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Effects of Contingent Music on Performance of Retarded Children in a Two-choice Discrimination Task

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ABSTRACT

A 125-item, two-choice discrimination test was given to 14 institutionalized mentally retarded children who were subsequently matched on several relevant variables. After Test I was given, all subjects received a music-preference test, and according to their preference were placed in one of two experimental treatment groups. Experimental Group A received music as reinforcement, and Group B received M & M's. The results indicated that a reliable difference was found between the two groups with the music group showing a highly significant increase in performance over Test I and Group B.

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CHAPTER I

INTRODUCTION

When an event is used to reinforce a response, some independent evidence is needed that the subject is familiar with the event, and that it is indeed a reinforcer. For that reason many studies of human behavior have obtained some prior estimate of the probable effectiveness of the intended reinforcer. Thus Barrett (1962) asked his subjects what music they preferred; Bijou and Baer (1966) indicated that while certain stimuli have been found to be reinforcing there is not a prior means for establishing that a given reinforcer will be effective for a group of children at one point in time or for a given child across time. For example, in a comparative study (Bijou & Sturges, 1959) of the reinforcing properties of consumables such as candy and ice cream versus nonconsumables such as trinkets, the consumables were generally more powerful but their power was determined by the food deprivation state of the child. White (1966), in his investigation of the effects of stimulus novelty on the discrimination learning of normal children, employed a two-choice simultaneous discrimination task in which pairs of bird pictures were presented to children of different age groups. In the

experimental conditions, each child was presented with one bird picture which reappeared on every trial, paired with different members of a series of 20 bird pictures. Half the experimental subjects were given a varying positive problem in which the child was reinforced for selecting the varying stimuli; the other half were given a varying negative problem in which the child was always reinforced for selecting the constant stimulus. In the control condition, a single positive as well as a single negative stimulus reappeared on each trial.

White found that nursery school children required significantly more trials to reach criterion in the varying conditions than in the control condition. With the upper grades, White found no significant difference in learning between the conditions. White hypothesized from his findings that when younger children notice usual change in the environment, they are less likely to be able to return their attention to whatever they had been observing formerly. The recent studies by Jeffrey (1955) and Rheingold, Stanley and Doyle (1964) have suggested that music may serve to increase response rate if it is contingent on a specific response. The procedure of Cotter and Toombs (1966) demonstrated that music reinforced the behavior of retarded children.

Using the information which is available on effective reinforcers with discrimination studies, it is the purpose of the present study to investigate the effect of music versus consumables on performance in a two-choice discrimination task.

Statement of the Problem

The problem was to contrast music with edibles as reinforcers in discrimination learning of severely retarded children.

Need for the Study

It has been the practice of previous investigations to examine a wide variety of reinforcers in discrimination studies. The results of these studies clearly indicate a division between using pretraining, consumables, and novelty reinforcers in motivating children to learn on discrimination tasks. However, few studies have explored the properties of music as a reinforcer to facilitate correct response behavior. It is the aim of this study to investigate the properties of music as positive reinforcement in discrimination learning.

Delimitation

The study was delimited to the Parsons State Hospital and Training Center and was also delimited to using level IV and V retarded children from the Hospital.

Limitation

The study was limited in the following ways:

(1) The number of subjects used in the experiment may have been limited in that a larger number of subjects may have yielded a more statistically reliable result.

(2) The use of subjects in previous experiments could be a limitation since subjects are not naive in the experimental situation.

(3) The use of the experimenter as his own data collector could also be a limiting factor, since experimenter bias could occur in the event of difficult response discrimination.

(4) The heterogeneous selection of subjects in regard to such factors as age, etiology, response repertoire, level of functioning, also could be viewed to be a limitation.

Hypothesis of the Problem

The null hypothesis to be tested is that there is no significant difference between performance in a two-choice discrimination task when music and consumables (M & M's) are used as reinforcers.

Definition of Terms

(1) Operant conditioning is concerned with the functional relationship between the behavior of organisms and consequences produced by this behavior.

(2) Respondent behavior is a specific kind of response which is elicited by a specific kind of stimulus, and the stimulus always precedes the response.

(3) Respondent conditioning involves the repeated presentation of a new stimulus along with a stimulus that already elicits a respondent.

(4) Operants are emitted by the organism (the dog runs; the bird flies; the human infant babbles vocally).

(5) Topography refers to the physical description of the responses which compose the operant.

(6) Extinction refers to a precedure in which reinforcement of a previously reinforced operant performance is discontinued.

(7) Operant discrimination (1) As operation: the differential reinforcement of a response with respect to a property of a stimulus (e.g., responses to a red key are reinforced; responses to a green key are not).

(8) Discriminative stimuli precede and accompany operants but do not elicit them as the eliciting stimuli elicits respondents.

(9) Stimulus novelty is the presentation of different stimuli on each trial.

(10) White noise consist of a mixture of all audio frequency at the same intensity level.

(11) S^D represents a discriminative stimulus which is the particular occasion on which a performance is reinforced, in contrast to other occasions (stimuli) on which this performance is not reinforced.

(12) S^Δ represents the particular occasion on which a performance will not be reinforced, in contrast to other occasions (discriminative stimuli) during which the performance will be reinforced.

(13) SQ refers to social quotient.

(14) CA refers to chronological age.

CHAPTER II

REVIEW OF THE LITERATURE

In a recent study, Stevenson and Pirojnikoff (1958) found that the rate with which children learned to discriminate was significantly affected by pretraining trials in which responses to each stimuli form received 0 per cent, 50 per cent, or 100 per cent reinforcement. The subjects who received 100 per cent reinforcement for the choice of each correct response during pretraining later learned to discriminate among the stimuli with rapidity. Subjects who received 50 per cent random reinforcement or 0 per cent reinforcement during pretraining showed a much slower rate of learning. The results were interpreted that before a child can learn to associate a name with an object he must be able to distinguish one name from another as well as one object from another. The majority of the studies done in this area have followed a similar design. One-third of the subjects are given relevant pretraining, such as labeling the stimulus objects; one-third are given irrelevant pretraining; and the remaining one-third are given no pretraining (Spiker, 1960). Dickerson, Girardeau and Spradlin (1964) and Cantor (1955) demonstrated

that when relevant verbal pretraining is given to either young children or retarded individuals, better performance is ascertained on the criterion task.

Norcross and Spiker (1957) reported that subjects who first acquired names for the stimuli of a discrimination learning task were superior in performance to subjects given other control pretraining experience. One of the control groups had received pretraining which required that the subject say "same" when presented with two like pictures, and "different" when the pictures presented were not alike. This procedure is similar to that which Kurtz (1955) claimed adequate to establish "observing responses" and which he demonstrated to produce positive transfer. Kurtz characterized an observing response as ". . . any response which, when made to one or the other of a given pair of stimulus complexes which are different, consistently results in distinctive stimulation from those two stimulus complexes." Presumably, observing responses would also result from pretraining in learning of discrete verbal labels for each picture. Kurtz, therefore, suggested that observing responses might adequately account for the positive transfer demonstrated to follow the acquisition of verbal responses for stimuli of a transfer task.

Experiments with both rats (Forgus, 1955) and chimpanzees (Riesen, 1947) have also demonstrated that early environment is important for

later discrimination learning. For the practical, as well as theoretical purposes, it would be valuable to know the type and amount of experience that is necessary and the time at which it could occur--if the time factor is critical at all. Young children may be particularly good subjects for such research provided that discrimination tasks can be found which are not typically made, or which are learned with only great difficulty before certain ages. The ability to learn these discriminations may then be taken as a critical indication of the effect of various types of experience in a pretraining situation. In a study using young children, Jeffrey (1958) demonstrated that children who could not learn to apply distinctive labels to stimuli differing in spatial orientation could, nevertheless, learn to press buttons toward which the stimuli (stick figures) could be said to be pointing.

In numerous studies dealing with novelty, House and Zeaman (1958) found that performance of retarded subjects on a two-choice discrimination problem was stronger to the new stimulus after an initial forced response to either the negative stimulus or the positive stimulus. They interpreted their results as evidence for a tendency to approach novel stimuli. Zeaman, House and Orlando (1958) have also demonstrated that the introduction of a novel positive or

negative stimulus, after prolonged failure on a two-choice discrimination problem, facilitated the learning performance of retarded subjects; whereas the introduction of a novel positive or negative stimulus into an established two-choice discrimination problem has been found detrimental to the learning performance of retardates (Zeaman & House, 1962).

The studies cited above clearly indicate the many different procedural variations in dealing with discrimination learning; nevertheless, limited data refers to the value of reinforcement as a variable which effects discrimination learning. In support of reinforcement value, some studies (Terrell & Kennedy, 1957) point out that children learn faster when rewarded with candy rather than with praise. However, despite the fact that children, as a group, learn more effectively on candy reinforcement, it is hardly conceivable that any one type and amount of reinforcement has an exactly equal reinforcing effect on all subjects of any such group. Given one group of children, one type of reinforcement, there still must be some intragroup variability in the effectiveness of the reinforcement as a function of the variability in the value of the reinforcer for the children. In other words, for different subjects, the objective or external reinforcer may have different reinforcement values; and, if so, these values should be tested. Sweet chocolate

(M & M's) has become one of the favorite reinforcers for use with moderately and severely retarded persons (Bijou & Orlando, 1961; Ellis, Barnett & Pryer, 1960; Orlando & Bijou, 1960; Spradlin, Girardeau & Corte, 1966). While M & M's are reinforcing for many retardates, there are some for whom they are not. This same comment, however, could not be made about any other single nutritive. For this reason, some experimenters use a mixture of candies and other nutrients as reinforcers. Bijou and Orlando (1961, Orlando & Bijou, 1960) used a mixture of nutrients to increase the chances that an effective reinforcer would be included.

Watson, Lawson, and Sanders (1965) studied the edible (candy and food) and manipulable (movie, sounds, mechanical toys) reinforcement preferences of 14 moderately and severely retarded children (mean CA = 11.0 years and mean IQ = 23). These subjects were given poker chips which could be exchanged for any of five types of candy or the operation of a tape recorder, movie projector and screen, or any one of five mechanical toys. One poker chip would produce either a piece of candy or 10 sec. of music, viewing a movie, or movement by a mechanical toy. Initially there was a preference for the manipulables but, over 13 sessions, there was no evidence for a difference between the two classes of reinforcers. Among the reinforcers, music was preferred significantly more than the other six alternatives.

Spradlin (1966) compared six types of food reinforcers (grapes, corn chips, maraschino cherries, cheese sticks, M & M's, and mints) for five severely retarded children. Each child received five 20-min. sessions on FR-25 with each food. As a group, these children did not show food preferences.

Other reinforcers have been suggested and used with severely retarded children. For example, Hollis (1965) found that performance on a bent wire problem could be maintained for some subjects by social reinforcement (gentle pat on the head and a verbal statement, "good girl").

Several researchers have used generalized reinforcers in operant studies dealing with retardates. A generalized conditioned reinforcer is a discriminative stimulus which sets the occasion wherein responding will yield one of several types of reinforcers (e.g., food, water, toys, or termination of an aversive condition). Money is a prime example of a generalized conditioned reinforcer and has been used in a variety of human operant studies (Lindsley, 1964; Schwitzgebel & Schwitzgebel, 1961). Tokens have been used by researchers dealing with retarded persons (Ayllon & Azrin, 1965; Birnbrauer & Lawler, 1964; Girardeau & Spradlin, 1964; Watson, Lawson & Sanders, 1965). These tokens are redeemable for such merchandise as trinkets, toys, candy, fruit, articles of apparel, pop, music, etc. They are

established as reinforcers rather quickly even with moderately and severely retarded children (Girardeau & Spradlin, 1964; Watson, et al., 1965). In general, tokens have been used primarily in executing rather gross demonstrations of procedures based on operant techniques; however, work has been done using tokens as reinforcers for studying schedule effects with moderately retarded children.

Still other persons (Long, Hammack, May & Campbell, 1958) have used a mixture of trinkets as reinforcers in various kinds of operant experiments using normal and retarded children.

There have been a few systematic studies of the effects of the termination of an aversive stimulus on the behavior of moderately or severely retarded children. However, Lovaas, Freitag, Kinder, Rubinstein, Schaeffer, and Simmon (1964) have reported on the use of an aversive electrical stimulus with behaviorally limited autistic children. Lovaas' procedure involved placing the autistic child in a small room with electrical grids. Two adults were in the room with the child. Initially, when the electricity was turned on, one adult pushed the child into the arms of the other adult. The child thus escaped the electrical stimulation. After relatively few shocks, the child was shaped to sit on the adult's lap, to hug, and touch him. This behavior extinguished when shock was discontinued for long periods of time; however, one noncontingent shock was enough to reestablish the behavior.

Only a token number of research findings dealing with music are available. This research includes studies by Jeffrey (1955), Cotter and Toombs (1966), Morgan and Lindsley (1966), Lovitt (1968), Butterfield (1968), and Cotter (1969).

Jeffrey reports that children pressed a button repeatedly to receive 10-second intervals of music. Preferential responses of 20 retarded children for music, noise, and no-music were analyzed by Cotter and Toombs (1966). Music was preferred significantly over noise and no-music by all subjects. Morgan and Lindsley (1966) suggested that operant techniques using a physical rather than a verbal response were necessary for a valid and reliable analysis of preference. Lovitt (1968) evaluated preference by analyzing rate of response to maintain continuous music. Butterfield (1968) used contingent music to modify sucking responses of neonates as young as 48 hours. Cotter (1969) used contingent music presented through headphones in a sheltered workshop setting to study its effects on retarded girls' performance of simple manual tasks. Productivity increased under both contingent and noncontingent music as compared to silence.

These findings indicate that music as a reinforcer can be used in experimental situations to maintain certain types of performance. The question asked in the present investigation is: "Will music facilitate learning when used with severely retarded children in a two-choice discrimination situation?"

CHAPTER III

METHOD

Subjects

The 14 subjects used in this investigation were residents of Parsons State Hospital and Training Center, Parsons, Kansas. The CA's ranged between 8 and 12 years. The social quotients were taken from the Vineland Social Maturity Scale in the institution files and ranged between 15 - 49. The design called for two groups of children matched on CA, SQ, and pretest scores. The subjects were matched and then randomly assigned to one of two conditions. Due to the fact that half of the subjects received auditory reinforcement, children with severe hearing losses were excluded. Using the AAMD classification (Heber, 1948), most subjects ranged in the severe and profoundly retarded level. Table 1 in Appendix B presents vital information about the subjects.

Apparatus and Stimuli

The study was conducted in an experimental room located in the research building on the institution grounds. The subjects were brought from their residence hall to the laboratory for each session.

The room in which the experiment was conducted was 8 x 12 ft. and contained one table, one modified Wisconsin General Test Apparatus (WGTA) and two chairs. Figure 1 in Appendix A presents a schematic diagram of the WGTA. The WGTA is a large box with a moveable door in the front and a moveable door at the rear. Located on the floor of the WGTA is a moveable tray with two food wells cut into the top. The subject sits in front of the WGTA while the experimenter sits behind the apparatus and lowers the door between trials so the subject cannot observe the reinforcement being placed into one of the wells and the placing of the stimuli over the wells. The experimenter can also observe the subject through a one-way mirror which is placed in the rear door. At the beginning of each trial, the door is raised by the experimenter and the tray moved forward so the subject can make his selection.

The stimuli used were small three-dimensional objects. These objects were mounted on small wooden squares measuring three inches by three inches, which allowed for easy handling and provide adequate cover for the food wells. A list of the stimulus objects used are presented in Table 2 of Appendix B, which also shows the test form used.

The auditory reinforcement given to the subjects in Group A was recorded after music preference was established. The tape was made

by the institution's Audio-Visual Department (monitored and compressed for equal RMS power levels) on a Magnecord 1021 tape recorder. The reinforcement was then presented on a Magencord 1022 through a Grason-Stadler model 162 speech audiometer with TDH-39 earphones.

Reinforcement was contingent on correct responses throughout the study.

Design

Table 3 in Appendix B shows a schematic of the experimental design used in the study. The design divided the experiment into three phases. First, Test I baseline was given in which all subjects received 125 discrimination trials under the same conditions using M & M's as reinforcers for correct responses. The second phase of the experiment was designed in order to establish each individual subject's preference for music over white noise. Thirdly, Test II was given dividing the subjects into two groups with Group A receiving music as reward and Group B receiving an M & M.

The dependent measure tested was, "Is there a difference in performance between Test I and Test II, and is there a difference between Group A and Group B?"

Procedure

Test I

Test I was given to all subjects under the same conditions in order to establish performance data before the experimental condition was introduced. The test was composed of 25 items; these items are presented in Table 4, Appendix B. Each of the 25 objects was presented ten times (five times as S^D, and five times as the S Delta). The total test was composed of 125 trials. M & M's were used for all subjects as reinforcers throughout the experiment. The left-right position of the reinforced objects was randomly generated with the restriction that the correct object would not appear on the same side of the WGTA tray more than two consecutive trials. The sequence of pairs and presentation was the same for all subjects. Each trial followed a standard procedure: (1) the door on the WGTA was lowered; (2) the experimenter filled the well with a small edible and placed the stimuli over the wells; (3) the door was raised and subject made his selection (receiving reinforcement if a correct response was made); and (4) after the subject made his selection the door was lowered and the experimenter recorded the response.

Music preference: Music preference was determined individually for each subject following a procedure similar to that outlined by Cotter and Toombs (1966). Each subject was taken to the experimental room which was sound-proof and seated at a table where a set of

headphone was placed on the subject by the experimenter. A plexiglas keyboard, similar to a miniature piano, was placed in front of the subject and he was shown how to operate the keyboard. After the subject learned how to manipulate the keyboard, the music tapes were turned on. In the event the subject made a positions response to one switch, the apparatus was so equipped that every two minutes the music randomly switched to another key. In order to continue listening to a specific type of music, the subject had to switch to a new key. Each subject had the opportunity to listen to two types of music: (1) folk music, Jimmy Rogers; (2) children's music. His other choices were white noise or nothing.

The preferences were assessed by measuring the cumulative duration of time that each subject spent listening to the available music. Relative proportions of time were calculated during each session until preference scores were available.

Test II

Test II was composed of 15 items which are presented in Table 5, Appendix B. Each of the 15 items was presented six times (three times as S^D, and three times as S Delta). The total test was composed of 60 items (Table 2). The test was given after each subject established his preference for music. Although all subjects were given the music preference test only seven were used in the music reinforcement group.

These seven subjects were selected according to the duration of their response to music. The music preference data is presented in Table 6, Appendix B. The procedure used for Test II was similar to that of Test I with the exception that each stimuli presentation was presented using a matched-to-sample procedure--thereby eliminating all verbal interaction between subject and experimenter. Again the reinforcement was contingent upon making a correct response.

CHAPTER IV

RESULTS AND DISCUSSION

Results

In Table 7 of Appendix B the results of Test I are shown by the number of correct discriminations made by each subject to 125 trials. The mean scores of both groups on Test I and Test II are shown in Table 8, Appendix B.

Chi square was calculated on the results of Test I to determine the goodness of fit between the sample used and a normally distributed population. The Chi square obtained was 2.66 with 8 df, which was not significant at .05. From this it was concluded that the subjects selected did not significantly differ from a normally distributed population, and therefore, a simple analysis of variance was used to determine the difference for the experimental conditions.

Test I

A simple randomized design of variance was performed on the number of correct responses on Test I for the experimental groups in order to establish that there were no differences in performance when the same reinforcer (M & M's) was given to both groups. The results of this analysis were not found to be significant ($F = .819$, $df = 1/13$, p .05). The summary of this analysis appears in Table 9, Appendix B.

Music preference. All 14 subjects demonstrated a preference for total music over total noise and no-response (Table 6 shows the distributions of mean proportions of time committed by each subject over all three sessions). Within the total music category, the greatest proportion of time was committed to children's music (mean = 0.48). The next preferred level was folk music (mean = 0.37). The mean for white noise and nothing was not established since only two subjects showed any response to white noise.

Test II

A simple analysis of variance was computed on the results of Test II in order to establish if there were any differences in performance between the groups using the two types of reinforcement schedules. Table 4, Appendix B, shows the schematic of how Test II was presented. The results of Test II, which are shown in Table 10, Appendix B, clearly indicate a significant difference ($F = 22.45$ with 1,13 df between treatment groups, significant at .001), thus rejecting the hypothesis that there would be no significant difference found in performance between Group A and Group B.

Discussion

The purpose of the present investigation was to determine the effect of music on the performance of severely and profoundly retarded children on a two-choice discrimination task. Subjects were matched on several relevant variables and subsequently divided into two groups.

Test I was given to all subjects; music preference was established; Test II was given. An analysis of Test II revealed a reliable difference in favor of Group A, suggesting that music was an effective reinforcer with retarded children. Although these results indicate that music was a highly effective reinforcer for severely retarded children, the author must also mention some relevant methodological problems encountered throughout the study.

First, an experimenter who employs a simple analysis of variance design--using children as subjects--frequently finds that between-group differences are large, but the size of the within-group variability is even more impressive, suggesting that the use of individual reinforcers could reduce such error variance.

Second, in working with severely retarded children, some difficulty in maintaining sufficient motivation to ensure subject cooperation (or even to keep subjects in the experimental room) is often encountered. Many experimental sessions could not run the full length since subjects would not sit still, soiled themselves, or even got up and left their position. A method of allowing subjects to choose the reinforcer he himself would most likely work for would probably maximize his motivation as a function of high incentive value.

A third methodological concerns the fact that the effectiveness of any given type of reinforcer varies with age. For example, Sturges (1957) has reported that trinkets are not effective reinforcers at age

two and one-half, but are effective at age four. What is needed, then, is a "methodological cookbook" of normative data, listing relative effectiveness of all possible reinforcers by successive age levels. But this information is not available, except for the limited data provided by Terrell and Kennedy (1957). At present, selection of the most effective reinforcer for a given problem and age group depends on a good guess or a time consuming pilot study.

The above data may also lend themselves to pratical application. For example, in a classroom situation, teachers depend principally on grades as reinforcers. However, grades are not equal in reinforcement value for all students. In view of this, teachers might obtain better academic results from their poorer students by offering music as a reward. Experimental evidence by Cotter and Spradlin (1970) indicate that contingent-preferred music ("rock'n roll") increases the number of arithmetic problems solved per minute. The present investigation showed clearly that the children who were in the music reinforcement group were more motivated, spent more time in the testing situation (some children even hummed along with the songs), which clearly indicates that music should be given a place among important reinforcers in motivating response activities.

In conclusion, it would seem that the results of this investigation would justify expanded examination for the use of music in working with severely and profoundly retarded children.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATION FOR FURTHER RESEARCH

Summary and Conclusions

Human behavior involved with music has been studied by psychologists, anthropologists, and sociologists. These three disciplines are known as behavioral sciences. They deal with human behavior and aim at the establishment of generalizations about man's behavior.

Behavioral sciences are relatively new, and many matters of immediate relationships to man's happiness have been investigated insufficiently; the data on music used as a reinforcer is almost nonexistent. Few investigations are available which deal with the effects of music on the performance of the retarded.

As we know, music is important to persons in the general culture and is used quite frequently to influence behavior; however, music in the life of the retardate has seldom been investigated and is almost nonexisting in regard to the severely and profoundly retarded child. Since music is found to be important to the normal population, one can only ask, "What influences can music have with the subnormal population?"

The present experiment investigated the effect of music on the performance of severely and profoundly retarded children in a two-choice discrimination task. The subjects were 14 mildly and severely retarded children ranging in age from 8 - 14 with a mean SQ of 30. All were given test I, which contained 125 discrimination items, and M & M's were used as rewards throughout the test. After completion of the test, all subjects were given a music-preference test, then divided into Group A and Group B--Group A receiving music as the reward and Group B receiving M & M's.

Data were obtained by the experimenter's marking correct and incorrect responses on the score sheet after each discrimination was made.

The results obtained showed that Group A (music) showed a significant increase in correct discriminations made over that of Group B (M & M's), permitting the following conclusions covering the results of this study.

1. The subjects demonstrated that under the same reinforcement schedule, there was no reliable difference in performance among the subjects.

2. During Phase II, which tested the preference of music for each subject, all subjects demonstrated a significantly greater duration of commitment to the musical stimuli than to the noise or silence.

3. The subjects preferred children's music over instrumental music.

4. Out of all 14 subjects, only one spent time listening to white noise. This strongly supports the theory that even severely retarded subjects are affected by music.

5. The results after test II show clearly that music is an effective reinforcer when used with severely retarded children.

Recommendations for Further Research

In general, it is suggested that further research with severely and profoundly mentally retarded children should include music as a reinforcer. Based on the findings of this study, future research might be directed to the following:

1. A greater selection of subjects, using both male and female.

2. The effects of preferred music in comparison to non-preferred music.

3. The effects of contingent music and noncontingent music.

4. The effects of preferred music under a cottage-learning situation.

5. Finally, the value of music as an effective tool in working with retardates not only in the laboratory but also as a tool for behavior modification with the child in his cottage environment.

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APPENDIX A

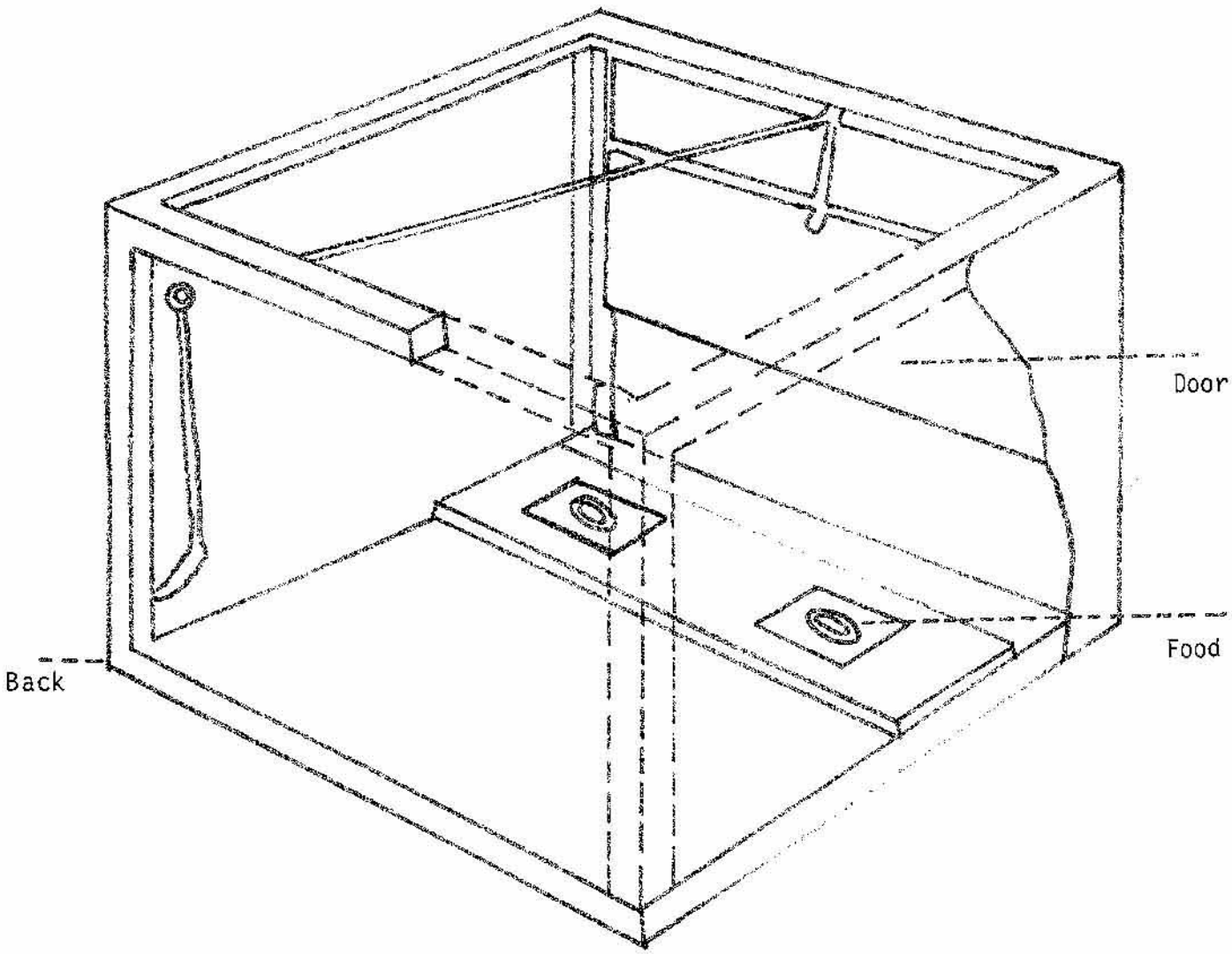
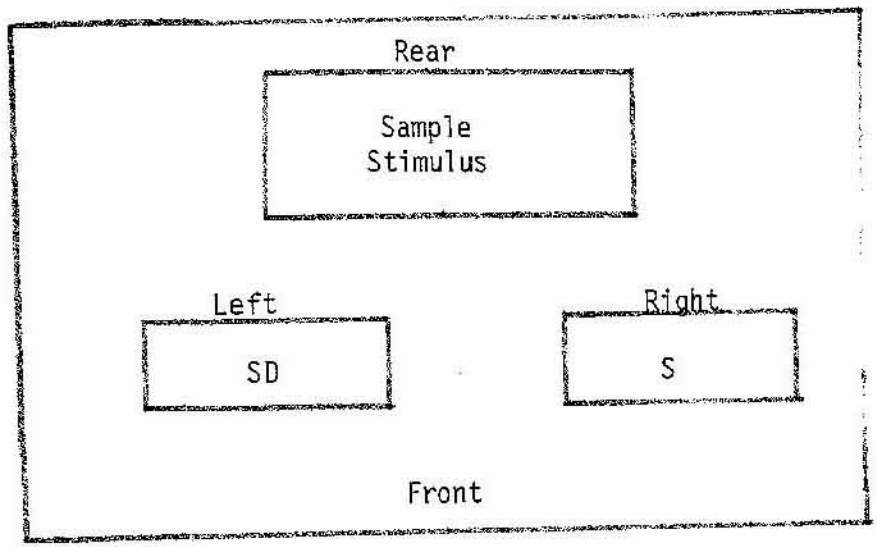
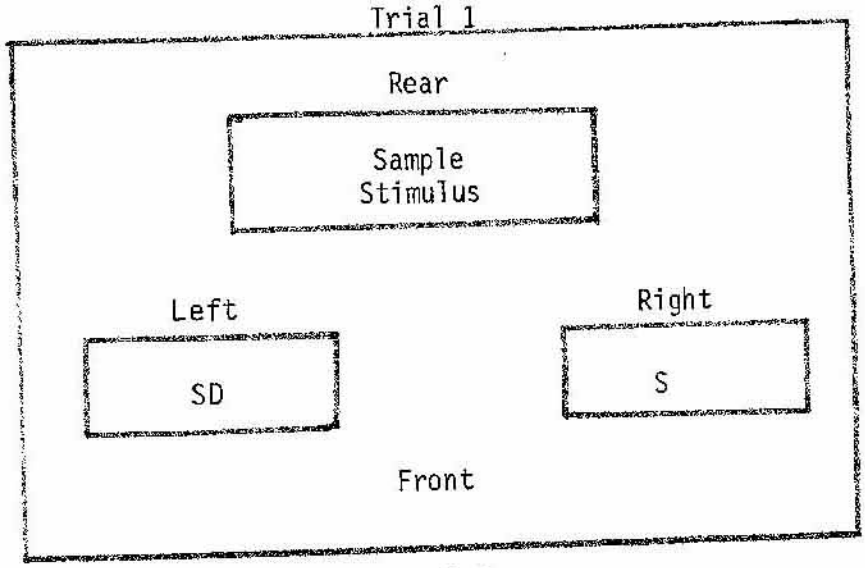


Figure 1. Modified WGTA.

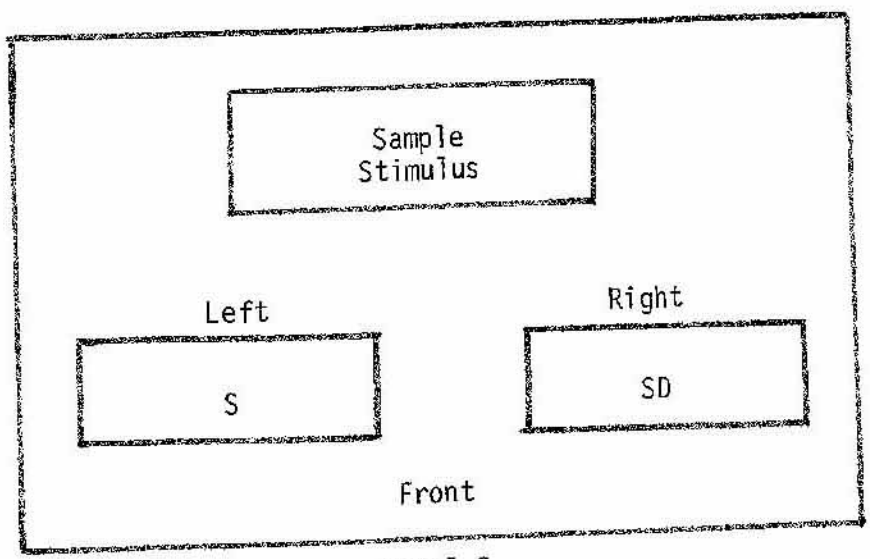
Stimulus Presentation



Trial 1



Trial 2



Trial 3

Figure 2. Stimulus Presentation

APPENDIX B

Table 1

Information on Subjects

Name	CA (yrs.)	SQ	IQ	Sex
D.H.*	12	29	--	M
G.K.*	13	13	--	M
R.J.*	12	37	--	M
T.P.*	12	32	--	F
J.H.*	13	39	--	F
J.S.*	12	28	--	M
T.K.*	12	27	--	M
J.M.	12	21	--	M
J.C.	11	27	--	M
M.McN.	9	34	--	M
M.D.	14	31	--	M
J.S.	15	20	--	M
M.F.	12	24	--	M
K.K.	9	27	--	F

*Subjects in group A (music reinforcer)

Table 2

Stimulus Items Used in Test II

Date_____ Time_____

Objects	+	-		+	-		+	-
1. button - box			21. box - jar			41. globe - fruitglass		
2. airplane - mixer			22. airplane - cookie press			42. cookie press - block		
3. clip - fruitglass			23. cork - ornament			43. block - fruitglass		
4. battery - globe			24. cork - block			44. hook - swan		
5. box - swan			25. jar - swan			45. jar - battery		
6. fruitglass-cookie press			26. fruitglass - mixer			46. ornament - swan		
7. globe - mixer			27. box - cookie press			47. mixer - fruitglass		
8. block - airplane			28. fruitglass - globe			48. hook - airplane		
9. swan - cookie press			29. hook - button			49. cork - jar		
10. button - hook			30. jar - airplane			50. box - cookie press		
11. ornament - jar			31. jar - airplane			51. block - button		
12. ornament - cork			32. box - swan			52. box - button		
13. battery - block			33. ornament - clip			53. clip - globe		
14. cork - jar			34. button - box			54. clip - cork		
15. hook - clip			35. button - cork			55. globe - fruitglass		
16. battery - clip			36. clip - mixer			56. jar - ornament		
17. hook - ornament			37. hook - mixer			57. airplane - block		
18. swan - clip			38. cork - battery			58. cookie press - jar		
19. button - block			39. ornament - airplane			59. hook - mixer		
20. airplane - globe			40. cookie press - globe			60. battery - swan		

Table 3

Schematic of the Research Design Employed in the Study

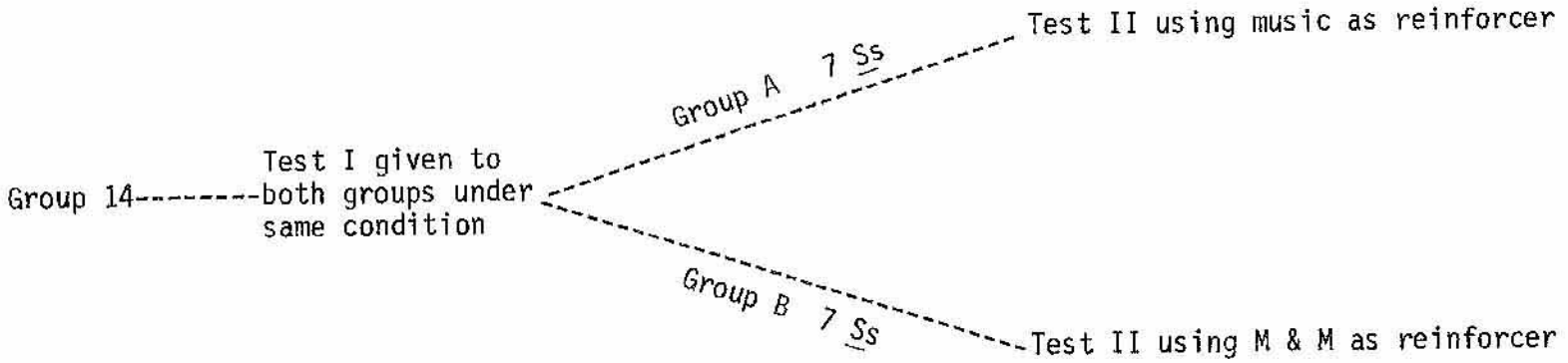


Table 4

A List of the 25 Stimulus Objects Used in Test I

Categories				
Noisemakers	Vehicles	Animals	Clothing	Containers
Horn	Airplane	Pig	Hat	Pan
Rattle	Trailer	Bear	Coat	Bottle
Bell	Bus	Cow	Shirt	Box
Whistle	Train	Dog	Pants	Barrel
Harmonica	Tractor	Horse	Dress	Pot

Table 5

List of 15 Stimulus Objects Used in Test II

1. Globe	6. Cookie press	11. Fruitglass
2. Ornament	7. Button	12. Block
3. Clip	8. Mixer	13. Cork
4. Airplane	9. Battery	14. Jar
5. Swan	10. Hook	15. Box

Table 6

Music Preference

(Mean Proportion of Time Committed to Music, Noise, and No Response)

Subject	Total Music	Childrens' Music	Folk Music	White Noise	No Response
1*	0.89	0.30	0.59	0.05	0.06
2*	0.91	0.70	0.21	0.04	0.05
3	0.76	0.35	0.41	0.10	0.13
4	0.50	0.21	0.29	0.34	0.16
5*	0.90	0.28	0.62	0.05	0.05
6*	0.89	0.52	0.37	0.02	0.09
7	0.93	0.56	0.37	0.04	0.02
8	0.91	0.59	0.32	0.04	0.05
9	0.83	0.46	0.37	0.09	0.07
10	0.69	0.37	0.32	0.15	0.15
11	0.86	0.42	0.44	0.11	0.04
12*	0.95	0.83	0.12	0.02	0.02
13*	0.89	0.34	0.55	0.05	0.05
14*	0.95	0.80	0.15	0.04	0.01

*Subjects selected for Group A

Table 7

Number of Correct and Incorrect Responses Made by Subjects in Test I

Subject	Correct	Incorrect	Total Possible
1*	42	83	125
2*	40	85	125
3	39	86	125
4	43	82	125
5*	38	87	125
6*	47	78	125
7	36	89	125
8	48	77	125
9	42	83	125
10	38	87	125
11	49	76	125
12*	42	83	125
13*	61	64	125
14*	46	79	125

*Subjects used in group A

Table 8

Mean Scores for Group A and B on

Test I and Test II

Test I		Test II	
Group A	45.14	Group A	39.42
Group B	42.24	Group B	28.42

Table 9

Analysis of Variance for Test I

Source	SS	df	ss	F
Between	31.49	1	31.49	
Within	499.72	13	38.44	*819
Total	531.21			

*p > .05

Table 10

Analysis of Variance for Test II

Source	SS	df	ss	F
Between	731.44	1	731.44	
Within	423.48	13	32.57	*22.45
Total	1154.92			

*p > .05, > .001