things, and to get ready to go home. This included going to his locker to get his jacket and lunch pail and returning to the classroom to get his papers to take home for the day. The timing ended when all these were completed. Reliability was measured for Steps 1, 3, and 4 during Session 7 and Steps 1, 3, 4, and 8 in Session 11. Latency measures obtained by two independent observers yielded Pearson coefficients of 0.856 for Session 7 and 0.998 for Session 11.

Experimental manipulations. The experimenter explained to subject that their time together would be divided into play and work periods. When contingencies went into effect, it was explained to subject that the first play

period was no longer going to be free but that he must earn tokens to purchase it by following directions (Steps 8 and 9). The subject was later required to earn the second play period (Steps 1 and 3). In the fourth session, it was explained that in order to have tokens to pay for the first period at the next session he would have to put his toys away within 3 min (Step 8) and get to class within 3 min (Step 9). The second play period continued to be free until the ninth session. When the change was introduced, it was explained that subject would now have to buy both play periods and he could earn the needed tokens by going from his classroom to the experimental room within 3 min (Step 1) and by putting play items away within 3 min (Step 3). As subject became successful in meeting the requirements, the time limits in Steps 1, 3, 8, and 9 were reduced and it was simply explained to subject that he would now have to respond faster to earn the tokens.

Simultaneous with the imposition of the experimental procedure, a maximum of 5-min latency was imposed for Steps 1, 3, 8, and 9. After 5 min had passed, the experimenter took subject's arm and guided him, by helping him put his toys away (Steps 3 and 8) or taking him to the classroom (Step 9). It was necessary to set this maximum time because during baseline Sessions 1, 2, and 3, when no time limits were set, it took more than 30 min to progress through the nine steps. As a result, the other children had already been dismissed from school and subject's driver had been impatiently waiting. To avoid this, experimenter decided to include the 5-min time limit. (Actually this limit was reached only five times out of 43 opportunities).

When the reinforcement contingency went into effect, a plastic token accompanied by verbal praise was presented following completion of a task within a designated number of minutes or seconds. Steps 1, 3, 8, and 9 were to be completed in 3 min, until the fifteenth session, when the time requirement was reduced to 2 min. When the time requirement changed to

2 min the reinforcement ratio was increased, allowing subject to receive two tokens for Steps 2, 3, 8, and 9. For example, in Step 8, if subject had put his toys away and was at the door ready to leave, he immediately was given his token(s). Likewise, in Step 9, if he returned to the classroom and was prepared to leave school within the time limit, token delivery immediately followed. In Step 4 a time limit of 15 sec was given. If after verbal directions the subject began his work within 15 sec, he was rewarded. The selection of the 3-min and 15-sec limits for Steps 9, 8, 3, and 1 and 4 respectively were chosen arbitrarily by experimenter as being reasonable limits. If subject had not been able to meet the time requirements after two sessions, the experimenter had intended to loosen the restrictions. As Figure 1 shows, this was not necessary and as the 3-min contingency was fairly consistently met it was reduced to 2 min as a successive approximation towards "immediate following of directions."

The reinforcement contingency was put into effect at varying times. Reinforcement for Steps 8 and 9 began on the fourth session, for Steps 1 and 3 on the ninth session, and Step 4 on the twelfth session. Also beginning on the twelfth session, occasional reinforcement by a token was added when subject engaged in two additional desirable behaviors: handing in papers without unnecessary marks and for saying "finished" when he had indeed completed his paper.

The tokens were used by the subject to buy play periods and toys. During the first three baseline measures, the two play periods of each session were free. However, once reinforcement was added (Steps 8 and 9 in the fourth session), the first play period of the session (beginning with Session 5) was no longer free but cost two tokens. The second continued to be free until the ninth session. If the subject did not have sufficient tokens to purchase a play period, he did additional pages in his workbook. On the twelfth session, additional back-up reinforcers at prices ranging from four to 12 tokens were made available for purchase. These reinforcers in-

cluded such items as a play watch, rubber animals, small trucks, balloons, playing cards, and a harmonica. Once purchased, they became the possession of the subject. The purchase of these items was also made possible because of the increase in the number of tokens received for Steps 1, 3, 8, and 9 after the fourteenth session when the time requirement was reduced from 3 min to 2 min.

During the play period, the subject was allowed to play with any of the toys listed above under *Experimental space and materials*. In the selection of these toys, care was taken to choose items that required similar amounts of time to clean up and put away. Those that might seem to take longer actually did not. For instance, a sink in the room made paint clean-up of water colors easy because subject had only to dump a glass of water, close the paint box, and place brush and paint box on a shelf. Checkers could quickly be placed in a box and put on a shelf and Playdoh was simply put back in the can and on the shelf. Items that were more complicated to put away were omitted. On the sixth session, a limitation was made in the availability of two reinforcing activities in an attempt to try to increase their consumption. Painting was the only activity made available during one play period on Mondays, as was the trip to the candy machine on Wednesdays. [The rationale for this restriction was based on the Ayllon and Azrin (1968) *Compatibility of reinforcers rule*; that suggests that reinforcing activities be scheduled to occur at different times (p. 85)].

RESULTS

The response latencies for Steps 1, 3, 8, and 9 are indicated in seconds on Figure 1. The 3- and 2-min reinforcement requirements in Steps 1, 3, 8, and 9 are represented by the two horizontal lines, as is the single 15-sec requirement in Step 4. All points on or below these lines indicate that the subject met the criterion and received tokens. When subject failed to earn enough tokens to purchase either one of the play periods

Fig. 1. Latency of responding to directions in seconds. Point A—subject returned to class and proceeded to write on the blackboard; Point B—subject dropped his pencil; Step 1—going to the experimental room; Step 3—putting away toys after the first play period; Step 4—beginning academic work; Step 8—putting toys away after the second play period; Step 9—returning to the classroom and prepared to leave school.

(Steps 3 and 8) the number of seconds it took to put the play items away are, naturally, omitted. The figure demonstrates that the token system was generally effective in reducing response latency.

There were only three baseline measures for Step 8, yet all baseline times were much greater than any measured during the experimental phase. None of the three baseline measures was within 2 min of the criterion time. Under the 3-min requirement, subject failed to meet the time limit twice. Once, however, he missed it by only 3 sec. The 2-min requirement was not met the first time it was put into effect, yet the response times for the three occasions when the requirement was not met were all less than the shortest response time in the baseline measure.

Though data on Step 9 demonstrated a trend towards contingency effectiveness, the change was not as dramatic as it was with the other steps. This was the only step with which the token system failed clearly to demonstrate its effectiveness. For the other four steps measured, performance under token reinforcement was substantially more rapid than that under baseline conditions.

DISCUSSION

During several sessions, the data indicate that a considerable amount of time was spent in returning to the classroom (Step 9). Actually, at the three points labelled A, subject went quickly to his locker and obtained his jacket and entered the classroom. There, however, instead of getting his class papers, he drew on the chalkboard. Perhaps chalkboard drawing was more reinforcing to him than the exchange items for the tokens. Also, there exists the possibility that the ride home or going home was aversive and subject preferred to lose the token in an attempt to postpone the situation as long as possible.

The experimenter met with the subject's mother to discuss the purpose of the experiment and to suggest approaches that could be used at home. This meeting took place after the twelfth

session and her efforts may have affected his performance on later sessions.

In general, response latency figures in this study showed that, irrespective of the session when it was introduced, token reinforcement promptly and effectively reduced the time it took for subject to follow specific directions. These results suggest that such a procedure may have promise for teachers, parents, therapists, and others who are beset with the problem of individuals who do not follow directions quickly enough.

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