A Preliminary Investigation of the Consequences That Define the Mand and the Tact

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Skinner (1957) proposed that the mand and the tact differed with respect to their unique antecedents and consequences. The present study examined the specific reinforcement characteristic of the mand, and the nonspecific reinforcement characteristic of the tact. A severely mentally impaired individual who used sign language served as subject. A concurrent-chain with latency measures and choice was used. The results showed that specific reinforcement produced stronger verbal behavior than nonspecific reinforcement, but only when response strength was measured in terms of latency and choice. These data lend support to Skinner's assertion that the mand and the tact are different operants. These results also have practical significance in that they may lead to more effective work with individuals who have speech and language impairments.

The distinction between the mand and the tact is an important aspect of Skinner's (1957) analysis of verbal behavior. These two verbal operants are defined by variables not present in the other types of verbal behavior, and as a result, have often been a source of difficulty for those trying to understand and use Skinner's classification system. In the mand relation the form of the response is controlled by establishing operations (Michael, 1982; 1988) and specific consequences. In the tact relation the form of the response is controlled by nonverbal discriminative stimuli and generalized conditioned reinforcement. Research on these different types of control has been virtually nonexistent since *Verbal Behavior* was published thirty-one years ago. However, a thematic line of research on the mand and the tact has recently begun to appear in the behavioral literature.

Portions of this paper were presented at the 4th Annual Meeting of the Midwestern Association for Behavior Analysis, Chicago, IL, May, 1978.

The authors would like to thank Gerald L. Shook, former coordinator of the Kalamazoo Valley Multihandicap Center (now Croyden Ave. School), for his administrative support for this research. Appreciation is also extended to Cassandra Braam, David Ray, Mary Riordan, and Thomas Rueber for their assistance in conducting this study, and to Joe Lancaster, Jane Howard, and Jack Michael for their helpful comments on earlier versions of the manuscript. Reprint requests should be sent to Mark L. Sundberg, P.O. Box 21492, Concord, CA 94521.

In one of these studies, Lamarre and Holland (1985) showed that subjects who learned to first mand using the phrases, *On the right* and *On the left*, did not demonstrate collateral acquisition of the tacts. And those who learned to first tact the locations were not automatically able to mand for them. These authors conclude that the mand and the tact are functionally independent at the time of acquisition.

In a related study, Hall and Sundberg (1987) examined the distinction between establishing operations and nonverbal discriminative stimuli. Their results, like those of Lamarre and Holland, showed that verbal behavior acquired under the control of nonverbal discriminative stimuli did not automatically transfer to control by establishing operations. Subjects showed no tendency to mand for objects, even though they had a successful tact history with respect to them. Special training was required to establish the mand repertoire. These data, along with those of Lamarre and Holland, have begun to clarify the distinction between the mand and the tact, while providing support for Skinner's (1957) assertion that they are separate operants. However, this line of research is clearly in its preliminary stages.

The current study was a further investigation of the mand and the tact, but with the focus on consequences. Skinner (1957) states that in the mand "The response. . .comes to 'specify' its characteristic consequence"

(p. 83). The verbal response "I want food," for example, specifies to the listener that food would be an effective form of reinforcement. The receipt of food can be identified as "specific reinforcement." The tact is *not* characteristically followed by any single type of reinforcement, rather by various forms of generalized conditioned reinforcement. The tendency to say "It's raining." for example, when one sees rain (discriminative stimulus) is not reinforced by the receipt of rain, but by some form of generalized conditioned reinforcement such as "Thank you." or "That's right, it is raining."

There were no studies in the literature which directly examined these different types of consequences in relation to verbal behavior, but Saunders and Sailor (1979) have provided some direction with their research on receptive discriminations. They used a form of generalized reinforcement identified as "nonspecific reinforcement" and contrasted it with specific reinforcement. In their study toys which appeared to function as reinforcement were assigned nonsense names and presented in pairs to institutionalized retarded subjects. They were asked to point to one of the toys given its nonsense name. Correct responses were consequated in the following manner:

1. In the *specific reinforcement* condition correct responses were followed by an opportunity to play with the toy to which the child pointed.
2. In the *nonspecific reinforcement* condition correct responses were followed by the opportunity to play with a toy offered by the experimenter, which was not part of the training pair.
3. In the *variable reinforcement* condition the child was offered, on correct pointing occasions, either the toy to which he or she pointed, or the toy which was not one of the pair being trained, in a randomized order.

The results of this study demonstrated that the percent of correct receptive discriminations was higher under the specific condition than it was under either of the other two conditions. Based on these results, it seems plausible to speculate that the consequences of the mand may produce stronger behavior than those of the tact. However, there are no data to support this extension. The purpose of the current research was to examine the effects of specific and nonspecific reinforcement on *expressive verbal behavior,* when establishing operations, nonverbal stimuli, and response requirements were equated.

There were several features of this study which differed from that of Saunders and Sailor (1979). First, the research was exploratory, and several procedural changes occurred during the experiment which were an attempt to "follow" the behavioral changes of the subject (cf. Skinner, 1956; Day, 1975). Also, the study differed in the following ways: (a) Sign language was used rather than pointing at objects, (b) a complex chain of verbal responses was required rather than a single response, (c) a multielement design was used rather than a reversal design, and (d) latency and choice were explored as dependent variables.

METHOD

Subject

An eleven year old speech and language impaired male with severe retardation served as subject. He attended the Kalamazoo Valley Multihandicap Center and was completely nonverbal prior to beginning a sign language training program at the Center. He had a long history of self-stimulation, and daily aggressive and destructive behaviors (e.g., hitting himself and others, scratching, pinching, kicking, spitting, screaming). The current study began after approximately two years in the sign program. The subject had acquired over 100 single-component signed mands and tacts, and approximately 10 intraverbal responses. Also, his rate of negative behaviors decreased by about 80%. Although his vocal behavior had improved during the two years, the subject used sign language as his main form of verbal behavior, and all his responses in the study were signed.

Materials and Setting

The materials in the experiment consisted of a blue plastic 8 ounce cup, a green plastic salad bowl, a small table approximately 30 cm high, a small chair approximately 30 cm at the seat and 56 cm at the back, and two cardboard boxes. The boxes were the same size (58 cm high), but differed in both color

and pattern so that clearly distinguishable stimuli were associated with each condition. One box was covered with red-and-yellow one-inch paper stripes, while the other was covered with white paper, and painted with purple dots approximately 5 cm in diameter. Both boxes had a base measurement of 70 cm x 78 cm. They were cut diagonally along the sides leaving the back of the box at 58 cm, and reducing the front of the box to 12 cm.

A stopwatch and data sheet on a clipboard were used to record the data. A random numbers table was consulted prior to the experiment to order the trials and presentation of reinforcers. This information was printed on the data sheets, and was used to determine which condition to present, and what reinforcer to place in the cup or the bowl during the experiment.

The stimulus materials were separated into two sets and placed in the boxes. One stimulus array consisted of the *blue cup on* the *table* in the striped box, and the other array consisted of the *green bowl under* the *chair* in the dotted box. All the stimuli were clearly visable, and the subject could tact all the items in the chain—but not *as* a chain. The two sets of stimuli were randomly assigned (using a random numbers table) to two different conditions. The striped box and its contents were assigned to the mand condition, which involved specific reinforcement, and the dotted box and its contents were assigned to the tact condition which involved nonspecific reinforcement (the mand condition was more correctly both a mand and tact condition since there were always nonverbal stimuli present along with establishing operations and specific reinforcement).

Five other objects or actions which had consistently functioned as reinforcement in the past were selected for use as consequences. These were soda, water, food (usually a potato chip), a ball, and a tickle (a photograph of the experimenter tickling the subject was used as the stimulus and actual tickling was used as the consequences). The subject could correctly tact, and mand for, all these items.

The sessions were conducted in a 3.3 m x 6.6 m x 2.4 m room at the Center. In Phase 1 a cardboard divider, approximately 1.5 m high, was used to reduce the room size to 3.3 m x 3.3 m. The divider was removed during three sessions in Phase 2. The two boxes were placed along opposite walls, and the experimenter and the subject stood facing each other in the center of the room, directly between the two boxes. The mand box was on the experimenter's left and the tact box was on his right. The reinforcement items were placed on the floor behind the experimenter, and the reliability observer sat in a chair in one corner of the room.

Design and Procedure

A within-subject multielement design was used. Trials consisted of presenting the subject with one of the two stimulus arrays, and consequating correct responses with either specific (mand) or nonspecific (tact) reinforcement. Later aspects of the study used latency, and a concurrent-chain with forced-trials and choice-trials (Nevin & Mandell, 1978), as dependent variables.

Baseline. The contingencies were exactly the same for the mand and tact during baseline conditions. There were 3 sessions of 10 randomized trials on each component of the concurrent-chain. The experimenter held up one of the five reinforcement items, placed it in either the cup or the bowl (all determined by the order pre-printed on the data sheets), and said and simultaneously signed, "Look here." The subject was asked to attend to the appropriate box by stepping in front of it, and orienting his head toward the set of stimuli in that box. The experimenter then said/signed, "Where?" A correct response was scored if the subject signed at least two-components of the stimulus array. In both conditions correct responses were followed by verbal praise (e.g., Right!), but not by the receipt of any of the items placed in the cup or the bowl.

Phase 1: Shaping the five-component chains. Each session consisted of an equal number of trials in both the mand and tact conditions. During the two- and three-component training there were a total of 20 trials per session, and during four- and five-component training there were 10 trials per session.

The training began with reinforcing a two-component chain consisting of tacting (1) the reinforcement item, and (2) the cup or the

bowl, in any order, within 10 seconds. The procedure was the same as in baseline, except the correct response was modeled once for each condition, and a correct response in the mand condition was consequated with the reinforcement item placed in the cup. A correct response in the tact condition was consequated with one of the other forms of reinforcement (presented in the random order pre-printed on the data sheets), none of which were in the bowl.

Incorrect responses, which were usually only single-component responses, were followed by a correction procedure consisting of the experimenter stating the correct response, prompting the subject to imitate the response, consequating correct imitations with verbal praise, and presenting the original trial again. Correct responses on this trial were followed with only verbal praise.

When correct responses occurred on 90% or more of the trials for two consecutive sessions, another component was added to the response chain. Each time a new stimulus was added to the chain the correct response was modeled once for each condition. The third stimulus was *table* for the mand condition and *chair* for the tact condition. Following two consecutive sessions of meeting the response requirement a fourth component was added to the chain. The prepositions *on* and *under* were used for the mand and the tact conditions, respectively (a correct mand response was now *food-cup-on-table*). Finally, a fifth stimulus was added following successful completion of the four-component responses. The adjectives *blue* and *green* were used for the mand and tact conditions, respectively (a correct mand response was now *food-blue-cup-on-table*).

Due to the exploratory nature of this research, several procedural changes were made during the study in an attempt to follow the behavioral changes of the subject. Starting with the four-component trials, the first change occurred with the addition of latency as a dependent variable. Timing began with the stimulus, "Where?" and ended with the completion of the last response in the chain. This measure was added to further quantify the differences between the two sets of contingencies. Also, the number of trials per session was reduced from 20 to 10 per session to avoid satiation.

Phase 2: Choice trials. The second phase of the study (which had not been planned at the outset of the study) was conducted to further measure the preference the subject seemed to be showing for one contingency over the other. Following the completion of the five-component trials, a choice condition was added to the concurrent schedule. A foam block was placed on the floor between the experimenter and the subject. The experimenter held up the reinforcement item which was next on the list and said and signed to the subject, "Throw the block in the box," (four trials later this stimulus was reduced to simply pointing to the block on the floor). Following the block-toss to a box, the experimenter placed the reinforcer in the box selected by the subject, and the procedure from Phase 1 began.

There were four different types of trials in Phase 2. First, four sessions of five choice-trials were conducted. Second, stimuli from the boxes were exchanged and, choice-trials were conducted. Third, 10 forced-choice trials were added to the conditions just described. And finally, the subject was allowed to select a reinforcer to use on each trial prior to the choice-trials. Each of these conditions will be described further below.

In the first four sessions of choice-trials there were four different types of choice-trials. In the first choice session, the boxes were in the same position as they were during training. In the second session, the positions were reversed. In the third session, they were placed in various positions in the room without the divider. And in the forth session, they were placed in various positions in the larger room, including turning the boxes backwards, and placing the mand box behind the divider.

During the second condition of Phase 2, in an attempt to determine what variables were controlling the subject's behavior, five choice-trials were conducted with two of the stimuli from the boxes exchanged. The cup and bowl were exchanged, because they seemed to be the most salient feature of the array (i.e., the cup was placed in the tact box and the bowl in the mand box). The two boxes were placed in various positions in the larger room and five open-choice trials were conducted.

The results from this condition controlled the third condition which consisted of conducting 10 forced-trials (5 on each condition)

before the choice-trials (Nevin & Mandell, 1978). Prior to the first session of scheduled forced-trials, two warm-up trials (one in each condition), in which the correct response was modeled, were conducted. The same foam block was used, and the boxes were placed in various positions in the room with the divider back in place. The forced-trials were conducted in the same manner as the choice-trials, except the subject was told where to throw the block. After the block was thrown, the procedure was the same as in Phase 1. After 10 interspersed forced-trials on the specific as well as nonspecific consequences, 5 choice-trials occurred.

The results from these conditions controlled the final condition, which consisted of an attempt to control for the momentary establishing operations during each trial. This condition consisted of choice-trials only, and the *subject* selected the form of reinforcement to be used on each trial. The experimenter pointed to the reinforcers and said, "Pick one." The subject then picked up one of the items and handed it to the experimenter. The experimenter held up the reinforcement as before, placed the block on the floor in front of the subject, and pointed at the block. After the subject threw the block into a box, the procedure was the same as in Phase 1.

Reliability

Reliability data were collected on correct and incorrect responses, latency of responses, and choice. Reliability measures were taken on approximately 75% of the trials in the experiment. Agreements, divided by agreements plus disagreements, times 100 was used to compute reliability on percent correct and choice measures. In baseline the mean reliability was 86%, in Phase 1 the mean reliability was 99%, and in Phase 2 the reliability was 100%. Reliability on latency measures was calculated by weighing means. Table 1 shows that the difference between observers varied from 0.0 to 0.7 seconds. The number of differences at each tenth of a second were counted and multiplied by the corresponding number of tenths of a second difference between observers. The resulting numbers were then summed and divided by the total number of reliability observations. This resulted in a mean difference of 0.19 seconds (237÷121=0.19 s).

Table 1.
Reliability on latency measures.

Differences in tenths of second	0	.1	.2	.3	.4	.5	.6	.7	-
# different at each tenth	23	32	31	13	12	7	2	1	121
# tenths x # differences	0	32	62	39	48	35	12	7	237

RESULTS

Baseline. Figure 1 shows that during the three baseline sessions the subject failed to tact more than one stimulus item from the array on 92% of the trials. The subject typically tacted the cup or the bowl, or the reinforcement items correctly, but rarely the prepositions or adjectives, and never the table or chair. The higher performance on the mand condition was probably due to social praise, since specific and nonspecific reinforcement were not used.

Phase 1. The subject acquired both two component responses in three sessions (see Figure 1). There was almost no difference between the two conditions. During the first session of intervention the subject was correct in the mand condition on the last trial of the day. For the first time he came in contact with the contingency of receiving a reinforcer out of either the cup or bowl. The reinforcement item on that trial was food, and it happened to be placed in the cup, thus specific reinforcement was used. However, the rapid acquisition of both response chains in the next two sessions indicated that receiving *any* of the reinforcers from the cup *or* the bowl was a stronger form of reinforcement than verbal praise alone.

The three-component responses were acquired in two sessions, and again correct responses and trials to acquisition were equal (see Figure 1). However, the subject seemed to behave differently during the two conditions. He responded more slowly in the tact condition, and occasionally emitted negative behaviors (e.g., screams, and attempts to pinch the experimenter) when he did not receive the item in the bowl. These behaviors led the experimenters to include latency to completion of the response as a dependent variable. Also, it appeared that the subject began to satiate toward the end of the sessions, so at this point the number of trials was reduced to 10 per session.

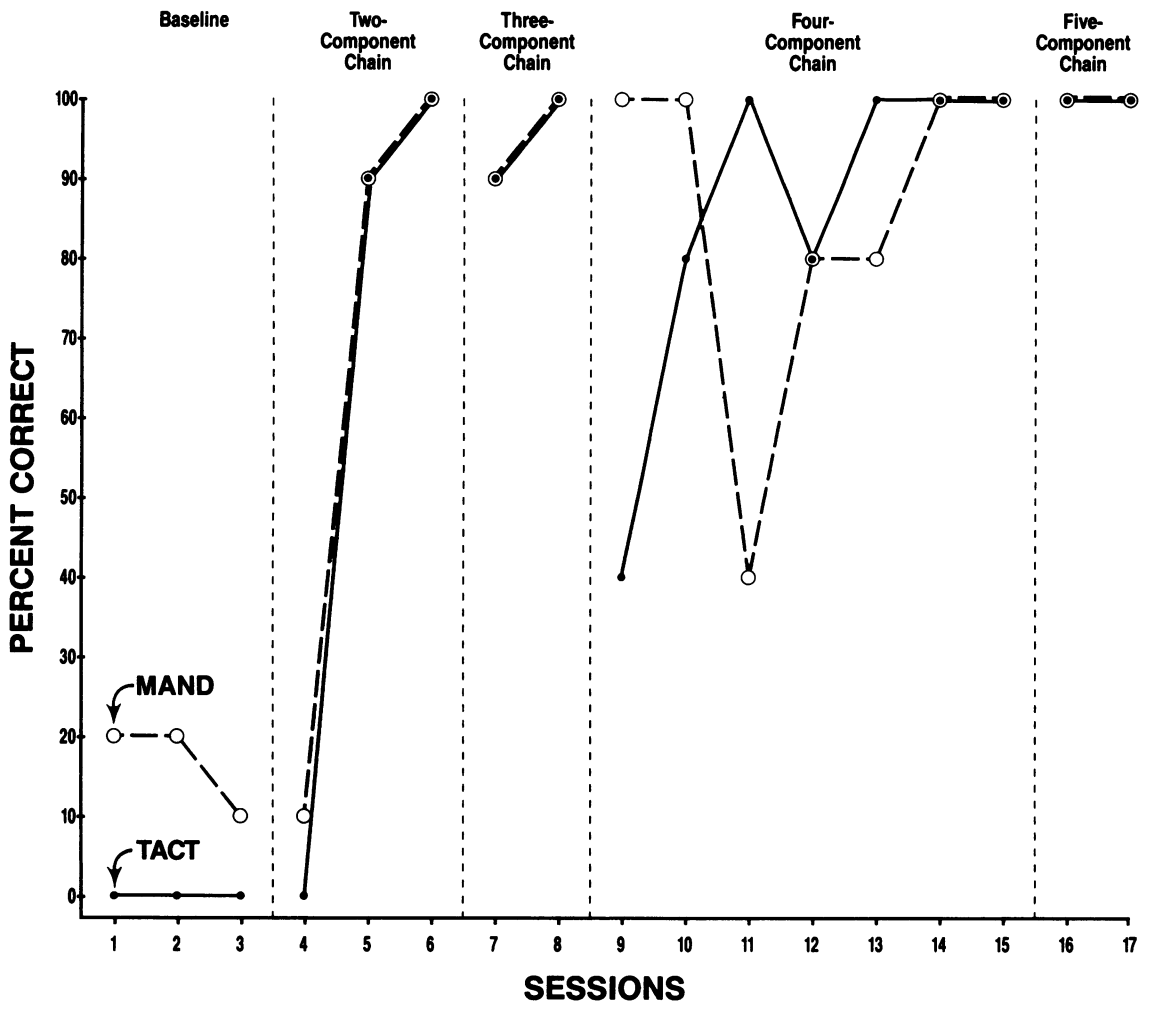

Fig. 1. The percent of correct responses for mand and tact chains during baseline and two- through five-component training.

Figure 1 also shows that during the four-component training, when the prepositions were added, it took seven sessions to meet criterion on both operants (but sessions were now only 10 trials long). The criterion was met in the mand condition in only two sessions, thus showing the first difference between the two conditions in terms of percent correct and trials to acquisition. However, mand performance deteriorated somewhat before performance on the tact met criterion, and as a result, the average percent correct was equal for both mand and tact conditions.

There was, however, a consistent difference in the response latency. Figure 2 shows the mean latency in seconds during the four-component and five-component training, and a later condition. In the four-component training, the mean latency for the mand condition was 2.5 seconds (range 1.5—3.2), and for the tact condition it was 3.0 seconds (range 2.1—3.6). Thus, it now appeared that there was *some* measurable difference between specific and nonspecific reinforcement.

In the five-component training, both response chains were acquired in two sessions (see Figure 1). The percent of correct responses, and the trials to acquisition were equal. However, there was a relatively larger latency differential than that observed during the four-component training. The mean latency for the mand condition was 3.5 seconds (range 2.7—4.2), and for the tact condition it was 4.7 seconds (range 3.6—5.7).

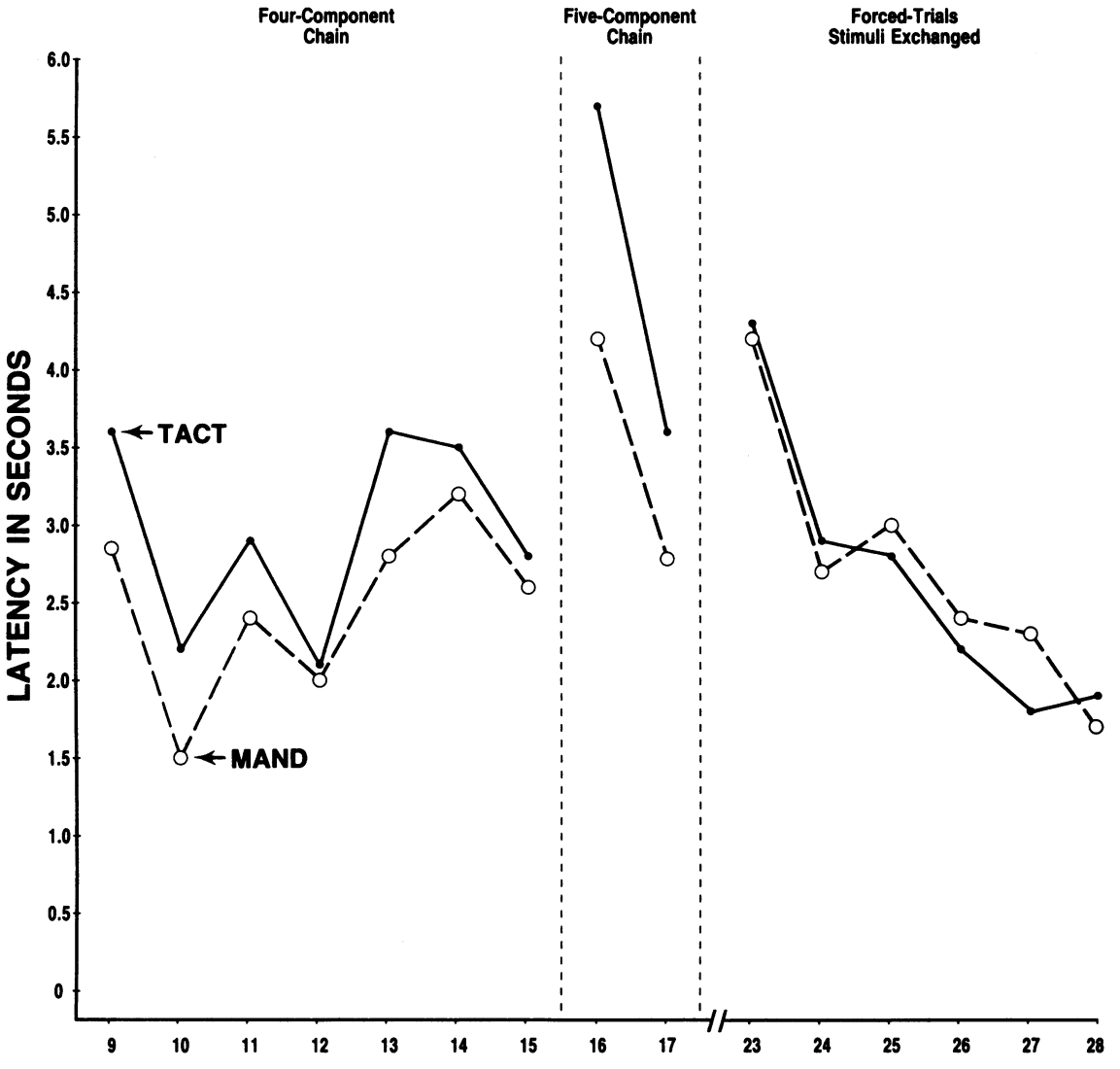

Fig. 2. Latency in seconds for mand and tact chains during four- and five-component training, and during the forced-trial procedures with the stimuli exchanged.

Figure 2 also contains latency data for the forced-trials, which will be described shortly.)

Phase 2. The subject's quicker responding in the mand conditions controlled the experimenters' decision to continue studying the two verbal operants with a series of choice-trials. These trials were conducted in order to determine if there was a preference for specific reinforcement. Figure 3 shows that during the first four choice sessions the mand box was chosen 100% of the trials (panel 1), and the five-component response was always correct (panel 2). The boxes were placed in several different locations, and even made difficult to get to, but the subject continued to always chose the mand box. When the mand box was placed out of sight, behind the divider, he threw the foam block over the divider. Since all the choices were for the mand condition, there were no tact trials.

To determine if the strength of the behavior could be reduced, and the control produced by specific reinforcement transferred to a different stimulus array, the experimenters exchanged the cup and the bowl. These particular stimuli were exchanged because of their involvement in all phases of the study,

and the reinforcers were placed in them. In session 21 (Figure 3), when the cup and the bowl were exchanged, the subject chose the mand box four out of five times (80%). However, he responded incorrectly on the first two mand choices. The correct response in the mand box was now *(S^R/S') green-bowl-on-table,* but the subject rapidly signed "*(S^R/S')* blue-cup-on-table." The errors resulted in withholding reinforcement and the subject chose the tact box on the third trial. However, he again made an error on the five-component response, did not receive reinforcement, and changed-over to the mand box. He then emitted a correct response on the next two mand trials and received reinforcement.

The subject's incorrect tacting during this session controlled the experimenters' decision to add forced-trials to establish the new five-component response chains (i.e., *green-bowl-on-table* rather than *blue-cup-on-table*), and facilitate the transfer of stimulus control. The forced-trials also allowed for latency data to again be collected and compared. Figure 3 shows that following the first set of forced-trials, choice for the mand box dropped to 0%. It appeared that the subject still preferred that the reinforcer be placed in the cup. But over the next five sessions (numbers 24-28), choice for the bowl (which was previously associated with the tact condition), and the mand condition increased to 60%, with 100% correct responses for those mand choices (the mean percent of correct responses for the tact choices was 90%). Thus, stimulus control transferred, in part, to the bowl and its accompanying array, because of its new correlation with specific reinforcement.

In addition, when the stimuli were exchanged, the latency differences previously seen between the two conditions diminished during the forced-choice condition (Figure 2, sessions 23-28). The speed of responding became about equal for the two conditions. The mean latency during the mand condition was 2.7 seconds (range 1.7—4.2), and during the tact condition it was 2.6 seconds (range 1.8—4.3). Thus, the differential control acquired by the two types of consequences was lost when the stimuli that had been correlated with those consequences were reversed.

The final procedural change occurred when it was noted in session 28 that the subject consistently chose the mand condition when a consumable was the item shown prior to the trials (water, food, or soda), and the tact condition when the item was a non-consumable (tickle or ball). Apparently, the subject became sensitive to the contingency that there was a .75 probability of obtaining a consumable under these conditions. In order to control for the momentary establishing operations, the subject was allowed to select the reinforcement item to be used on each trial. As a result of this change, the subject showed a stronger preference for the mand condition. Choice for the mand condition increased to a mean of 85% with 85% correct responses. During sessions 30 and 32 on three occasions errors on the five-component responses occurred following a mand choice, which resulted in withholding reinforcement. The subject always then chose the tact box on the subsequent trial. When this choice did not produce the selected reinforcement, the next choice was always back to the mand condition.

DISCUSSION

The results of the study indicate that specific reinforcement produces stronger verbal behavior than nonspecific reinforcement, but only when response strength was measured in terms of latency and choice. Specific reinforcement did not always produce a higher percent of correct responses, or result in fewer trials to acquisition. With the exception of the results of the four-component training, both conditions were typically equal. It was clear however, that the subject preferred specific reinforcement and responded quicker when it was available, but he did not consistently learn the multiple responses any faster under those conditions.

These results may seem contrary to those of Saunders and Sailor (1979), but there are some possible explanations for the differences. During baseline the only consequence used was praise. The transition from praise to obtaining any one of five stronger forms of reinforcement may have initially decreased any significant differences between the two types of consequences. Regardless of *which* form of reinforcement (specific or nonspecific) the subject received in intervention, it was more effective than praise alone. Also, the individual tact

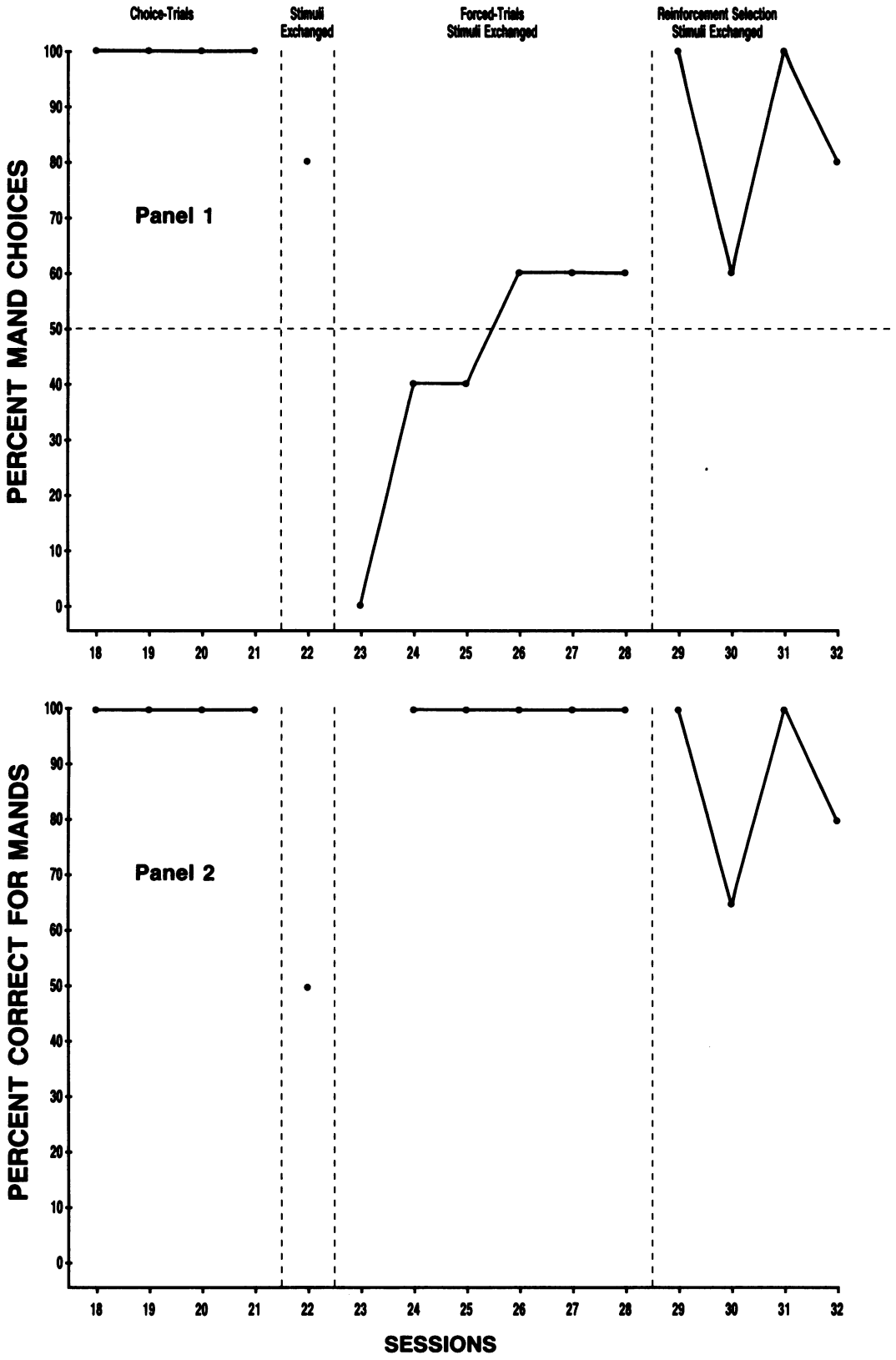

Fig. 3. Percent of mand choices in panel 1 and percent of correct responses for those mand chains in panel 2 during choice-trials, and choice-trials a) with the stimuli exchanged b) preceded by forced-trials with the stimuli exchanged, and c) the reinforcement selected by the subject each trial with the stimuli exchanged.

responses were already strong in the subject's repertoire. Combining known responses may have been a simpler task than learning new nonsense names for objects. In fact, recent research using response topographies not in the subject's repertoire has shown that specific reinforcement does produce more correct responses, and a faster rate of acquisition (Carroll & Hesse, 1987). The results of the four-component training in the current study, which involved prepositions and the most errors, may also indicate that differences could be seen when more difficult tasks are involved.

Based on the results of Saunders and Sailor (1979) the experimenters expected differentiation in the acquisition of the two responses. Even though there was no difference, casual observation indicated that there was something different about the way the subject responded during the two conditions. He seemed "less interested" in the tact condition and "more interested" in the mand condition. Therefore, latency and choice were added as dependent variables in an attempt to quantify what appeared to be an obvious difference in the two conditions.

With these additional measures, the results of the current study support the general findings of Saunders and Sailor (1979). The results also extend this line of research into the area of verbal behavior, and specifically to the distinction between the mand and tact. This research is important because there are several practical applications of the mand-tact distinction in language instruction for the developmentally disabled. In procedures for teaching language to nonverbal individuals, for example, specific reinforcement has been an effective tool for generating successful verbal behavior when other methods have failed (Sundberg, 1987).

The specific consequences characteristic of the mand may improve language instruction because they directly benefit the speaker. This type of consequence may produce more "interest" or motivation for learning verbal skills because of the clear relation between what functions as reinforcement and obtaining that reinforcement. These can be useful independent variables and should be incorporated into daily language instruction procedures. Establishing operations and specific consequences can also be used to teach other types of verbal operants. Carroll and Hesse (1987) demonstrated that these contingencies could improve tact training. And Sundberg (1987) has proposed that they could be used to teach echoic, intraverbal and textual behavior as well.

Another use of specific reinforcement in language training is that it may help develop control by the establishing operation for that reinforcement. According to Skinner's analysis, if you consistently reinforce a response with a specific consequence that response will more likely come under the control of the relevant establishing operation (Skinner, 1957, p. 35). If an establishing operation for a specific consequence is strong and appropriate verbal behavior is not available, inappropriate behavior such as aggression, pushing, or hitting may occur. If these behaviors are followed by specific reinforcement, then the next time the establishing operation is strong they will likely occur again. These behaviors may erroneously be viewed simply as negative behavior that must be punished, rather than verbal behaviors which occur because of a defective mand repertoire.

Skinner's analysis of verbal behavior has much to offer the fields of developmental disabilities and speech pathology. Professionals in these areas typically emphasize only receptive and tact training in work with language delayed individuals, while neglecting the mand (as well as some of the other verbal operants). The blame for verbal failures is often placed on the student's general lack of "cognitive" ability, rather than the contingencies and the nature of the training program. It may be interesting to note that the subject in this study had been labeled "severely mentally impaired," and rarely emitted more than single-component responses. However, he acquired two *five*-component responses in only 17 sessions. Thus, the current study not only demonstrated some potential differences between two types of consequences, but it was a successful demonstration of procedures for teaching sentence construction. Also, these results may support the analysis that the causes of the subject's intellectual and social behaviors were due to verbal and environmental deficits, rather than cognitive deficits.

This research was preliminary, and attempted to provide some of the basic groundwork for further research in this area.

The effects of specific and nonspecific reinforcement on verbal behavior have received very little experimental attention and need to be further explored. There are several possible extensions of this study. First, since there was only one subject, the procedure needs to be replicated with additional subjects. The effects of a praise and/or an extinction condition interspersed with the other two conditions could be interesting, as could further experimentation with latency and choice as dependent variables. It may also be productive to conduct the procedure using speech, and typical children. The use of specific consequences in the acquisition of other verbal operants should also be further examined, as should its role in bringing behavior under the control of establishing operations.

The research methodology employed in the study may also be of use in future verbal behavior studies. The concurrent-chain procedure allows for within-subject comparisons which are important to verbal behavior research because of the diverse verbal history of each person. This procedure could be effective for studying the other verbal operants as well. The current research was exploratory in the sense that conditions and dependent variables were changed in an attempt to follow events that occurred during the study. This approach to research was inspired by Skinner's (1956) unformulated principles of scientific method (e.g., "When you run into something interesting, drop everything else and study it."), and Day's (1975) "radical methodology," where the subject's behavior becomes an independent variable, and the experimenter's behavior a dependent variable.

In conclusion, specific and nonspecific reinforcement seem to have different behavioral effects. The current study shows these effects in terms of shorter latencies and preference for specific reinforcement. These data lend support to Skinner's assertion that the mand and the tact are different operants, but represent only the beginning of this line of research. These results also have practical significance in that they may lead to more effective work with individuals who have speech and language impairments.

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