

# The Effects of Alternating Mand and Tact Training on the Acquisition of Tacts

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Two training procedures were compared with respect to the average number of training trials it took to teach new verbal responses to normal children. Mand contingencies were alternated with tact contingencies in one condition while only tact contingencies were in effect in the other condition. Normal, preschool children served as subjects and toy parts were the objects that were to be named. The results indicated that it took, on the average, fewer trials to teach part names (tacts) in the mand-tact condition than in the tact only condition. Although more research is needed to confirm this, it appears that mand contingencies involve stronger controlling variables and can facilitate the acquisition of a tact repertoire.

Skinner proposed that principles derived from studies in the experimental analysis of behavior could be applied to the analysis of complex human behavior. His book *Verbal Behavior* (1957) was an extension of these principles to a form of complex human behavior commonly referred to as language. Rejecting the term "language" because it referred "to the practices of a linguistic community rather than the behavior of any one member," he settled on "verbal behavior" because it "emphasizes the individual speaker" as well as "specifies behavior shaped and maintained by mediated consequences" (Skinner, 1957, p. 2). His analysis was directed toward "causal" variables, ones that would allow for prediction and eventual control of specific instances of verbal behavior. Although Skinner did not conduct formal "verbal behavior research" at the time, he did offer a classification system which advances a behavioral analysis of "language."

The Teaching verbal behavior involves the development of specific response forms which have characteristic effects on another person (typically this consists of some form of reinforcement mediated by that person). The functional analysis of this behavior takes into account the formal aspects of the response (topographies), but the main concern is with the environmental circum-

stances under which a particular response topography occurs. Since verbal behavior is subject to the same principles that shape and maintain nonverbal behavior, it can be treated as any other operant behavior under the control of antecedent and consequential environmental events. **The main difference (according to Skinner, 1957) is that verbal behavior achieves its effect on the environment through a listener. This listener (or more generally an audience) mediates the reinforcement for the behavior because it has been specifically trained to do so.**

The analysis of verbal behavior typically begins with the specification of response forms in terms of their controlling variables. By specifying the antecedent verbal or nonverbal stimuli and the consequences, the response form can be classified as a verbal operant. Skinner (1957) **identified seven elementary verbal operants and named them echoic, mand, tact, intraverbal textual, copying a text and taking dictation.** The defining features of each of these can be found elsewhere. (Skinner, 1957; Peterson, 1978). However, for the purposes of this study, tacts and mands will be defined.

The tact is a verbal response whose form is controlled by a nonverbal discriminative stimulus ( $S^D$ ). This can be an object, event, or property of an object or event. The mand is a verbal response whose form is controlled exclusively by a motivational variable (e.g., deprivation or aversive stimulation) rather than an  $S^D$ . Motivational variables, or "establishing operations," are defined by Michael

(1982) as "any change in the environment which alters the effectiveness of some object or event as reinforcement and simultaneously alters the momentary frequency of the behavior that has been followed by that reinforcement" (pp. 150-151). The reinforcement for the mand is usually the thing being mandated. For instance, when hungry, a person says "I want some soup" in the presence of an appropriate listener, the reinforcement is getting the soup (specific reinforcement for the verbal response). The reinforcement for the tact is non-specific and is usually some form of generalized conditioned reinforcement.

Manding is the repertoire which most directly benefits the speaker and hence establishes the "value" of effective verbal behavior, while tacting often benefits the listener (the tact "hot" helps the listener avoid a plate they have not yet touched).

Often, response forms are under the control of more than one variable. For instance, a child may say "candy bar" because he is hungry (mand conditions) and because he sees the candy bar next to the grocery store checkout counter (tact conditions). In this case the response "candy bar" is not a pure mand, nor a pure tact, but rather a blend of each. Multiple control such as this contributes to the novelty and richness of our verbal behavior, but often makes the analysis of the controlling variables very difficult. On the other hand, pure mands and tacts represent responses occurring for different reasons. If we teach a particular response form (for example the word "water") it does not follow that all the other verbal operants involving the response "water" are learned without additional training. In other words just because a person learns the response form "water" when displayed a glass of water does not mean this person can now ask for water when he/she is thirsty. This functional independence has been supported by recent research (Hall & Sundberg, 1987; Lamarre & Holland, 1985). However, most traditional language training programs teach tacting and assume manding will occur "spontaneously."

Stafford, Sundberg, and Braam (1978) investigated differences in repertoires generated by mand or tact training. They found differences (measured by response latency and number of correct responses) in five-

component response units under mand and tact contingencies with an eleven year old mentally retarded male who used sign language as his main form of communication. More correct units occurred with shorter latencies under the mand training contingencies. They concluded that (1) since different contingencies are in effect with the mand and tact repertoires, specific training should be given under both sets of contingencies, and (2) the specific reinforcement characteristic of the mand is critical. Teaching manding allowed the speaker more control of his environment thus obtaining more specific reinforcement. The establishing operations critical to the mand enhanced language training because as the motivational level increased the probability of the response which produced the characteristic consequence also increased.

In a similar study, Hall and Sundberg (1987), investigated the functional independence of mand and tact repertoires. Behavior chains leading to reinforcement were trained. Two deaf, mentally impaired subjects were taught tacts for each object in the chains. Next, all objects except one were presented and each subject was asked to complete the chain. To do this they needed to ask for the missing object. If no asking occurred, they were prompted with the sign for the missing object (imitative prompt), or shown the object and required to say its name (tact prompt). The point was to see if spontaneous manding would occur. The results indicated that reliable manding occurred only after direct mand training, spontaneous manding was not apparent. Both imitative and tact prompt procedures were successful in transferring stimulus control from nonverbal stimuli to conditioned establishing operations. The advantage of the imitative prompt procedure was that the tact for an object was not needed before manding could be trained; correct imitation of the response was sufficient.

Sundberg, Milani, and Partington (1977) found that mands were acquired faster than tacts and speculated that specific reinforcement (characteristic of mands) was more effective than generalized conditioned reinforcement (characteristic of tacts) for certain populations (such as the language delayed).

Lamarre & Holland (1985) used nine, normal preschool children to investigate the

functional independence of mand and tact relations involving the same response form. The response forms employed were prepositional phrases "on the right" and "on the left." Four subjects first learned to mand the experimenter's placement of objects with "on the right" or "on the left." They were tested for the collateral development of a tact repertoire for these same phrases. This did not occur. Five subjects learned to tact with these phrases, but did not collaterally acquire the corresponding mands. The experimenters also introduced reversed mand and tact training procedures. In the mand training procedure the subjects were taught to reinforce the experimenters for putting the objects on the left when the subjects manded on the right and vice versa. In the reversed tact training procedure subjects were trained to say "on the left" when the object was on the right and vice versa. Test questions were given to determine if the untrained mand or tact reversal would also occur. For six of the nine subjects, reversing one repertoire did not result in reversal of the other. The results demonstrated that tacts and mands, even when incorporating identical response forms, are functionally independent during acquisition.

Although the research conducted in the area of verbal behavior, and specifically on mands and tacts, is limited, some conclusions can still be drawn. First, mand and tact repertoires are independent and both repertoires need to be trained under their respective controlling conditions. Second, since the reinforcement for manding is the *specific* thing manded, and thus is beneficial to the speaker (in that some deprivation state or aversive stimulation is removed), mand conditions make it easier to train a verbal repertoire because of the establishing operation in effect.

The role of the establishing operation and the reinforcement associated with it in language training needs further investigation. In order to examine this role, alternating mand and tact training of verbal responses was investigated in the current study.

## METHOD

### *Subjects*

One female and five male preschool children enrolled at the California State University, Stanislaus, Child Development

Center participated as subjects. The subjects ages ranged from 3.0 to 4.2 years, with a mean age of 3.7.

### *Setting*

Experimental sessions were conducted in a room at the Child Development Center where possible interruptions to training were minimized. The room contained a small table and two chairs. The training materials were placed on the floor beside the experimenter who sat across the table from the subject.

### *Materials*

Four toys were used in mand and tact training. Each toy was assigned to a training condition and was only used during that condition. The toys had separate parts which could be assembled to form various kinds of vehicles, animals, or games. Three parts from each of the four toys were chosen to use in mand and tact training. Thus, there were three parts trained in each condition. Parts used in mand training were necessary to complete assembly of the toy. Other toy parts used to assemble the toy (but not manded nor tacted) were available. A watch was used for session timing and a video camera was used to record some of the training sessions.

### *Procedure*

Each of the parts used in mand and tact training was given a name which was not currently in the subjects verbal repertoire. These names were the responses to be trained. The names were originally chosen to match a function the part had in the whole toy. Part names were changed later in the study to make acquiring the responses to be trained more difficult. The new names had no functional connection to the parts.

*Subject Selection.* All subjects were asked two questions to assess how familiar they were with the names of the parts to be trained. First, the experimenter put the parts to be trained, one at a time, on the table and asked the subject to name the part (i.e., What is this?). Second, subjects were read each part name, one at a time, and were asked if they knew what it was (i.e., What is a \_\_\_\_\_?). Subjects who gave functional descriptions for several of the parts being used in the study were not allowed to participate. It was found that for many of the subjects, some of the parts evoked responses which functionally described the part to be trained.

Therefore, those names were changed to eliminate any prior functional association the subjects may have had with the part, rather than eliminating the majority of the subjects.

*Pre-training.* Initially the subjects were trained to assemble the toy. The experimenter modeled a way to put the toy together and when assembled, assigned it a name, such as "crane." The subject was then asked to construct a "crane" using the appropriate parts. No names were used for the parts of the toy during this training. The subjects were given some time to play with the assembled toy. During pre-training the experimenter attempted to build a working rapport with the child.

*Training Overview.* Subjects were exposed to four training conditions in two phases. Each phase had one tact only and one mand-tact training condition. Phase 1 part-names were

fairly easy to master while Phase 2 part-names were more difficult. This difficulty was accomplished by using novel words with no relationship to the part.

In Phase 1, training was conducted on one condition at a time. Subjects completed all three parts in one condition before advancing to the next condition. Subjects 1-3 were given tact only training as their first condition in this phase while subjects 4-6 received mand-tact training as their first condition. The parts in each condition were trained one at a time in the order represented in Table 1. When subject responding met mastery on one part they moved to the next part in that condition. Advancement from one training condition to the next was contingent upon meeting mastery criteria for all parts in each condition.

In Phase 2, mand-tact and tact only train-

Order of Training for Subjects and Training Objects for Each Condition

Subjects 1-3		Subjects 4-6	
Tact-only condition (T1)		Mand-Tact condition (M-T1)	
P	1. Ejector		1. Ringer
H	2. Torso		2. Carriage
A	3. Coupling		3. Cradle
S			
E	Mand-Tact condition (M-T1)	Tact-only condition (T1)	
	4. Ringer		4. Ejector
1	5. Carriage		5. Torso
	6. Cradle		6. Coupling
Tact-only condition (T2)		Mand-Tact condition (M-T2)	
P	7. Tarmen		7. Waldorf
H	8. Lever		8. Binkle
A	9. Basting		9. Pinnacle
S			
E	Mand-Tact condition (M-T2)	Tact-only condition (T2)	
	10. Waldorf		10. Tarmen
2	11. Binkle		11. Lever
	12. Pinnacle		12. Basting

Table 1

ing conditions occurred within the same session. This was done in order to expose the subjects to as much training as possible before the school year ended. Mand-tact training and tact only training were not strictly ordered as in Phase 1 (see Table 1). During the sessions subjects sometimes started with mand-tact training and other times they started with tact only training to avoid any sequence effects in training. Subjects progressed within each condition in the same way as in Phase 1. When they met the mastery criteria on one part they advanced to the next. All subjects were trained on Mondays, Wednesdays, and Fridays with the training sessions lasting about 20 minutes each.

Mastery criteria during training for each condition consisted of six out of six correct responses (with no prompts) for two consecutive sessions. When the first six correct responses occurred, the session ended. At the next session the subject was asked to put the same toy together again (manding or tacting the same part as before). If the subject again emitted six consecutive correct responses a new part-name was introduced. If less than six consecutive correct responses occurred, training continued on that part-name until meeting the mastery criteria. The session ended after six consecutive correct responses, or after 20 minutes, whichever came first. In the actual analysis of the data for the tact training conditions, mastery was considered reached after the third consecutively correct tact trial for that session, even though training continued until six consecutive correct responses were made. The purpose for this was to eliminate any possible bias toward the mand-tact condition, since in the mand-tact conditions only three tacts were required for mastery (the other 3 correct responses were mands).

During pre-training and tact training, verbal feedback (informing the subject that the response was correct was the immediate consequence of responding. No tangible incentives were used. In mand training the immediate consequence for a correct response was the part of the toy manded, as well as a verbal acknowledgement or further instruction (i.e., "OK, now finish the crane").

*Tact-Only Training.* The objective was to train the subject to correctly tact a particular part six out of six times for two consecutive ses-

sions. The experimenter placed the part on the table in front of the subject and said "This is a \_\_\_\_\_. What is this?" If the subject did not give the correct response, the experimenter said the name of the part then asked, "What is this?" Correct responses were praised (e.g., "good job"). If the subject needed further prompting, minimal prompts were used (the experimenter provided the first few sounds or syllables in the word). Also, once the response was firm (usually after three or four trials) the experimenter juxtaposed other questions or commands, such as "Touch your nose." or "What color is this." This created a time delay between presentations of the part being trained and asking "What is this?" and was used to match the slower pace of the mand-tact training (since subjects had to assemble toys and play with them in between responses). Each trial began with the presentation of the toy part and the prompt and ended with the subject's correct response.

*Mand-Tact Training.* The objective was to train the subject to correctly mand and tact a particular part six out of six times for two consecutive sessions. Mand and tact trials alternated. The first trial for each part was a mand training trial. The trial began by displaying the unassembled parts of the toy on the table with the exception of the part to be trained. The experimenter ask the subject to "Make a \_\_\_\_\_." (crane, for example). In order to complete this task the subjects had to ask for the missing part. When the subject needed the missing part to finish the task, the experimenter said the name of the part and when the subject repeated that name, the experimenter gave it to him/her. The subject then completed the task and played with the toy for a short time. When play was finished all parts were unassembled and removed from the table.

The next training trial for that part was a tact trial. Tact training proceeded as previously described. When the subject gave the correct response on this trial (with or without modeling or prompting), the part was removed from the table and a new mand training trial began. These trials continued to alternate until the subject correctly manded and tacted the part for a total of six consecutive trials, or until 20 minutes had passed. Training continued on each part until the mastery criteria had been met.

*Retention.* A tact retention test was given to each subject when training on all parts was completed. Each part (which had a name) was placed on the table in front of the subject in a random order and the experimenter asked "What is this?". If the correct response occurred within ten seconds, the experimenter provided praise and removed the part. A new part was then presented. If the subject did not give the correct response within ten seconds, the part was removed and a new one presented. Each object was presented only once.

*Reliability.* At least one session from each

training condition was videotaped. The observer, a graduate student of psychology at CSUS, watched and scored the videotaped session independently. Percentage reliability was calculated by dividing twice the number of agreements by the sum of the total responses recorded by the experimenter and the observer. The analysis of the data was based on the average number of trials needed to complete the training in each condition.

RESULTS

Initially, when subjects were shown the objects, none of the twelve words to be

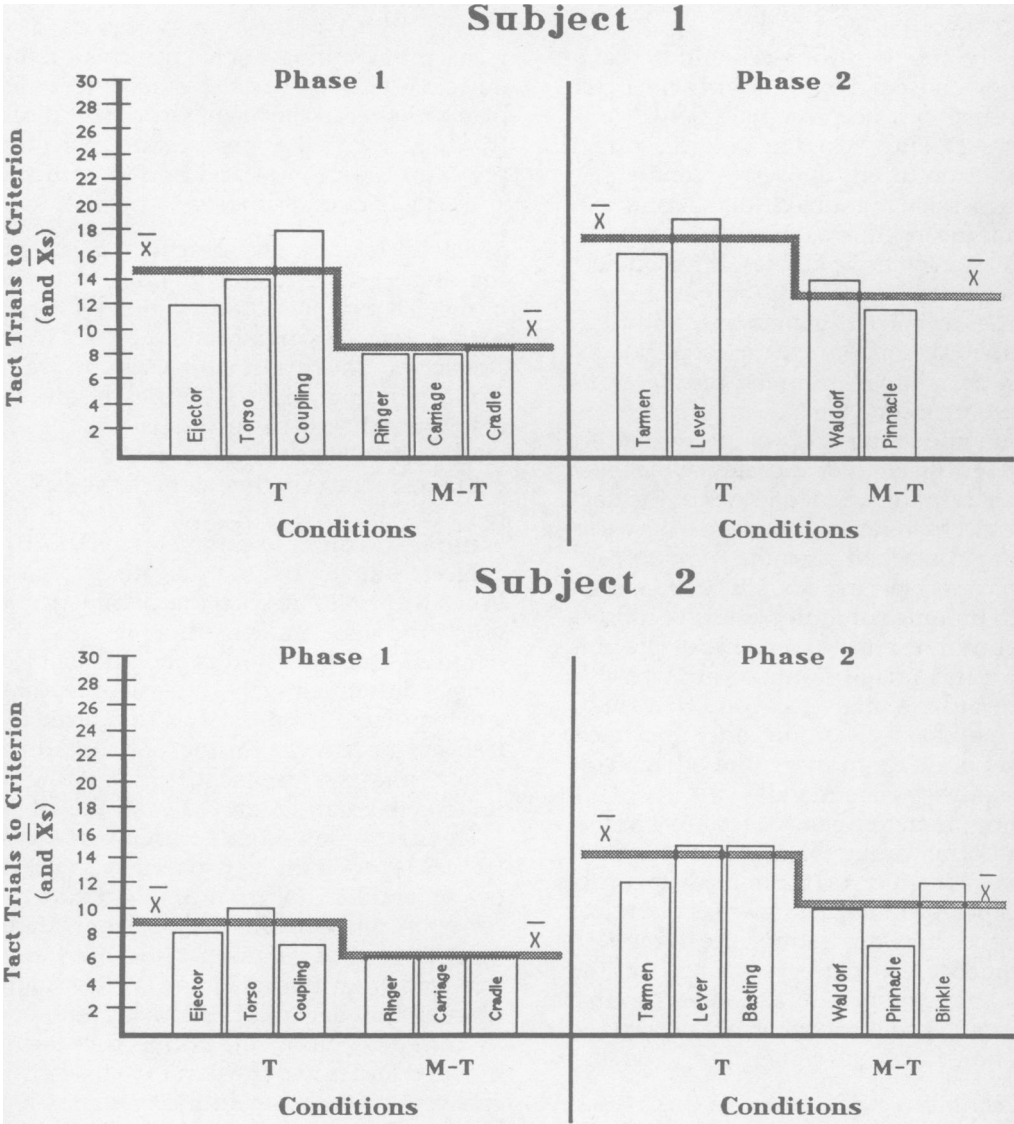


Figure 1. Mean number of trials in tact-only and mand-tact conditions for subjects 1 and 2.

taught were given in response to "What is this?" Also, when the name of each part was read to the subjects, no subject described the parts to be used in the study, but many did have functional descriptions for several of the words to be taught.

A response was considered "mastered" in both conditions when three consecutive, correct tact responses were made per session for two consecutive sessions. Due to time limitations (the school year was coming to a close) not all parts were trained in later conditions. Figures 1 and 2 display the average number of trials it took each subject to correctly tact parts trained in each condition. Observer reliability was checked at least once during each condition. The overall reliability of the observations was 89.5%.

Overall, it took subjects fewer trials to acquire tacts for parts trained under the mand-tact training conditions. In Phase 1 the total average number of trials per subject for the tact only training condition was 50.3, and in the mand-tact condition was 28.3, a difference of 22 average trials. In Phase 2 the total average for the tact only training was 69.3, and in the mand-tact training condition was 48, a difference of 21.3 average trials.

Subjects 1-3 received tact only training first in both phases of the study (refer to figure 1). Subject 1 completed training for 10 of the 12 objects. All parts in Phase 1 were completed. The average number of trials for the tact only (T1) training condition was 14.7 trials. In the mand-tact (M-T1) training condition the average number of tact trials was 8.3, a 43.5% decrease. In Phase 2, only four parts were trained, two in each condition. The average number of trials for the tact only (T2) training condition was 17.5. In the mand-tact (M-T2) training condition the average number of tact trials was 13.5, a 22.9% decrease.

Subject 2 completed training on all objects. The average number of trials for the T1 training condition was 8.3. In the M-T1 training condition the average number of tact trials was 6, a 27.7% decrease. In Phase 2, the average number of trials for the T2 training condition was 14.3. In the M-T2 training condition the average number of tact trials was 10, a 30% decrease.

Subject 3 completed only the T1 training condition of Phase 1 and then stopped com-

ing to the training sessions and was dropped from the study.

Subjects 4-6 received mand-tact training first in both phases (refer to figure 2). Subject 4 completed training for 11 of the 12 objects. All parts in Phase 1 were completed. In the T1 training condition the average number of trials was 14. The average number of tact trials for the M-T1 training condition was 6.7, a 52.1% decrease. In Phase 2, subject 4 completed training for three parts in the M-T2 condition and two parts in the T2 condition. In the T2 training condition the average number of trials was 21.5. The average number of tact trials for the M-T2 training condition was 13, a 39.5% decrease.

Subject 5 completed training for eight of the 12 objects. All parts in Phase 1 were completed. In the T1 training condition the average number of trials was 16. The average number of tact trials for the M-T1 training condition was 10.7, a 33.1% decrease. Since subject 5 completed training for only two parts in Phase 2 (M-T condition), a meaningful comparison can not be made, and the data are not shown.

Subject 6 completed training for 11 of the 12 objects. All parts in Phase 1 were completed. In the T1 training condition the average number of trials was 13.3. The average number of tact trials for the M-T1 training conditions was 7.3, a 45.1% decrease. In Phase 2, subject 6 completed two parts in the M-T2 condition and three parts in the tact only condition. In the T2 training condition the average number of trials was 16. The average number of tact trials for the M-T2 training condition was 11.5, a 28.1% decrease.

Following training, a tact retention test was given to each subject to determine which part names were still in their repertoire (see Figure 3) Subject 1 retained 20% of the part-names in the tact only conditions, and 60% of the part-names in the mand-tact conditions. Subject 2 retained 50% of the part-names in the tact only conditions, and 66.7% of the part-names in the mand-tact conditions. Subject 4 retained 20% of the part-names in the tact only conditions, and 50% of the part-names in the mand-tact conditions. Subject 6 retained 16.7% of the part-names in the tact only conditions, and 80% of the part-names in the mand-tact conditions. Overall, it was found that only 27.2%



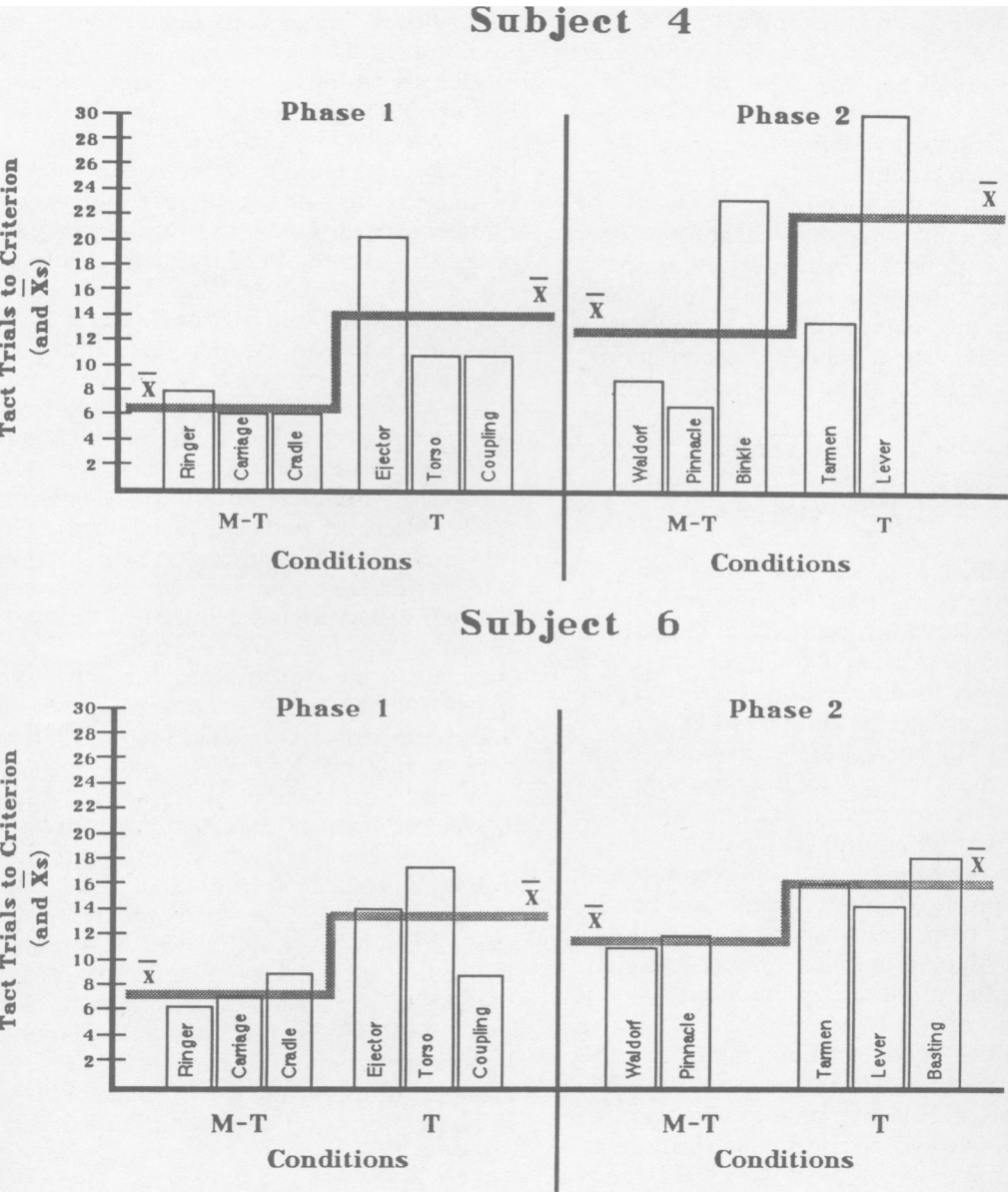


Figure 2. Mean number of trials in mand-tact and tact-only conditions for subjects 4 and 6.

of the part names from the tact only training conditions were retained while 63.6% of the part names from the mand-tact training conditions were retained.

DISCUSSION

With all the subjects who completed the study, the mand-tact training procedure was more effective in training tacts than the tact only training procedure. In all conditions fewer trials were needed to meet mastery criteria during mand-tact training than tact

only training. Subjects also were able to recall substantially more part names trained under mand-tact contingencies than tact only contingencies.

Because responses in the mand-tact condition were trained under both mand and tact contingencies, two repertoires developed rather than just one as in the tact only condition. It seems that less training was actually needed for both the mand and tact repertoires when the training for them was combined. Further study is needed to clarify this



# Retention

## Subjects

			1	2	4	6
P H A S E  1	Mand-Tact	Ringer	X	X	X	X
		Carriage		X		X
		Cradle			X	
	Tact	Ejector				
		Torso			X	
		Coupling		X		
P H A S E  2	Mand-Tact	Waldorf	X	X	X	X
		Binkle	X			X
		Pinnacle	--	X		--
	Tact	Tarmen	X	X		
		Lever				X
		Basting	--	X	--	



Part name  
retained



Part name  
not retained



Part name  
not trained

Figure 3. Object names retained from mand-tact and tact-only conditions for all subjects.

but it appears that training time can be economized by alternating the contingencies under which a response form is learned.

The mand training procedure proved effective in creating the establishing operation for the missing toy part. This procedure was very similar to that utilized by Hall and Sundberg (1987), thus replicating its effectiveness. Although Hall and Sundberg's (1987) subjects were deaf and developmentally disabled, the procedure proved appro-

priate for normal children as well.

The present study attempted to determine whether mands were acquired faster than tacts as found by Sundberg, Milani, and Partington (1977). In spite of the problem with word familiarity, the general results supported their results that the contingencies of mand training (involving establishing operations and specific reinforcement) could facilitate the learning of a tact repertoire. This was first also implied by Stafford, Sundberg

and Braam (1978) who noted an increased probability of responding in mand training situations and related this to language training.

In evaluating the results, several questions arise concerning what actually contributed to the differences found. Could these differences be attributed to such things as sequence effects in training, subject absenteeism, the type and frequency of interrupters used, unequal word difficulty between conditions or, was in fact the learning of mand relations the critical feature which produced the results?

#### *Sequence effects*

The order in which the conditions were presented to the subjects was varied across subjects. If the learning in the first condition caused the decrease in the second condition (see figure 1) then we would expect the same sort of decrease even when the conditions were reversed in order (see figure 2). Since the average number of trials increased for subjects 4 and 6 in both phases of the experiment (a replication across phases), a sequence effect was not apparent.

#### *Absenteeism*

It was observed that when a subject missed a day of training, maintenance of correct responding was weakened. Since the mastery criteria required correct responding across two consecutive days of training, an absence on the second day was critical. The effect was usually to lengthen training. Absenteeism was an uncontrolled variable whose effect was not limited to any one condition. There was nothing inherent in one training condition which produced more absenteeism than the other. When a subject missed so many sessions that progress through training was prevented (as with subject 5), they were not included in the results.

#### *Interrupters*

One consistent difference between tact only conditions and mand tact conditions was the use of interrupters. In the tact condition interrupters consisted of unrelated tasks (i.e., following an instruction or answering a question). These interrupters were used to avoid echoic control of correct responses (if you asked the child "what's this" three times in a row they could simply say the same thing three times). Interrupters were introduced after about three or four trials (introduction any earlier reduced the

effectiveness of the verbal prompts which were needed to get the appropriate response form in the first place). Once it was observed that the response form was established, the interrupters were introduced. In the mand training trials, a "natural" interrupter was the play activity which followed giving the correct verbal response and getting the toy part. It is possible that this form of "interruption" was not functionally similar to the interrupters used in the tact only conditions. Also, in the mand tact condition a correct mand was followed by a tact trial which was followed by another mand trial. In a sense, the entire mand trial could be considered an "interrupter" between tact trials. This long delay between tact trials probably prevented control by anything other than the toy part. In the tact only trials some partial echoic control could still have been present during the session. When the subject came back the next day, emitting the correct tact was more difficult on the first try (the guaranteed absence of self generated echoic prompts) than on later tries (for example after being prompted or given the correct name). Therefore the mand tact training could have facilitated generalization across time while the tact only training did not. If this were the case, the mastery criteria (two consecutive days, of 3 consecutive correct responses) would favor the mand tact training.

#### *Word familiarity*

When training for Phase 1 was completed, it was hypothesized that words in the mand-tact condition were already familiar to the subjects and hence easier to learn than words in the tact only condition. This was partially revealed during pre-testing. When the subjects were asked, "What is a cradle?" some would answer "it is something for babies." Since the word "cradle" and other part-names in Phase 1 were already in the subject's verbal repertoire, they probably were also easier to learn with respect to a new object. A new set of words was chosen for Phase 2. When pretested with these words the subjects revealed no history with respect to any of them. Word familiarity was therefore, not differentially associated with one or the other conditions in Phase 2. The same relationship between conditions was seen in Phase 2 as in Phase 1. It generally took more training trials across all conditions in Phase 2 than in Phase 1. This could be

because of the increased word difficulty and/or the modification of the training procedure. In Phase 1, training progressed one condition at a time. All three part names had to be mastered in one condition (tact-only or mand-tact) before moving to the next condition. In Phase 2, to insure that more training conditions were introduced to the subjects in the remaining time available for the experiment, a part-name from each condition was trained each session. In other words, subjects were required to master two different part-names under their respective contingencies (mand or tact) during each training session. This could explain (along with the increased word difficulty) the increase in training trials in Phase 2. This seemed to facilitate generalization across time of the correct responses in each condition. The tact retention test lends support to this generalization notion in that more part-names were retained from Phase 2 than Phase 1. Unfortunately, the retention test was given at the end of the experiment and Phase 2 was closer in time to the test than Phase 1. The increased retention could simply have been the result of a recency effect.

Further research is needed in this area to solve the questions raised by this study. However, the following issues appear clear. It would benefit those who are developing

language curricula to understand the basic principles which control verbal behavior. In particular, it appears that mand contingencies are effective in increasing the rate of acquisition of tact repertoires. If a synergistic relationship between mand-tact contingencies exists, the outcome of concurrently training other verbal repertoires (i.e., the intra-verbal, echoic, textual, etc.) should also be investigated.

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