The Use of Musical Reinforcement to Improve Practice Behaviors of Competitive Swimmers

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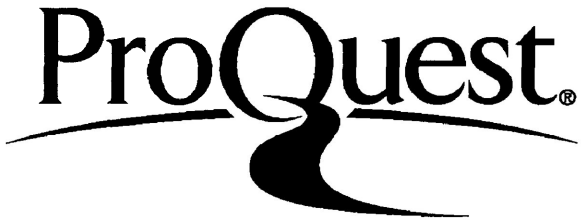
Running Head: The Use of Musical Reinforcement



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Abstract

The rationale for the study was to determine if music could be used as an effective reinforcer for increasing appropriate practice behaviors, and reduce problem behaviors in the competitive swimming environment. The effects of musical reinforcement were examined with six competitive swimmers. The swimmers were selected by the coach as individuals who did not consistently make effective use of practice sessions. The swimmers were randomly assigned to either a contingent reinforcement group or a noncontingent reinforcement group. A reversal replication ABAB design, was used to compare the groups to standard coaching prodecures.

A portable stereo cassette unit was used to present instances of contingent and noncontingent musical reinforcement during the treatment phases. During the noncontingent reinforcement phase, music was presented to the swimmers regardless of the behaviors emitted during the dry land training sessions. Music was only presented in the contingent reinforcement phase if 20 percent of appropriate behaviors was achieved. Differences in performance levels during the contingent and noncontingent phases were recorded and compared.

Since the experimental design in this study was based on the steady state method, departures from the baseline were

used to evaluate the treatment. Results indicated that there was a large and immediate effect shown during the contingent reinforcement conditions for all subjects when compared to the baseline phases. Slight improvements were noted during the noncontingent phase for two of the subjects, however a much larger and more consistent effect was demonstrated with these subjects when they were later switched to the contingent phase.

At the conclusion of the study, social validation questionnaires were distributed to the swimmers and the coach. The questionnaires asked the athletes and coach to evaluate the goals, procedures and results produced by the intervention. Social validation measures indicated that 3 out of 4 subjects rated the procedure positively, felt the procedure improved the dry land training period and wished to have the procedures continued in the future.

Data suggests possible benefits of using a musical reinforcement condition might be obtained in other sports settings and could be investigated further.

The results of this study suggest that the contingent reinforcement condition produced improved time usage during the dry land training sessions. Results indicated an increase in the percentages of appropriate behaviors per session and a decrease in the frequency of inappropriate behaviors occurred when the independent variable was applied.

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Introduction

In recent years there have been a growing number of studies examining the use of behavioral techniques in physical education and sport environments. Prior to 1980, must papers consisted of program descriptions and coaching recommendations (Donohue, Gillis, & King, 1980). It is apparent from a review of recent papers using behavioral principles in sport environments that applications are expanding in scope and direction (Martin & Hrycaiko, 1983).

Specific areas and procedures have been developed to deal with problems such as: persistant errors, pre-competition and competition anxiety, disruptive behaviors, and low productivity levels. The major thrust or emphasis in these efforts seems to be directed at providing a satisfying and rewarding experience from sport involvement. Such concerns have lead to an examination of reinforcers in sports settings.

When evaluating the effectiveness of a reinforcer, the behavior change is of primary importance to the psychologist. To the sport psychologist and members of the physical education community, assessing enjoyment on the part of the athlete is also an important concern. Several texts have stressed the need to increase enjoyment in athletics

(Martens, 1978; Tutko & Burns, 1976). Authors such as Orlick and Botterill (1975) have strongly emphasized the need to use positive reinforcement to increase childhood participation and enjoyment in sports. Associations, such as the Coaching Association of Canada, are basing program development procedures on one goal: to simply provide all individuals involved in sports the best possible sport experience while also enabling optimal satisfaction to occur (Smith, 1979). So the question is presented, "How is an environment created where enjoyment and satisfaction may flourish?"

Research on the operating capacity of human beings by Otto (1970), suggests that only 5-6% of actual human potential is ever achieved. This figure is not specific to top level athletes, however, a great deal of room for improvement in human performance appears to exist. It appears that two steps should be taken with regard to maximizing performance in the athletic domain. First, optimal levels of performance should be striven for with greater effort. When individuals are carefully motivated performance improvements are readily noted, along with greater personal satisfaction levels, i.e. enjoyment increases. (Martin, LePage & Koop, 1983). Secondly, procedures used to motivate individuals during practice sessions should be positive procedures, which will not discourage sport involvement but rather increase the

enjoyment of the sport.

Studies in many different areas of sport have examined positive ways to increase motivation. Behavioral techniques have been implemented in such sports settings as: swimming (Cracklen & Martin, 1983; McKenzie & Rushall, 1974; Rushall and Pettinger, 1969), exercise programs (Kau & Fischer, 1974; Keefe & Blumenthal, 1980), baseball (Heward, 1978), aerobics (Epstein, Wing, Thompson, & Griffin, 1980), figure skating (Hume, Martin, Gonzalez, Cracklen & Genthon, 1985), and university basketball (Bradshaw, 1984). Procedures used in these studies varied greatly and included self-recording, a lottery procedure, coach feedback, public posting, and a money reinforcement contingency. All studies indicated that large increases in athletic output can be obtained when appropriate motivational techniques are implemented.

Research by Crossman (1985) indicated that serious problems exist in time management during the practice sessions of various sports. The time athletes spent engaging in productive behaviors ranged from a low of 26% in volleyball, to a high of 57% behaviors in swimming, ringette, and hockey (goalies). Poor time usage was also noted in football, gymnastics, figure skating, and hockey (offense and defense). In these sports, productive behaviors were emitted only on an average of 34% of the time. Two

studies cited previously (Hume, et al, 1985; McKenzie & Rushall, 1974) concur with Crossman's study. These findings indicate that athletes do engage in a large number of unnecessary and unproductive activities during training sessions, which may decrease the potential for improvement and reduce the possibility of reinforcement. Both studies attempted to combat the problem with the introduction of a self-monitoring procedure. The procedure proved successful in both instances and was rated favorably by athletes and coaches. Both procedures required the use of log-books or program boards and coach feedback on performance, to increase productivity levels.

While most of the preceding studies have examined strictly individual performance improvements, research indicates that small group reinforcement procedures can be used effectively to motivate improvements in group performance levels (Heward, Heron, Hill & Trap-Porter, 1984; Zander, 1974). When each new goal or specified level of performance is moderately higher than the past level of performance and when individuals in the group are aware that each member must achieve a particular level of performance for reinforcement to occur, positive results are noted (Zander, 1971). This is of particular benefit to the researcher in situations where individual reinforcement is

impractical.

A recent psychology text (Schubert, 1986) based on sports experiences in the German Democratic Republic, strongly suggests that music can be a valuable reinforcer when presented in a sports setting. It is also suggested that music is effective for maintaining rhythm during warm-ups, mobilizing, stimulating and reducing boredom in athletes. It is also noted that music is frequently played to improve the atmosphere in various day-to-day settings (e.g. elevators, grocery stores, or in office waiting rooms). Music is also heard frequently during practices for various sports such as: figure skating, speed skating, swimming, basketball, gymnastics and track. Music is even played at practice sessions when it is not required for routines like those found in gymnastics and figure skating. Similarly, Jernberg Jr. (1982) who is both a swim coach and pianist suggests that the power of music can "support and inspire movement" while performing both in water and out-of-water exercise.

Vyatkin and Dorfman (1980) found that athletes increased their levels of activation and static endurance while music was played. However the authors stressed that individual differences were apparent when the type of music and scores on the Eysenck Introversion/Extroversion scale were

considered.

Kodzhapirov, Zaitsev and Kosarev (1988) studied the effects of music on the performance of 65 weightlifters. They found that music stimulated their work capacity and raised the effectiveness of training. Furthermore they found the subjects exhibited greater effort when listening to preferred music and also indicated that music need not be played continually (in some cases where concentration is imperative music can disrupt performance). When asked whether they liked to train to music, 96% responded positively and felt the music made training easier, reduced the psychological stress of training and improved skill mastery.

Thirty-two male and female Physical Education students perform the PWC 170 test on a bicycle ergometer under three conditions: (a) synchronous movement to music, (b) asynchronous movement to music and (c) control (Anshel & Marisi, 1978). The researchers concluded that "music, particularly if synchronized to physical movement had a positive effect on the ability to endure the task" and males endured longer than females.

The purpose of this study was to examine the effects of contingent and noncontingent musical reinforcement when presented to a small group of athletes. A small group of subjects was used in the study, due to existing limitations

in methods for presenting musical reinforcements. Martin & Pear (1983) suggest that generally reinforcers are more effective for improving behaviors when presented as soon as possible following responding and when contingently based on responding. Since little research has previously been conducted examining the effects of music on sport behaviors, both a contingent and noncontingent condition were examined in this study.

Although swimming tends to show one of the highest levels of productive time usage at 57% (Crossman, 1985), there is an apparent need for improvement during practice sessions. Specifically, poor levels of productivity occur during the dry land training periods, which occur prior to entering the water. The treatment package or contingent condition in this study therefore attempted to increase appropriate productive behavior and decrease the inappropriate responding by the athlete that occurred during swimming dry land training sessions prior to entering the water. One factor worthy of note regarding swimming is that while the swimmer is under water not only are many common forms of distractions limited, but the potential for reinforcement becomes limited also (e.g. the swimmer can not hear coach reinforcement,can not see physical gestures, can not hear cheering of fans, etc.) A highly effective

reinforcer and the subjects level of deprivation may contribute to a high level of responding by a subject. This occurrance may often be referred to by the general public as motivated subjects (Dickinson, 1977). The distinction between an effective reinforcer and a motivated subject are important to recognize. Skinner (1957) suggests that behavior may be changed not only by deprivation, but by the impending reinforcement. The probability of a response is made more likely when one is deprived of the reinforcer. Music may be a valuable reinforcer in the swimming environment. Therefore, in order to determine if music can reinforce the practice performance of swimmers, the most appropriate time is during the warm-up or dry land training period. This is when the swimmers are on the deck at the side of the pool. The importance of maintaining adequate reinforcers in athletic settings has been clearly demonstrated (Martin & Hrycaiko, 1983).

Dickinson (1977) suggests that, when a change in external stimulation is created through the sport medium, reinforcing effects may be noted. It was therefore hypothesized that since swimming only provides specifically limited external stimuli, the contingent musical reinforcement condition would be effective in: (a) increasing productive practice behaviors, (b) reducing unproductive

practice behaviors, and (c) leading to a more enjoyable swimming environment and more conducive training atmosphere. The noncontingent condition included in this study served as a control to determine if music, irrespective of reinforcement, affects practice behavior.

Method

Subjects

The subjects were six highly ranked swimmers from the Thunder Bay Thunderbolts Swim Club. The coach, in conjunction with the author, selected swimmers who did not consistently make effective use of their practice sessions. The three female and three male subjects ranged in age from 12 to 16 years of age. All swimmers had been swimming competitively for 3 years, and attended at least five practice sessions weekly. One swimmer had to be eliminated from the study during the first treatment condition due to a lengthy illness.

Apparatus

Practices were held at the swimming facilities at the C.J. Sanders Athletic Fieldhouse at Lakehead University. The pool is 50 m. long and consists of 8 lanes. Between one and three coaches usually attended practices. The pool was usually occupied by between 20 and 40 swimmers per practice. The length of the practice sessions was approximately 120 minutes, including approximately a 20 minute dry land training period.

A portable Eversonic stereo cassette unit, Model MC-2 was used in the study to present instances of musical

reinforcement. Approximately five casette tapes were used in conjunction with the portable cassette player. To ensure accurate data collection procedures, observers were required to use a Walkman Stereo cassette player, model JWS552. Two sets of headphones were also employed to record data. One cassette tape, which stated when observers were to observe and when to record data, was used in conjunction with two sets of headphones. An example of the recorded message to the observer was: e.g. observe interval one, record interval one, observe interval two, record interval two.

Procedure

In the procedure section, specific definitions of the following components are presented: target behaviors, dependent variables, controlled variables and independent variables. The specific definitions are presented to assist the reader in achieving a clear understanding of the procedures that were followed in the study. Step by step details of procedures used with subjects are described under the headings of experimental design and training procedures. The conduct of the observers are described under the headings of: recording system used by observers, and reliability checks. Sections on social validation of procedures and analysis of data complete the procedure section.

Target Behaviors

The target behaviors examined were the productive behaviors occurring during each dry land training session. Each swimmer had specific dry land training behaviors to be done at the start of each practice (these were recorded).

Dependent Variables

During each 20 minute dry land training session, the frequency of productive and nonproductive behaviors were recorded. Productive, or appropriate behaviors, were defined by the author and swimming coach as those behaviors, when emitted by athletes during practice, had a high probability of improving subsequent athletic performance. For example, sit-ups, running laps of pool and stretching exercises, are examples of appropriate behaviors. Nonproductive behaviors or inappropriate behaviors are behaviors which have no effect or a detrimental effect on subsequent athletic performance. Examples of nonproductive are, talking to friends, taking other swimmers' belongings and leaving the pool area to answer the phone. A third category, concurrent behaviors, were also recorded and are behaviors which are necessary but not directly related to improving performance or changing behaviors. For example, helping the coach put the bulkhead into place was a concurrent or maintenance behavior. Specific definitions of appropriate, inappropriate and concurrent

behaviors were developed by Crossman (1985) and are presented in Appendix A.

Controlled Variables

Prior to, and throughout the study the coach had been asked not to provide individual feedback regarding the dry land training session use unless it was the specific feedback described in the study and requested by the experimenter. This was done in an attempt to minimize confounding variables in the study.

To ensure that standard coach to swimmer interactions occurred throughout the study, coach to swimmer interaction data was collected. Positive and negative interactions were distinguished for coach to swimmer interactions.

An interaction was rated as one of the following:

(a) POSITIVE FEEDBACK FOR APPROPRIATE BEHAVIOR:

- GENERAL - if positive remarks were made to the swimmer regarding work behavior but not specifically about any behavior or exercise. (e.g., "You're working hard").

- SPECIFIC - if positive remarks were made which specifically referred to an exercise, move or behavior which merited approval. (e.g., "Good push-off").

(b) NEGATIVE FEEDBACK FOR INAPPROPRIATE BEHAVIORS:

- GENERAL - if negative remarks of a general nature were made regarding work habits (e.g., "Get going:, or "Quit standing around").
- SPECIFIC - if comments referring to specific exercise, move or behavior which was performed incorrectly (e.g., "You're not bringing your legs out of the water").

Independent Variables

Prior to the start of the study, a description of the project was presented to the swimmers. The swimmers were then asked if they wished to participate in the study (see Appendix B).

The six swimmers were then randomly assigned to either a contingent reinforcement group or noncontingent reinforcement group. During the contingent reinforcement condition, music was presented immediately following a session where appropriate productivity levels were achieved (e.g. a period of reinforcement was presented on the first day in the contingent reinforcement phase after an appropriate productivity level was achieved). Swimmers in the contingent reinforcement group were told if he/she showed an improvement in productivity over the baseline average of 15 percent , then music would be presented in the pool area for all

swimmers. Music was only presented in the contingent reinforcement phase if 20 percent of appropriate behaviors was achieved. A five percent improvement in productivity was selected since it would require a consistently higher level of productivity than emitted during the baseline phase. Individual scores for appropriate behaviors often drop to zero percent during the baseline phase. The 20 percent productivity level was also selected so that all experimental swimmers could reach the required productivity level and earn the reinforcer early in the phase. Music was presented for 10 minutes at the end of the first dry land training period and throughout the dry land training session on the next day. If the appropriate level was achieved by all the experimental subjects again during this practice, music was again presented on the following day. Music continued to be presented throughout the treatment phase, as long as the five percent improvement was noted over the original baseline productivity level by the experimental subjects. If these swimmers failed to achieve the 20 percent productivity level no reinforcement was presented. The swimmers were told that not all swimmers had met the criterion for reinforcement and when their performance of appropriate dry land training behaviors increased to criterion the music would be resumed at practices. When the productivity improvement criterion

was achieved on the following day, reinforcement was again presented. This procedure was also used with the noncontingent reinforcement subjects during the second treatment phase.

Prior to the start of the study, questionnaires on musical preference were presented to each swimmer for completion (see Appendix C). The questionnaires were examined and used to assist the experimenter and coach in the selection of suitable music for the reinforcement condition. All subjects indicated in the questionnaires that they frequently listened to music. Several subjects reported that they listened to music up to 2 1/2 hours per day.

Recording System Used by Observers

The experimenter was assisted in data collection by two trained observers. One assistant was an undergraduate psychology student and the second observer was a sports psychology professor and former swim coach from the School of Physical Education at Lakehead University.

The training for the observers consisted of during three orientation sessions during which time procedures for accurate data collection were discussed. The experimenter and research assistants were required to record the frequency of appropriate and inappropriate behaviors during a practice session. During the first and second orientation session,

observers viewed actual swimming practices, to gain experience with swimming procedures and to familiarize themselves with the data sheets. During the third session following practice and training with the data sheets, interobserver reliability checks were independently and simultaneously made for instances of appropriate and inappropriate behaviors. The data obtained were used to calculate an interobserver reliability percentage. In order to insure that reliable and accurate data collection procedures were followed, a minimum interobserver reliability of 85% was required (Hersen & Barlow, 1976). Training sessions were continued for the data collectors until the minimum reliability was obtained. Reliability measures were calculated by adding the agreements to disagreements and then dividing the sum into the total number of agreements and multiplying by 100 (Agreements/Agreements & Disagreements x 100).

In addition, the observers compared collected data on coach to athlete interactions during the orientation sessions. Interobserver reliability checks were conducted throughout the data collection periods of this study to avoid observer drift. Observer drift is the tendency for observers to change the application of definitions for behaviors over time (Kazdin, 1982).

The specific appropriate and inappropriate behaviors recorded by the observers were listed on the data sheet (see Appendix D). The behaviors were described in abbreviated forms to facilitate recording. As a behavior was performed, the observer recorded the behavior in the appropriate box. Each observer recorded data for three swimmers each session, by using an interval recording procedure (Martin & Pear, 1983). For example, one swimmer was observed for 10 second intervals. The primary behavior to occur during the 10 seconds was recorded by the observer on the data sheet. All swimmers were observed in a predetermined random order throughout the entire dry land training session. A Walkman stereo cassette player and two head sets were used by the observers to monitor time intervals (i.e., a pre-recorded audio tape indicated when to observe or when to record). Coach to athlete interactions were also recorded using the interval recording procedure.

Experimental Design

A reversal replication (ABAB) design was used with the three swimmers (see Martin & Pear, 1983). During the initial baseline, (Phase A), data on appropriate and inappropriate behaviors were recorded for the six swimmers. Phase A continued for 11 to 13 sessions, each 20 minutes long, until the pattern of performance was stable or showed a trend in

the direction opposite to that predicted when the independent variable was introduced. As well, coach to athlete interactions were recorded during the baseline phase. At the end of baseline sessions, the treatment phase, Phase B, was introduced for three swimmers. The 20 percent productivity condition was introduced during Phase B for the contingent reinforcement group. Subjects in the noncontingent reinforcement group were presented music in a noncontingent manner during this phase. The subjects in the noncontingent reinforcement group were not told how musical reinforcement could be obtained and only heard music when the contingent reinforcement group achieved a high enough productivity level to obtain the reinforcer. In this way music was presented to both the contingent and noncontingent group for the same length of time on every presentation (i.e. simultaneously preseted). Phase B lasted for between six to 12 sessions, 20 minutes each, after which time a return to baseline took place for the three swimmers in the contingent reinforcement group (no musical reinforcement was presented). One subject in the noncontingent reinforcement group was eliminated during this phase due to a lengthy illness. Standard coaching procedures were maintained for the remaining five swimmers. The baseline reversal condition lasted between six and nine sessions. The treatment phase was then introduced to

the final two swimmers (originally in the noncontingent group) and reintroduced for the original group of contingent reinforcement subjects. In this way two swimmers in the noncontingent group had served as a control group throughout the initial AB phase; since during the first treatment phase the noncontingent subjects had heard the music also, even though no change in behavior was required of these subjects for music to be presented. These subjects did not receive the music in a contingent fashion until the second treatment phase, when music was again presented during the 20 minute warm up sessions. The study was designed in this fashion in order to further control for the possibility that music might affect performance when presented in a noncontingent manner. The second treatment phase lasted for six sessions, 20 minutes each.

With a reversal replication design, the effect of the independent variable on the dependent variable is evaluated on the basis of the immediacy of the change in behaviors when comparing the baseline and treatment phases for each subject (Kazdin, 1982). The size of the effect and the number of successful replications for individual subjects were also examined. The effectiveness of the reinforcement condition was evaluated according to changes in means and trends, the variability of data within a particular phase, the number of

overlapping data points between experimental phases, and the consistency of the effects throughout experimental phases.

Training Procedures

At the beginning of the initial treatment phase, three swimmers were told by the experimenter that they were starting to work on the project in which they had agreed to participate. The other three swimmers remained in the baseline condition. The following instructions were read to the first three treatment swimmers by the coach.

> The techniques we will be using involve examining how swimmers use their dry land training periods. Each day we will be observing your dry land training sessions. If all of you show a five percent improvement in productivity levels during your dry land training sessions, then at the next practice we will play music. We will continue to play the music for dry land training sessions as long as each of you continues to show an improved productivity level.

The swimmers were also told that if they achieved the five percent improvement level during the initial dry land training session then 10 minutes of musical reinforcement would be presented at the end of the day. The rationale was to provide immediate reinforcement for appropriate behaviors and the sampling of the reinforcer on the first day of the

treatment phase.

Any questions the swimmers had were clarified before the treatment phase was implemented. Following treatment, Phase B, the three swimmers were told that they would no longer be receiving the musical reinforcement for appropriate practice behaviors. This second baseline condition constituted a return to standard coaching procedures as in the first baseline. Following the stabilization of baseline data, a second treatment phase was reintroduced to the original three experimental swimmers. During this treatment phase, the behaviors of the other two swimmers under the contingent treatment conditions were also examined. The treatment procedures were introduced to the final two swimmers in the same manner as in the first treatment phase. During the second treatment phase, (Phase B), all five swimmers were required to perform appropriate behaviors in order for the musical reinforcement to be obtained.

Reliability Checks

Interobserver reliability (IOR) checks were conducted on 36% of all observational sessions by a second observer who independently and simultaneously recorded the frequency of appropriate and inappropriate behaviors. Data obtained by observers were also compared for coach to athlete interactions. Reliability measures were calculated by

dividing the number of agreements by the total number of agreements plus disagreements, and multiplying by 100. All observers were positioned such that they had a clear view of the swimmers and coach during practice.

Social Validation

Applied behavior analysis has stressed the evaluation of treatments by examining the effectiveness in terms of the client and from the point of view of significant individuals in the clients' life (Kazdin ,1977; Wolf, 1978). Consequently social validation of treatment procedures have been encouraged. Therefore, following the second treatment phase, the subjects and subjects' coach were asked to socially validate the goals, procedures and results of the treatment package. In this questionnaire subjects were asked (a) if they liked the procedure (b) if they thought it was beneficial (c) if they felt it made the sport more enjoyable (d) if they had any problems with the procedures (i.e. problems in understanding). All questionnaires were distributed and collected by the coach. Questionnaires were reviewed by the experimenter. A copy of the questionnaire is provided in Appendix E.

In an effort to ensure completeness, baseline and post treatment swim meet times were also recorded to enable further validation of the treatment procedure. Although this

study does not prove the causality of these swim meet times, it is recognized that improved swimming times of primary importance to the subjects.

Results

For several reasons inferential statistics will not be used to evaluate the results of this study. Instead, due to the small sample size used in this study and the selection of a reversal replication (ABAB) design, visual inspection of the graphed data will be used to evaluate whether or not there has been a consistent change produced by the treatment on the dependent variable. A large and consistent effect will be required to prove the effectiveness of the independent variable. Therefore only a strong intervention will be regarded as significant. Precise day to day changes also may be detected through this type of evaluation, which is of particular importance in this study. The significance of behavior changes and the importance of these changes to the client are also recognized as critical factors in evaluating the success of the independent variable. Therefore, social validaton will also be employed in this study.

In order to facilitate careful examination of the results, specific data for each of the following areas will be examined separately: reliability of data, effects of music with the contingent reinforcement group, effects of music with the noncontingent reinforcement group, concurrent behaviors emitted by all subjects, coach-subject interaction data and social validation.

Reliability Data

The interobserver reliability measures were taken on the behaviors of all five subjects during both baseline phases and treatment phases. Data and interobserver reliability measures were only recorded for the first baseline for one subject, as this subject was eliminated from the study following one data point in the first treatment phase. The average interobserver reliability rating was 89% across all subjects. The range for interobserver reliability measures was 78% to 100%. Interobserver reliability measures obtained for each experimental phase for individual subjects are provided in Table 1.

Insert Table 1 about here

Effects of Music with the Contingent Reinforcement Group

As Figure 1 indicates, the musical reinforcement conditions resulted in large improvements in the percentage of appropriate behaviors over the baseline conditons. During the initial treatment phase all three subjects showed an immediate and dramatic increase in appropriate behaviors.

Insert Figure 1 about here

Subject 1 showed a 34% average increase in appropriate behaviors from baseline to the treatment phase. A similar improvement was noted with Subjects 2 and 3. The average percentage of appropriate behaviors for Subject 2 and Subject 3 increased by 31% from the baseline to the treatment phase. The average percentage of appropriate behaviors emitted by each subject under each experimental phase are depicted in Table 2.

Insert Table 2 about here

As Figure 1 indicates, the improvement in appropriate behaviors was consistent during the first treatment phase for Subject 1 and Subject 2, with the exception of session 26 for Subject 1. Subject 3 showed a drop in appropriate behaviors for Session 26. The dramatic decrease in appropriate behaviors may be attributed to the absence of the coach who did not attend session 25 or session 26. Since Subject 1 and Subject 3 did not meet the criterion for the musical reinforcement condition on session 26, music was withheld during session 27, as indicated in Figure 1 with a circled data point. A large and immediate return to a high rate of appropriate behaviors is noted for session 28. During

session 30, Subject 3 again failed to reach the set criterion and the musical reinforcement condition was withheld during session 31 for all subjects. Subject 3 again showed an immediate return to high rates of appropriate behaviors. Subjects 1 and 2 had reached the criterion during session 30 and continued to show consistently high rates of appropriate behaviors during session 31. Return to baseline conditions, sessions 34 to 41, resulted in a large drop in appropriate behaviors, see Table 2. The low rate of appropriate behaviors was immediately increased again upon the reintroduction of the musical reinforcement condition. The rates of appropriate behaviors appeared to be more consistent during the second treatment phase, particularly for Subject 3. No overlapping data points occurred between the second treatment phase and the second baseline phase. All three subjects met the criterion for the musical reinforcement during all sessions in the second treatment phase.

Examination of the data for inappropriate behaviors shows that high rates occurred for Subjects 1 to 3 during the original baseline phase and during the return to baseline phase, see Figure 2.

Insert Figure 2 about here

The average percentage of inappropriate behaviors during the original baseline phase was 56% for Subject 1. A higher average of 64% inappropriate behaviors was recorded for Subject 2, with Subject 3 recording the highest baseline average at 69%, see Table 2. The introduction of the musical reinforcement condition resulted in a large drop in the rate of inappropriate behaviors. The average percentage decrease in inappropriate behaviors from baseline to the treatment phase ranged from 47% to 54%. The return to baseline phase resulted in large increases in the level of inappropriate behaviors. High levels of inappropriate behaviors were again noted, but were slightly lower than those recorded during the first baseline phase, (see Table 2). The second treatment phase showed the lowest rates of inappropriate behaviors for all subjects. The second musical reinforcement condition resulted in an average percentage range for inappropriate behaviors of 5% to 15%. The largest change between the baseline and treatment phases occurred with Subject 2. An average percentage decrease for inappropriate behaviors was recorded to be 42% for Subject 2. Subject 3 showed the smallest change, dropping inappropriate behaviors by 33%. Overall high rates of inappropriate behaviors were noted for subjects 1,2 and 3 during both the baseline phase and the return to baseline phase. Low levels of inappropriate

behaviors were recorded for the three subjects during both contingent treatment phases, with the lowest rates occurring during the second contingent reinforcement phase.

Effects of Music with the Noncontingent Reinforcement Group

The original baseline phase for Subjects 4 to 6 indicated low levels of appropriate behaviors were occurring on a consistent basis. Subject 5 recorded no appropriate behaviors on half of the baseline sessions,(see Figure 3). During the noncontingent treatment phase Subject 4 and Subject 5 showed differing results. Subject 5 continued to show low levels of appropriate behaviors.

Insert Figure 3 about here

Following the second baseline phase, Subject 4 and Subject 5 were introduced to the contingent reinforcement condition. Large immediate increases in appropriate behaviors were noted. The average percentage of appropriate behaviors emitted by Subject 4 and Subject 5 equalled levels achieved by Subject 1 to 3 during contingent reinforcement conditions, (see Figure 4).

Insert Figure 4 about here

The high levels of appropriate behaviors were maintained throughout the contingent reinforcement phase. Subject 4 averaged a 70% increase in appropriate behaviors, between the baseline and contingent treatment phase. Subject 5 averaged a 35% increase in appropriate behaviors between these phases. In comparison to behaviors recorded during the noncontingent phase the decrease was substantial. Subject 4, in spite of the increase in appropriate behaviors during the noncontingent phase, improved the average percentage of appropriate behaviors by 39% in the contingent phase. Subject 5 also exhibited a large increase in appropriate behavior when comparing the contingent and noncontingent phases. Subject 5 showed a 33% increase in appropriate behaviors for the contingent reinforcement phase over the noncontingent reinforcement phase average, (see Table 2).

Similar to the baseline condition, Subject 5 performed no appropriate behaviors during four of the sessions in the noncontingent phase. Only during one session did Subject 5 show a large increase in appropriate behaviors. Subject 4 performed slightly more appropriate behaviors at the start of the noncontingent treatment phase. The percentage of appropriate behaviors continued to increase until the end of the phase, as indicated in Figure 3. Session 31 to session 33 showed the highest percentage of appropriate behaviors for

Subject 4, however music was withheld during session 31 making the interpretation of the data less clear. Possible modelling effects of the contingent reinforcement group may explain the dramatic increase in appropriate behaviors for session 31. No attempt was made in this study to control the possibility of information exchange or imitation effects between the contingent reinforcement group and the noncontingent reinforcement group. No similar increase was noted during session 31 for Subject 5. The reintroduction of the baseline conditions resulted in a drop in appropriate behaviors for Subject 4, with Subject 5 continuing to remain at a consistently low level.

Extremely high levels of inappropriate behaviors were noted for Subject 4, Subject 5 and Subject 6 throughout the initial baseline phase. Both Subject 4 and Subject 5 showed a large decrease in the average percentage of inappropriate behaviors during the noncontingent treatment phase. Subject 4 decreased inappropriate behaviors by 32% when comparing the

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Insert Figure 5 about here

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baseline to the noncontingent treatment phase. As indicated in Figure 4 the frequency of inappropriate behaviors during the noncontingent phase was erratic for Subject 4. The data

on inappropriate behavior during this phase does appear to stabilize at a low level during the later stages of the noncontingent treatment phase. The data for Subject 5 during the phase showed a small amount of inappropriate behavior. The return to baseline condition resulted in a much higher and nonstable rate of inappropriate behaviors for Subject 4. Subject 5 also showed a dramatic increase in inappropriate behaviors, although somewhat inconsistently. Average percentage increases between the noncontingent treatment phase and the return to baseline phase ranged between 37% and 39% for the two subjects, (see Table 2). The most dramatic change in the frequency of inappropriate behaviors occurred when the contingent treatment phase was introduced. The average percentage of inappropriate behavior for Subject 4 was 5% during the contingent phase and 16% for Subject 5. The decreases in inappropriate behaviors were immediate after the reinforcement condition was introduced and remained consistently low throughout the phase. While some improvement in appropriate levels of behavior were noted during the noncontingent reinforcement phase with Subject 4 and Subject 5, the only consistent and stable increase in appropriate behaviors was found during the contingent reinforcement phase.

Concurrent Behaviors Emitted by All Subjects

Data on concurrent behaviors was recorded during each experimental session. Subjects 1 to 3, as Figure 6 indicates, engaged in concurrent behavior on an inconsistent basis. Average percentages of concurrent behaviors ranged from 21% to 27% during the initial baseline phase. The

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Insert Figure 6 about here

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average percentages of concurrent behaviors increased during the first contingent treatment phase and remained at a higher level until the end of the second treatment phase, (see Table 2). Data continued to show great variability from session to session throughout the two contingent phases and the return to baseline phase for Subjects 1 to 3. As described previously, reinforcement was withheld during sessions 27 and 31. Data for Subjects 1 to 3 indicate that concurrent behaviors were performed at a much lower rate during these sessions, with the exception of session 31 for Subject 2. The subjects appear to have engaged in fewer concurrent behaviors during the sessions when large increases in appropriate behaviors were necessary, and when the contingent reinforcment condition was in effect.

Data for Subjects 4 to 6 show a more stable initial

baseline for concurrent behavior rates. Erratic and inconsistent rates of behavior, similar to those noted with Subjects 1 to 3, are found in the remaining experimental phases for Subjects 4 and 5. Average percentages of concurrent behaviors were consistent with rates found for Subjects 1 to 3 during the initial baseline phase.

Insert Figure 7 about here

The range of average percentages of concurrent behaviors during the initial baseline phase was between 18% and 22% for Subjects 4 to 6. Large increases in the average percentages of concurrent behaviors occurred between the first baseline phase and the noncontingent treatment condition. Subject 4 emitted an average of 50% concurrent behaviors per session during tne noncontingent phase. Subject 5 had a higher session average, engaging in 63% concurrent behaviors during the phase, (see Table 2). During the return to baseline phase the average percent per session for concurrent behaviors increased to a slightly higher rate than during the first baseline phase (approximately a 5.5% higher rate of concurrent behaviors occurred). Concurrent behaviors increased again during the contingent reinforcement phase. The increase during the contingent reinforcement phase was

moderate in comparison to prior phases. Subject 4 averaged approximately 33% concurrent behaviors per session. Subject 5 was slightly higher averaging approximately 40% concurrent behavior per session. As Figure 8 indicates, the frequency of concurrent behaviors emitted by Subjects 4 and 5 during the contingent phase is very similar to the frequency of concurrent behaviors emitted by Subjects 1 to 3 during both contingent phases.

Insert Figure 8 about here

Figure 8 also clearly shows that the average percentage of concurrent behaviors across phases is relatively stable. Appropriate and inappropriate behavior percentages for each phase are included in Figure 8, and illustrate the effect that the contingent intervention had on the subjects' performance during swimming practices. An overview of the concurrent behaviors for Subjects 1,2 and 3 indicates that more concurrent behaviors were engaged in during both the contingent phases. Subjects 4 and 5 similarly also showed increases in concurrent behaviors during both the contingent and noncontingent treatment phases. Erratic variations in the amount of concurrent behaviors engaged in by all subjects were noted when sessions within each phase were examined.

Coach - Subject Interactions Data

Observations of coach - subject interactions were obtained during all experimental sessions except during the sessions when the coach was absent. Consistent coach to athlete interactions were observed across all phases of the study. The average number of interactions per experimental phase and the type of interactions per experimental phase and the type of interactions for each subject is displayed in Table 3. All of the five subjects received some positive feedback from the coach at some point in the study, with averages ranging from .15 to 5.4 positive instances per session. Only two of the subjects recorded negative interactions with the coach during the baseline condition, and only two subjects showed any negative interactions during a treatment phase. The negative interaction averages ranged from .39 to .71 per session. Interactions with the coach were infrequent throughout all experimental phases, with the lowest number of interactions occurring during the contingent reinforcement phase. During this phase all subjects had zero interactions with the exception of Subject 1 with .79 positive interactions and Subject 4 with .33 positive interactions per session.

Insert Table 3 about here

Social Validation

One section of the social validation questionnaire was completed by the coach. Using a 7 point scale the coach rated the characteristics of the musical reinforcement conditions. All aspects of the procedure were rated positively. The coach rated enjoyment and clarity at a 5 out of a possible 7 points. The same rating was given for the amount of increase he noted in appropriate responding. The coach felt the music made it easier for the swimmers to do the dry land training exercises and he believed that the percentage of talking definitely declined during the musical reinforcement condition. The coach felt he would like to continue with the musical condition at the start of practices, although a greater variety of music was suggested. To date, the coach has continued with music presentation at practice sessions with a greater variety of music being played.

A social validation questionnaire was completed by four of the five subjects. The questionnaire asked the subjects to rate the musical reinforcement condition using a 7 point scale. Characteristics such as, clarity, effectiveness and popularity with the subjects were examined. All of the subjects enjoyed having the music played on the pool deck, with an overall score of 25 out of a possible 28 points, (see

Table 4). Three of the four subjects felt the music condition made it eaier to complete the dry land training and felt they did more dry land training when they knew they could obtain music for their efforts. Subject 3 felt she did not do any

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Insert Table 4 about here

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more dry land training than usual during the treatment phase and had no strong opinion regarding whether or not dry land training was easier with the music. All of the subjects strongly wished to have the music condition continued at practices. Subjects stated they would like to bring more of their own music to future practices. One subject felt that a Walkman would be an improvement over playing the music on deck, however the other subjects preferred the implemented contingent reinforcement condition. Two of the subjects stated they would like to have more specific individual feedback regarding dry land training time usage as well as the music in the future.

Since appropriate behaviors were defined as behaviors having a high probability of improving subsequent athletic performance, baseline and post treatment swim meet times were recorded for further validation of the treatment condition. Both baseline meet scores and post treatment scores were

recorded at meets held at the Pan Am Pool in Winnipeg, Manitoba. Data was recorded for the 100 m Freestyle event and the 200 I.M. event, for all subjects. These events were selected since all subjects competed in these events. Examination of the baseline swim meet times in comparison to the post treatment swim meet scores showed all subjects improved in meet performances (see Table 5). All subjects showed improvement in the 100 m Freestyle event. In the 200 I.M. event Subject 2 and Subject 3 were the only subjects who did not show an improvement in swimming times for this event.

Discussion

The results of this study suggest that the contingent musical reinforcement condition produced improvements in the use of practice sessions. Results indicate: (1) an increase in the percentage of appropriate behaviors emitted per session; and (2) a decrease in the frequency of inappropriate behaviors occurring each session were produced by the independent variable. The subjects and the coach all felt the music presentation made the dry land training sessions more enjoyable as well.

The effectiveness of the independent variable in producing improvements in dry land training time usage was demonstrated by using a reversal replication design. Improvements in dry land training session time usage occurred after, and not before, the introduction of the contingent reinforcement condition with four of the five subjects. All subjects showed large and consistent improvements during the contingent reinforcement phase. These results were replicated with Subjects 1 to 3 by using a second baseline and then the reintroduction of the contingent reinforcement condition.

All subjects improved during the contingent phase but only one subject showed any improvement during any other phase; the noncontingent reinforcement condition. The

improvement was small in comparison to the effect produced by the contingent reinforcement condition. Also, performance improvement began to occur towards the end of the noncontingent treatment phase for this subject. This occurrence suggests that another variable may have been responsible for the performance improvements. The performance inprovement quickly declined when the second baseline phase was introduced. The improved use of dry land training time by other swimmers may have served as a model for this subject and thus explain her improved performance during the noncontingent treatment phase and sudden decline during the second baseline phase. It should be noted, however, that this subject rated the music condition the most favorably out of all subjects during social validation and showed "tremendous" improvements when she could obtain the musical reinforcement during the contingent phase. Music appeared to be a highly effective reinforcer for this subject. Further investigation into the effects of noncontingent musical presentations with similar subjects may therefore be warranted.

Although the contingent treatment condition in this study appeared to be effective for improving dry land training time usage, subjects did spend a lot of time performing concurrent behaviors. The concurrent behaviors

that the subjects emitted were most often behaviors that the coach stipulated for swimmers to complete (e.g., moving the bulkhead, moving the backstroke flags and setting up the time clock). Concurrent behaviors or maintenance behaviors reached percentage levels of 95% during some sessions, leaving little time for appropriate behaviors to occur. The competing of these two behavior types for time during the dry land training period could have been avoided had the coach set the time period strictly aside for appropriate dry land training behaviors. As the data indicate, average rates of concurrent behavior increased and remained slightly higher after the first baseline phase for all subjects. Subjects appeared to reduce inappropriate behaviors and increase concurrent behaviors. Apparently the subjects believed concurrent behaviors were appropriate behaviors to engage in during the dry land training period since these behaviors were required by the coach.

When the average number of concurrent behaviors and average of appropriate behaviors engaged in by each subject during each phase are combined and examined, the results become even more revealing, (see Table 2). Subject 1 engaged in 92% appropriate and concurrent behaviors during the first contingent treatment phase and 94% of these behaviors during the second treatment phase. Subject 2 showed similar high

combined rates, recording 91% and 93% for the phases. Subject 3 showed a slightly lower combined rate with 77% appropriate and concurrent behaviors and 87% during the second treatment phase. Subjects 4 and 5 during the noncontingent reinforcement phase engaged in combined appropriate and concurrent behaviors averages of 72% and 73%. During the contingent treatment phase these combined rates rose to a high of 94% for Subjects 4 and 83% for Subject 5. As this data indicate when concurrent behaviors and appropriate behaviors are examined together, subjects engaged in very little inappropriate behavior.

Data on concurrent behaviors appear inconsistent from session to session. A reason for this occurrence may be that sessions were often attended during the morning and the evening on the same day. Usually the bulkhead was moved by swimmers only during the evening sessions. Moving the bulkhead usually required the participation of all subjects for long periods of time, thus explaining the inconsistent appearance of the concurrent behavior data points. It should also be noted that inappropriate behaviors appeared more freqently during the evening sessions. One plausible explanation is that the subjects often seemed to have little extra energy to spend on socializing behaviors during morning practices since they were not yet awake!!! The most frequent

inappropriate behavior during normal sessions was sleeping which was incompatible with loud music during the treatment phases. Since the bulkhead was usually moved the evening sessions, subjects were required to get together to help in the task. This congregating often led to inappropriate socializing behaviors. It is possible that inappropriate behaviors would have occurred at even lower levels during the contingent phases if concurrent behaviors had been set to occur during a separate time period rather than during the dry land training session.

The performance of Subject 3 warrants further discussion. Throughout this study Subject 3 displayed the greatest percentage of inappropriate behaviors when one particular nonexperimental swimmer was present during practice sessions. All subjects with the exception of Subject 1 appeared to emit more inappropriate behaviors in the presence of this swimmer. The presence of this individual seemed to act as a prompt to other swimmers for inappropriate behavior to begin. It appears that this swimmer was not receiving necessary reinforcement through the sport itself and was considering quitting swimming. The reinforcers available through socialization appeared to be maintaining her attendance at practice sessions, but appropriate behaviors were not being maintained. This had a

definite effect on the behaviors of the experimental subjects. Subject 3 seemed to find socializing more reinforcing than the other experimental subjects. Comments to the coach indicated this subject felt that she did sufficient dry land training and more was not really necessary, especially since she could be engaging in other behaviors during this time. The answers Subject 3 gave to the social validation questions seem to support these comments. Subject 3 felt she did the same amount of dry land training during each session whether music was or was not presented contingently. This attitude may explain why Subject 3 was the only swimmer who failed to reach the reinforcement criterion on more than one session. Overall, however, Subject 3 did show marked increases in appropriate behavior levels and admitted she enjoyed having music played at the pool, and would like to have it continued in the future.

Other social validation results support suggestions made by Schubert (1986). Swimmers indicated that dry land training appeared easier when music was present, possibly due to the constant rhythm. The dry land training sessions became less boring and more enjoyable with the music. Two added benefits of using music as a reinforcer were noted. First of all, the music was not only stimulating during early

morning sessions but was incompatible with sleeping behavior during the dry land training period and coach's absence. Secondly, the loud music made talking between swimmers more difficult during the treatment phase, when the lower rates of socializing were noted.

Since improved swimming times at meets were of primary importance to the subjects in this study, baseline and post treatment swim meet times were recorded. A comparison of baseline swim meet times to post treatment swim meet times indicates that all subjects showed improvement at meets. Performance improvements were to be expected with swimming training, however these results may add further support for the success of the treatment procedures used in this study and the possible contribution to achieved results for the subjects involved.

Results of this study can be discussed from the perspective of previous sport performance literature. As Crossman (1985), indicated, serious problems exist in the utilization of practice sessions. Baseline data from this study supports Crossmans' data, showing poor levels of productivity. In addition to poor time usage this study suggests that a need for a clearer allocation of times for specific behaviors may exist.

The intervention procedures in this study proved

successful in increasing appropriate behaviors, similar to the reversal replication design used by Hume et al (1985). Results indicated that appropriate behavior rates were only maintained when the intervention packages were in effect. The witholding of the intervention packages led to immediate decreases in appropriate behaviors and increases in inappropriate behaviors in both studies. Comparable results were also found by McKenzie and Rushall (1974). Procedures such as self-recording and extensive coach feedback were replaced with the musical reinforcement condition in this study and proved similarly effective. As predicted by Schubert (1986) music can be a valuable reinforcer in the swimming setting. This study supports Schubert's contention and the replication of this study with different sports and different swimming settings may therefore be warranted.

Besides producing large increases in appropriate behaviors and decreases in inappropriate behaviors, this study used positive methods which led to greater reported enjoyment on the part of the participants, a goal strongly emphasized by authors such as Orlick & Botterill (1975). As well, the procedures displayed social validity requirements, as suggested by Kazdin (1977). Relevant individuals, (the athletes and the coach) felt the musical reinforcement condition produced significant improvements through the use

of acceptable procedures. Continuation of the reinforcement condition was desired for the future.

Also, the results of this study suggest that music may be used as a successful reinforcer when contingent on the behavior of a small group, supporting the findings of Heward et al (1984). In this study, physical limitations required the musical reinforcement condition to be presented based contingently on the performance of between 3 and 5 swimmers which represents a small group. Subjects in this study showed that improvements in performance will result even when reinforcement is not based simply on individual performances, as Zander's findings suggested. The generalization of the results are limited to small groups since this study involved six subjects in two groups.

The effect in this study was demonstrated on individuals since each individual had to reach the criterion for the reinforcement to occur. It may also be useful to test the effectiveness of the procedure with individuals using a Walkman to present the contingent treatment condition instead of the pool side music, to see if any differences in performance levels are obtained. Differing results might be noted when individual swimmers are examined without the group contingency condition.

In addition, although both sexes were examined in this

study, all of the swimmers were of similar ability and between 12 and 16 years of age. Therefore,further testing of the effectiveness of the procedures with different age groups and different skill levels may be needed before generalizatiom can be made. The external validity of the study is also limited by the fact that only five subjects were examined.

A number of future studies are suggested by this researcher. First, the study could be replicated using individuals, swimmers of different age groups and swimming abilities. The effects of the intervention could also be studied across other sports such as gymnastics, figure skating and speed skating. Future research could also more closely examine the effects of music, when presented as a noncontingent reinforcer. The results of this study suggest modelling effects lead to improved performance during noncontingent musical presentations. However, further investigations are warranted.

Finally, it would be ideal if musical reinforcement could be presented when the subjects are swimming. To date, the positive reinforcers available once the swimmer enters the water are limited. Advances in technology may soon enable the testing of music as a reinforcer in the presently isolated water setting.

References

Anshel, M.H., & Marisi, D.Q. (1978). Effect of music and rhythm on physical performance. The Research Quarterly, 49(2), 109-113.

Bradshaw, P. (1984, May/June). Motivation through basketball statistics. Coaching Review, 7, 52-54.

Cracklen, C., & Martin, G.L. (1983). Earning fun with correct techniques. Swimming Technique, 20(3), 29-32.

Crossman, J.E. (1985). The objective and systematic categorization of athlete and coach behaviors using two observation codes. Journal of Sport Behavior, 8(4), 195-208.

Crossman, J.E. (1985, May/June). Stop wasting time! Coaching Review, 7, 30-31.

Dickinson, J. (1977). A behavioral analysis of sport. Princeton, New Jersey: Princeton Book Company.

Donahue, J.A., Gillis, J.H., & King, K. (1980). Behavior modification in sport and physical education: A review. Journal of Sport Psychology, 2(4), 311-328.

Epstein, L.H., Wing, R.R., Thompson, J.K., & Griffin, W. (1980). Attendance and fitness in aerobics exercise: The effects of contract and lottery procedures. Behavior Modification, 4(4), 465-479.

Hersen, M., & Barlow, D.H. (1976). Single case experimental designs: Strategies for studying behavior change. Elmsford, New York: Pergamon Press..

Heward, W.L. (1978). Operant conditioning of a .300 hitter? The effects of reinforcement on the offensive efficiency of a barnstorming baseball team. Behavior Modification, 2(1), 25-40.

Heward, W.L., Heron, T.E., Hill, D.S., & Trap-Porter, J. (1984). Focus on behavior analysis in education, Columbus, Ohio: Charles E. Merrell.

Hume, K.M., Martin, G.L., Gonzalez, P., Cracklen, C., Genthon, S.M., (1985). A self-monitoring feedback package to improve freestyle practice behaviors of figure skaters. Journal of Sport Psychology, 7(4), 333-345.

Jernberg, Jr. P. (1982). Using music in swimming. Swimming Technique, 18(3), 37.

Kau, M.L., & Fischer, J. (1974). Self-modification of exercise behavior. Journal of Behavior Therapy and Experimental Psychiatry, 5(2), 213-214.

Kazdin, A.E. (1977). Assessing the clinical or applied importance of behavior change through social validation. Behavior Modification, 1, 425-451

Kazdin, A.E. (1982). Single-case research designs: Methods for clinical and applied settings. New York: Oxford University Press.

Keefe, F.J., & Blumenthal, J.A. (1980). The life fitness program: A behavioral approach to making exercise a habit. Journal of Behavior Therapy and Experimental Psychiatry, 11(1), 31-34.

Kodzhaspirov, Y.G., Zaitsev, Y.M. & Kosarev, S.M. (1988). The application of functional music in the training sessions of weight lifters. Soviet Sports Review, 23 (1), 39-42.

Martens, R. (1978). Joy and sadness in children's sports. Champaign, Illinois: Human Kinetics.

Martin, G.L., & Hrycaiko, D. (1983). Behavior modification and coaching: Principles, procedures, and research. Springfield, Illinois: Charles C. Thomas.

Martin, G.L., LePage, R., & Koop, S. (1983). Applications of behavior modification for coaching age-group competitive swimmers. In G.L. Martin & D. Hrycaiko (Eds.), Behavior modification and coaching: Principles, procedures and research. Springfield, Illinois: Charles C. Thomas.

Martin, G.L., & Pear, J.J. (1983). Behavior modification: What it is and how to do it, (2nd ed.). Englewood Cliffs, New Jersey: Prentice-Hall.

McKenzie, T.L., & Rushall, B.S. (1974). Effects of self-recording on improving attendance and performance in a competitive swimming training environment. Journal of Applied Behavior Analysis, 7(2), 199-206.

Orlick, T. and Botterhill, C. (1975). Every kid can win. Chicago, Illinois: Nelson Hall.

Otto, H. (1970). Human potentialities. Swimming Technique, 7(2), 39-45.

Rushall, B.S., & Pettinger, J. (1969). An evaluation of the effect of various reinforcers used as motivators in swimming. The Research Quarterly, 40(3), 540-545.

Schubert, F., (1986). Psychology from start to finish. Toronto, Ont: Sport Books.

Skinner, B.F. (1957). Verbal behavior. New York: MacMillan Publishing Company.

Smith, G., Editor, (1979). Coaching theory level 1. National coaching certification program manual. Ottawa, Ont: Coaching Association of Canada.

Tutko, T. and Burns, W. (1976). Winning is everything and other american myths. New York: MacMillan Publishing Company.

Vyatkin, B.A. & Dorfman, L.Y. (1980). The impact of music on psycho-motor performance as a function of individual neurodynamics. The Questions of Psychology, 1, 94-100.

Wolf, M.M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. Journal of Applied Behavior Analysis, 11(2) 203-214.

Zander, A. (1971). Motives & goals in groups, New York: Academic Press.

Zander, A. (1974). Productivity & group success: Team spirit vs. the individual achiever. Psychology Today, 8(6), 64-69.

Appendix A

Description of Appropriate, Inappropriate & Concurrent Behaviors

APPROPRIATE BEHAVIORS

1. Specific Practice

   The athletes practise a skill which he/she has been instructed to do by the coach; e.g., practice the motion of swimming strokes on the deck before entering the water, do sit-ups, run laps of the pool.

2. Related Practice

   The athletes perform a physical activity which is directly related to the subject matter; e.g. does push-ups on deck before entering water.

3. Demonstrating

   The athletes perform a skill while other athletes or the coach are watching with the purpose of showing how the skill should be done or pointing out something specific about the skill; e.g., show how to perform the back stroke.

4. Warming Up/Warming Down

   The athlete is either preparing his/her body for the practice ahead by performing various calisthenics and dry land training exercises or is reducing physical activity because practice will soon be terminated.

INAPPROPRIATE BEHAVIORS

1. Unrelated Activity

   The athletes perform a physical activity which is unrelated to the subject matter; e.g., does handstands during dry land training period, practices diving, eats lunch.

2. Inappropriate Activity

The athletes behave in such a way as to interfere with the functioning of another athlete; e.g., stabs other swimmers with pencils, steals other swimmers goggles.

3. Unrelated Interaction

The athletes converse with other individuals about subjects which are not related to the activity; e.g., talks about a date the previous night, asks mother what time it is.

4. Injury

The athlete is injured or hurt while in the athletic environment which results in inactivity; e.g., sprains finger on edge of pool.

5. Exclusion

The athlete leaves the practice area prematurely; e.g., gets a drink of water, answers the phone, etc.

6. Inactivity

The athlete is waiting for his/her turn to perform or waits in line to use equipment; e.g., waits in line to dive into swimming lane.

CONCURRENT BEHAVIORS

1. Responding

The athlete is answering questions from the coach or other athletes which are directly related to the subject matter.

2. Questioning

The athlete is questioning his/her coach or peers concerning a topic directly related to the subject matter.

3. Maintenance

The athlete is arranging equipment for practice; e.g., moves bulkhead into place, gets out flutterboards.

4. Resting

   The athlete is not involved in any physical activity due to fatigue; e.g., sits on floor after running laps of pool.

5. Attending

   The athlete is listening or paying attention to what the coach or other athletes are saying or doing. Attention is directed towards some activity directly related to the subject matter.

6. Instruction

   The athlete is telling another athlete to do something directly related to the subject matter; e.g., "go and get some flutterboards;" "keep your arm straight when you do that."

Appendix B

Description of Research Project for Swimmers and Request for Consent.

I would like to take this opportunity to describe to you a research project we would like you to participate in. The project will be a study of some new coaching techniques that may help to improve the quality of your swimming practices and your enjoyment.

The research will involve data collectors from Lakehead University. These people will be observing your practice sessions and will be helping to record observations which will help us develop ideas to enable you to get more out of your practices. These people will be sitting at the side of the pool during practices and will not be disturbing you while you are swimming.

I believe that it will be beneficial to your swimming if you participate in this project.

Do you have any questions? If not would you like to participate in this project?

Appendix C

Music Survey Questionnaire

Please answer the following questions as truthfully as possible.

1. Do you have your own stereo or radio in your room?___

2. Do you listen to the stereo or radio at least 1/2 an hour each day? If more, how long?____

3. What is your favorite radio station?____

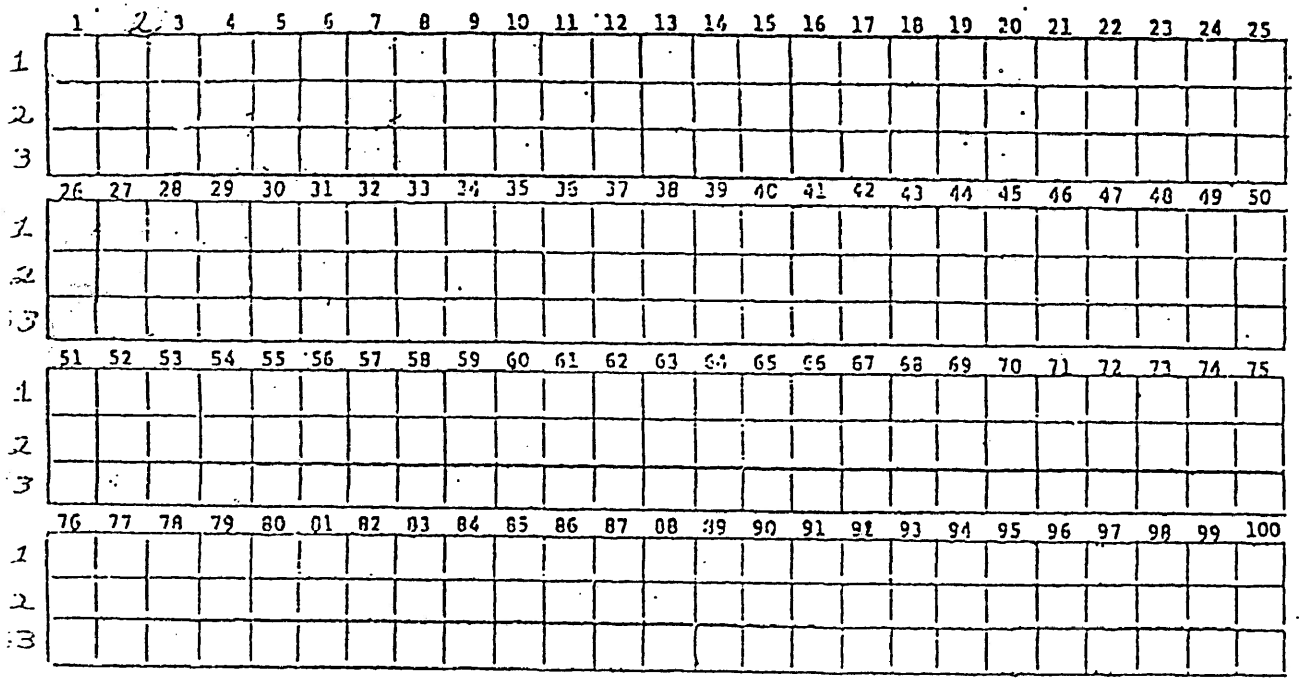
4. What is your favorite type of music. Name 3 favorite albums.

   i.e. Metal for Breakfast

   _____

   _____

Observer_____ Date_____ Start_____ End_____



	Subject 1		Subject 2		Subject 3	
	Frequency	percentage	Frequency	percentage	Frequency	percentage
Specific practice						
Related practice						
Unrelated activity						
Inactivity						
Inappropriate activity						
Responding						
Questioning						
Interaction +C						
-C						
+A						
-A						
Unreliable Interaction						
Instruction						
Attending						
Injury						
Exclusion						
Warm-up/Warm-down						
Maintenance						
Resting						
Demonstrating						

S_1 M F Age ____ Other _____
S_2 M F Age ____ Other _____
S_3 M F Age ____ Other _____

Comments _____

Behaviors

Specific practice	SP
Related practice	RP
Unrelated activity	UA
Inactivity	IN
Inappropriate activity	IA
Responding	R
Questioning	Q
Interaction	I
Unrelated interaction	UI
Instruction	IS
Attending	A
Injury	IJ
Exclusion	E
Warming-up/Cooling down	WC
Maintenance	MT
Resting	RS
Demonstrating	D

Subcodes

positive	+
negative	-
coach	C
athlete	A

IOR

AGREE:
DIS:
TOTAL:

Appendix E

MUSIC EVALUATION QUESTIONNAIRE

NAME:_____

I would greatly appreciate it if you would carefully and honestly answer the following questions. For each of the questions, please circle the number that you consider to be most appropriate. Each number means the following:

1 2 3 4 5 6 7

no or not at all — neutral or no strong opinion — definitely or very much

A) Do you enjoy having music played on deck at the pool?

1 2 3 4 5 6 7

B) Do you think music makes it easier to do dry land training exercises (stretching)?

1 1 3 4 5 6 7

C) Could you hear the music clearly while on deck?

1 2 3 4 5 6 7

D) Could you hear the music at all once you were in the pool?

1 2 3 4 5 6 7

E) Do you think you did more dry land training when you knew you could obtain the music?

1 2 3 4 5 6 7

F) Would you like us to continue to play music at the start of practices?

1 2 3 4 5 6 7

G) Would you prefer to bring your own music?

1 2 3 4 5 6 7

H) Would you prefer to use a Walkman on the pool deck instead of listening to the portable cassette player?

1 2 3 4 5 6 7

I) Would you like it if I were to tell you how well I felt you used your dry land training time each day?

1 2 3 4 5 6 7

J) Does the coach usually encourage you and give you positive feedback (pat on the back) when you really put out a good effort?

1 2 3 4 5 6 7

K) Do you have any other comments or suggestions about the music on deck? Is there anything we could do differently to improve practices?

Table 1

Interobserver Reliability Data

Subject #	Experimental Phase	Percentage of IOR Checks per Phase	Average Percentage IOR Score for Phase	Range of IOR Scores
1	Baseline 1	33	90	85-94
1	Treatment 1	42	89	85-100
1	Baseline 2	29	89	85-93
1	Treatment 1	33	88	82-93
2	Baseline 1	38	87	84-93
2	Treatment 1	33	87	83-91
2	Baseline 2	33	88	87-89
2	Treatment 2	38	88	82-94
3	Baseline 1	27	93	89-100
3	Treatment 1	36	86	78-95
3	Baseline 2	33	90	85-94
3	Treatment 2	38	88	88-91
4	Baseline 1	40	88	84-91
4	Treatment 1	33	88	79-100
4	Baseline 2	33	91	91-91
4	Treatment 2	50	90	82-100
5	Baseline 1	25	89	89-90
5	Treatment 1	43	88	80-100
5	Baseline 2	29	96	91-100
5	Treatment 2	50	87	83-89
6	Baseline 1	50	88	87-90

Note: IOR= Interobserver Reliability

Table 2

Average Percent of Appropriate, Inappropriate and Concurrent Behaviors in Each Experimental Phase For All Subjects

SUBJECT	Behavior	Baseline #1	Contingent Treatment #1	Baseline #2	Contingent Treatment #2
1.	Appropriate	16	50	16	62
	Inappropriate	56	8	39	6
	Concurrent	27	42	44	32
2.	Appropriate	13	44	7	50
	Inappropriate	64	10	47	43
	Concurrent	24	47	47	43
3.	Appropriate	10	41	18	39
	Inappropriate	69	22	50	15
	Concurrent	21	36	32	48

SUBJECT	Behavior	Baseline #1	Noncontingent Treatment #1	Baseline #2	Contingent Treatment
4.	Appropriate	22	22	10.5	61
	Inappropriate	60	28	65	6
	Concurrent	18	50	24.5	33
5.	Appropriate	8	10	6.5	43
	Inappropriate	70	27	66	16
	Concurrent	22	63	27.5	40
6.	Appropriate	22	--	--	--
	Inappropriate	58	--	--	--
	Concurrent	20	--	--	--

Table 3

Average Number of Coach-Subject Interactions Per Experimental Session

	Type of Interaction							
Subject	Baseline #1		Treatment #1		Baseline #2		Treatment #2	
	+	-	+	-	+	-	+	-
1	0	0	0	0	.57	0	.79	0
2	.15	.3	0	0	5.4	0	0	0
3	.39	.39	.23	0	.42	0	0	0
4	0	0	.11	.55	.33	0	.33	0
5	0	0	3.6	.71	1.8	0	0	0
6	0	0	0	0	---	---	---	---

Note: + = Positive Interaction

- = Negative Interaction

Table 4

Music Evaluation Results

Question	Rating Out of a Possible 28 Points
Enjoyment of Music Condition	25
Music Condition Made Dry Land Training Easier	22
Clarity of Music on Deck	23
Clarity of Music in Pool	7
Believed Dry Land Training Session Output Increased With Music Condition	20
Would Like Music Condition to Continue	27
Would Like to Bring Own Music	22
Would Prefer a Walkman	14
Would Like More Specific Individual Feedback on Dry Land Training Time Usage	21

Table 5

Baseline Swim Meet Times and Post Treatment Swim Meet Times For All Subjects

Subject	Behavior	Baseline Time	Post Treatment Time
1.	100m. Freestyle	116.33	110.14
	200 I.M.	311.05	251.97
2.	100m. Freestyle	102.96	102.02
	200 I.M.	238.14	243.85
3.	100m. Freestyle	111.14	110.99
	200 I.M.	257.27	259.03
4.	100m. Freestyle	105.89	105.21
	200 I.M.	233.98	232.95
5.	100m. Freestyle	104.39	101.04
	200 I.M.	232.98	231.97

Figure Caption

Figure 1: Percentage of appropriate behaviors performed by the contingent reinforcement group, Subjects 1-3, during all experimental phases (B = baseline, TC = contingent treatment).

Figure 2: Percentage of inappropriate behaviors performed by the contingent reinforcement group, subjects 4-6 during all experimental phases (B = baseline, TN = noncontingent treatment, TC = contingent treatment).

Figure 3: Percentage of appropriate behaviors performed by the noncontingent reinforcement group, subjects 1-3, during all experimental phases (B = baseline, TC = contingent treatment).

Figure 4: Mean percentage scores for appropriate behaviors performed by subjects 1-6 (S1-S6) during all experimental phases.

Figure 5: Percentage of inappropriate behaviors performed by the noncontingent reinforcement group, subjects 4-6, during all experimental phases (B = baseline, TN = noncontingent treatment, TC = contingent treatment).

Figure 6: Percentage of concurrent behaviors performed by the contingent reinforcement group, subjects 1-3 during all experimental phases (B = baseline, TC = contingent treatment).

Figure 7: Percentage of concurrent behaviors performed by the noncontingent reinforcement group, subjects 4-6, during all experimental phases (B = baseline, TN = noncontingent treatment, TC = contingent treatment).

Figure 8: Mean percentage scores for appropriate, inappropriate, and concurrent behaviors (A = appropriate behaviors, B = inappropriate behaviors, C = concurrent behaviors) for all subjects combined during each experimental phase.

FIGURE 1

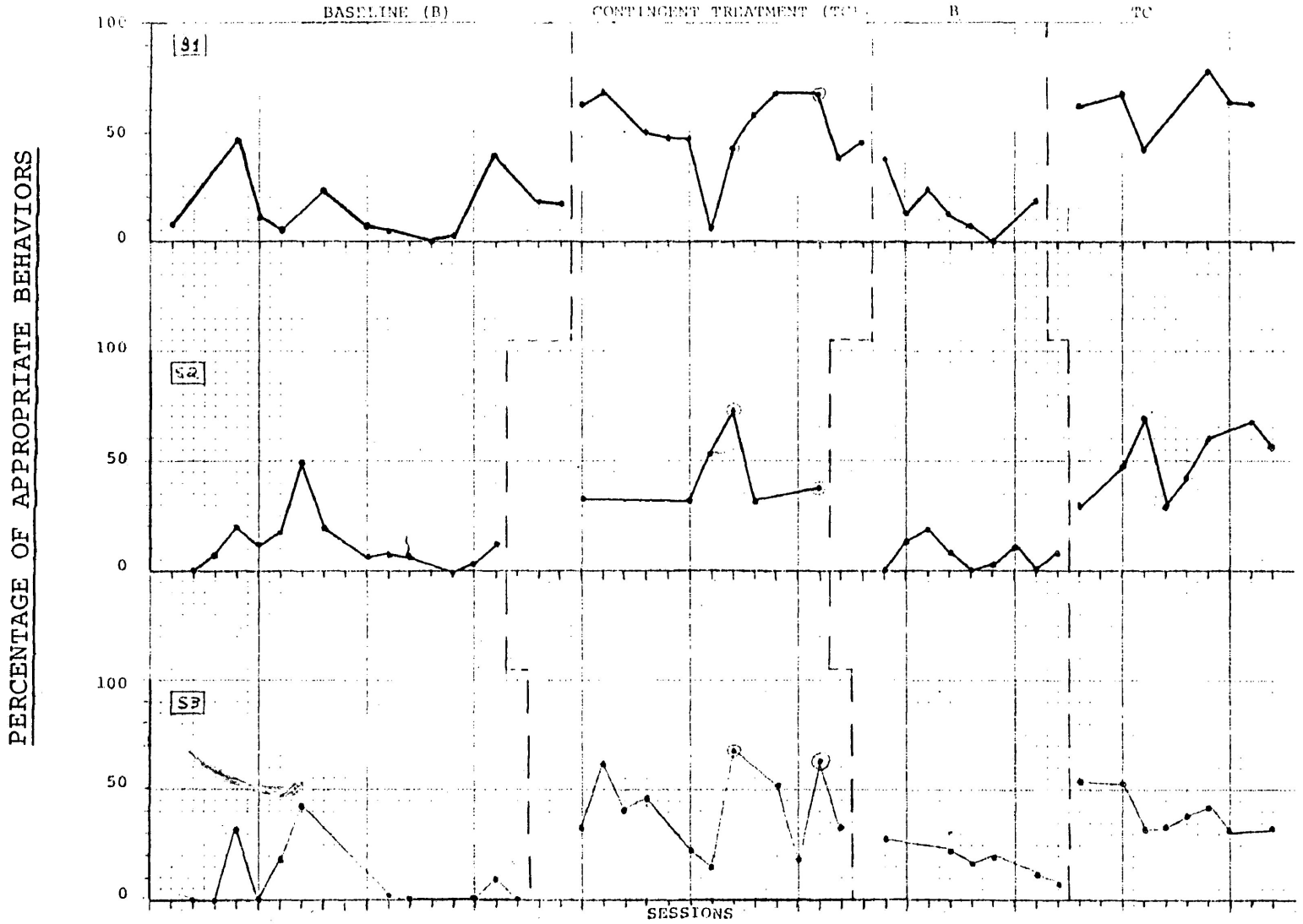
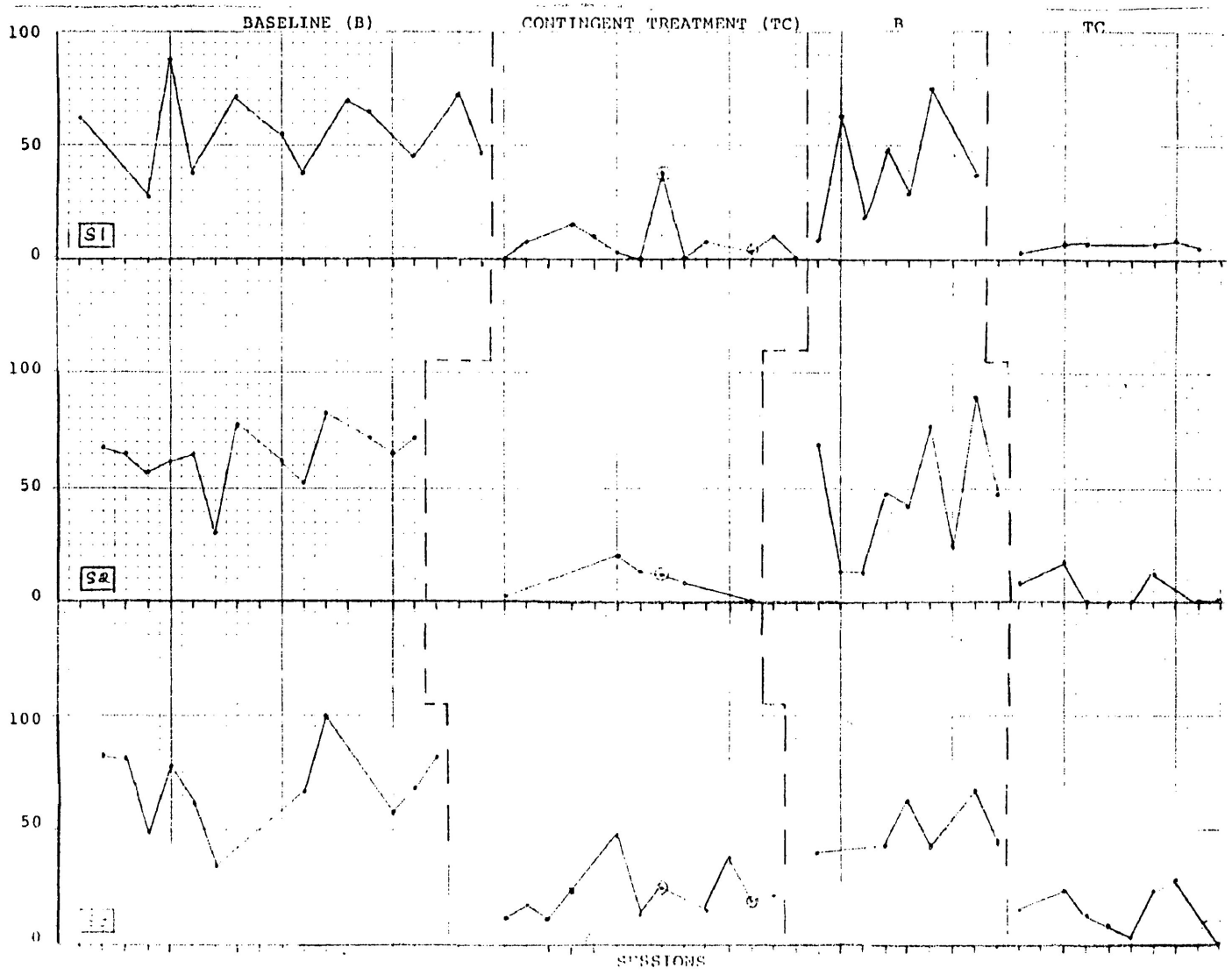

BASELINE (B)
CONTINGENT TREATMENT (TC)
B
TC
S1
S2
S3
100
50
0
PERCENTAGE OF APPROPRIATE BEHAVIORS
SESSIONS

FIGURE 2



PERCENTAGE OF INAPPROPRIATE BEHAVIORS

FIGURE 3

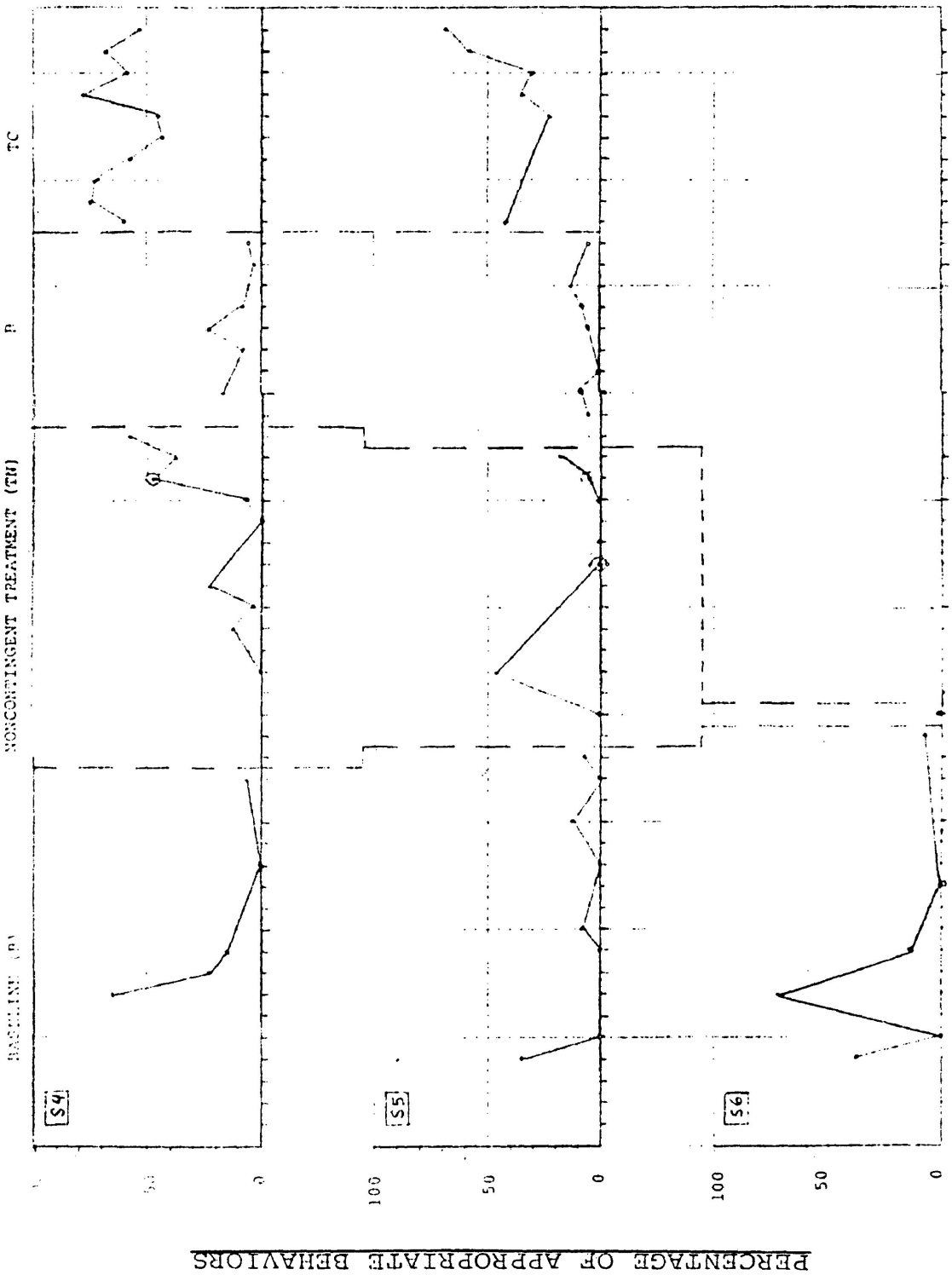

BASELINE (BL)
NONCONTINGENT TREATMENT (TM)
BL
TC
S4
S5
S6
100
50
0
PERCENTAGE OF APPROPRIATE BEHAVIORS
SESSIONS

FIGURE 4

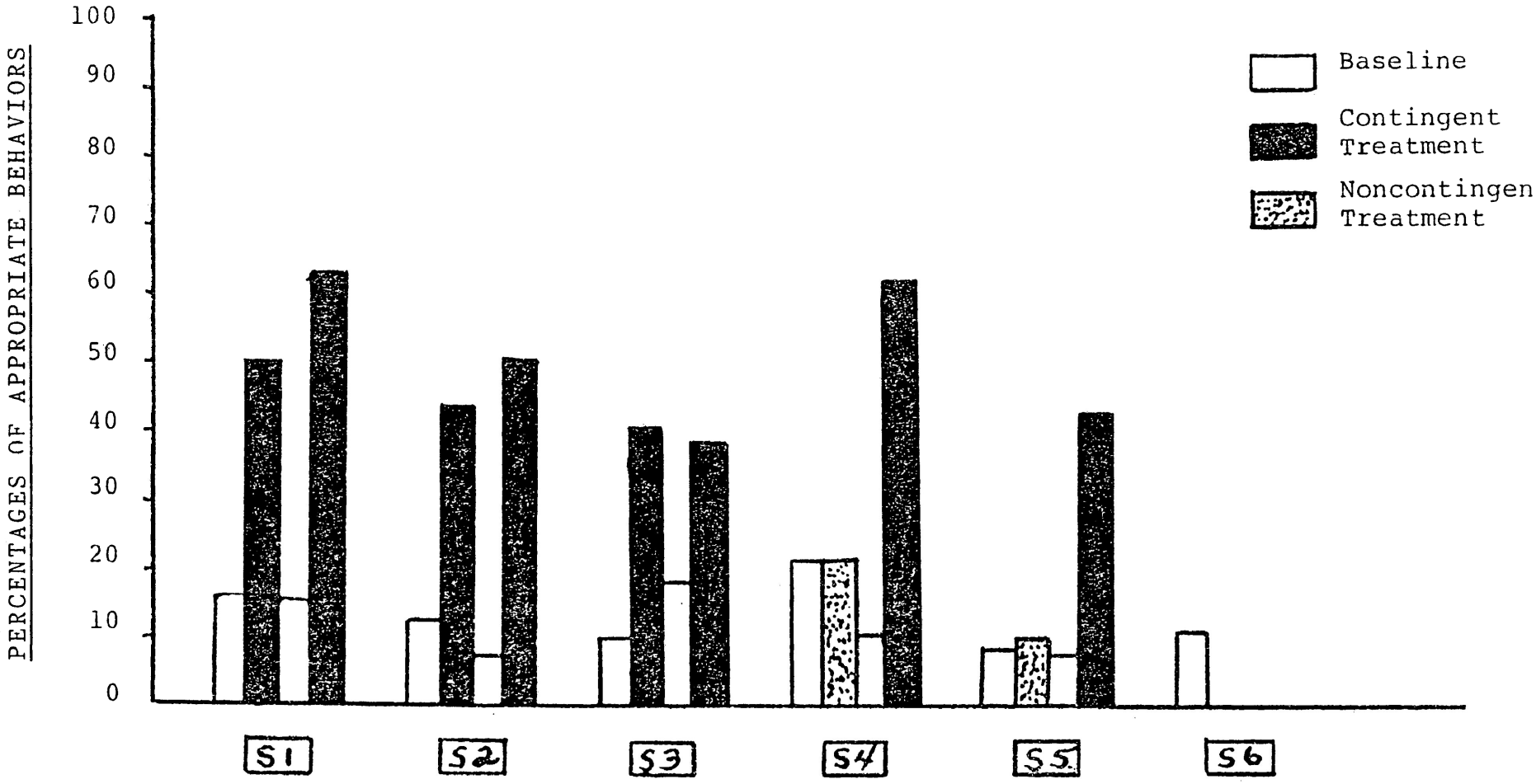

PERCENTAGES OF APPROPRIATE BEHAVIORS
100
90
80
70
60
50
40
30
20
10
0
Baseline
Contingent Treatment
Noncontingen Treatment
S1
S2
S3
S4
S5
S6

FIGURE 5

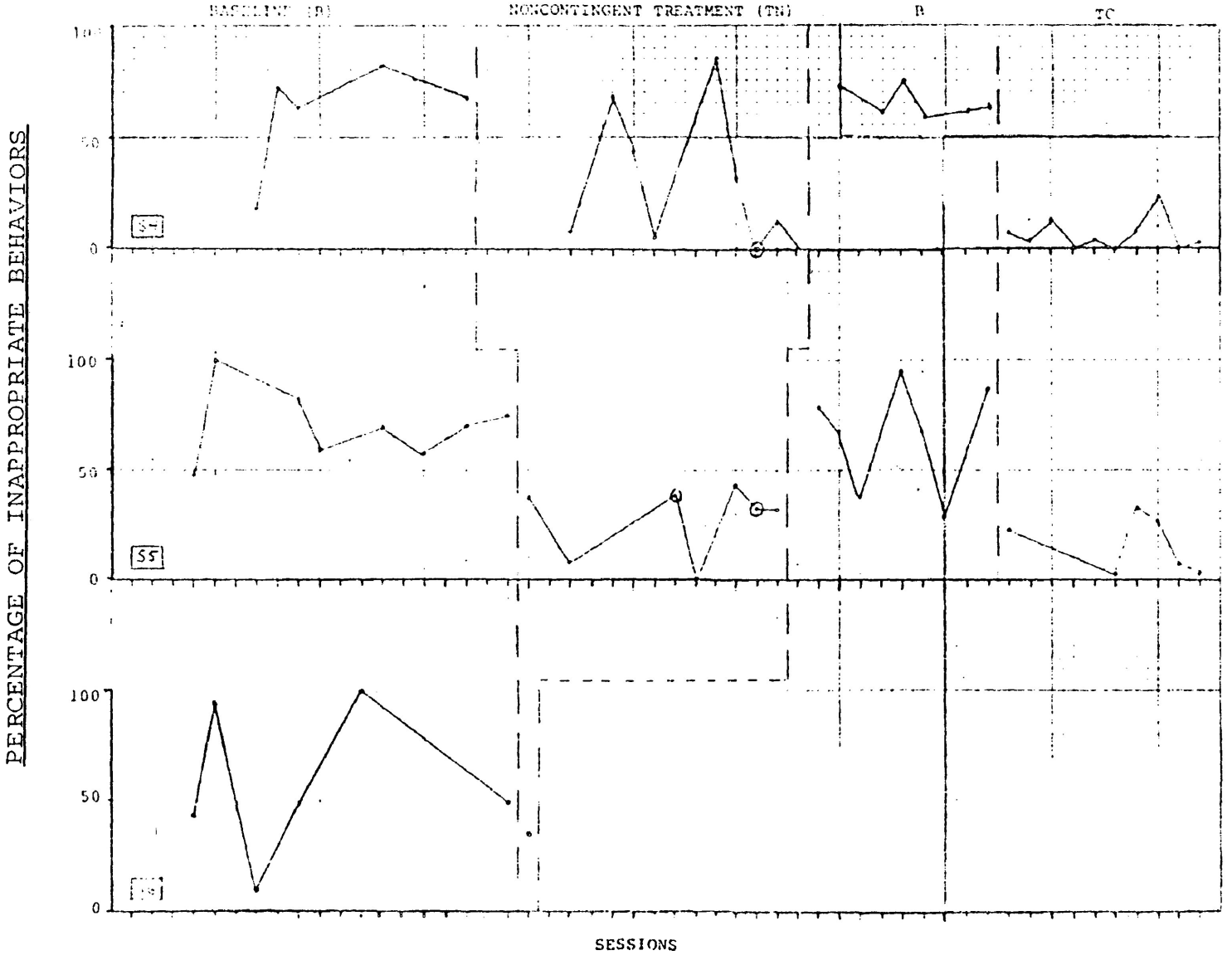

BASELINE (B)
NONCONTINGENT TREATMENT (TN)
B
TC
100
50
0
SE
SS
SB
PERCENTAGE OF INAPPROPRIATE BEHAVIORS
SESSIONS

FIGURE 6

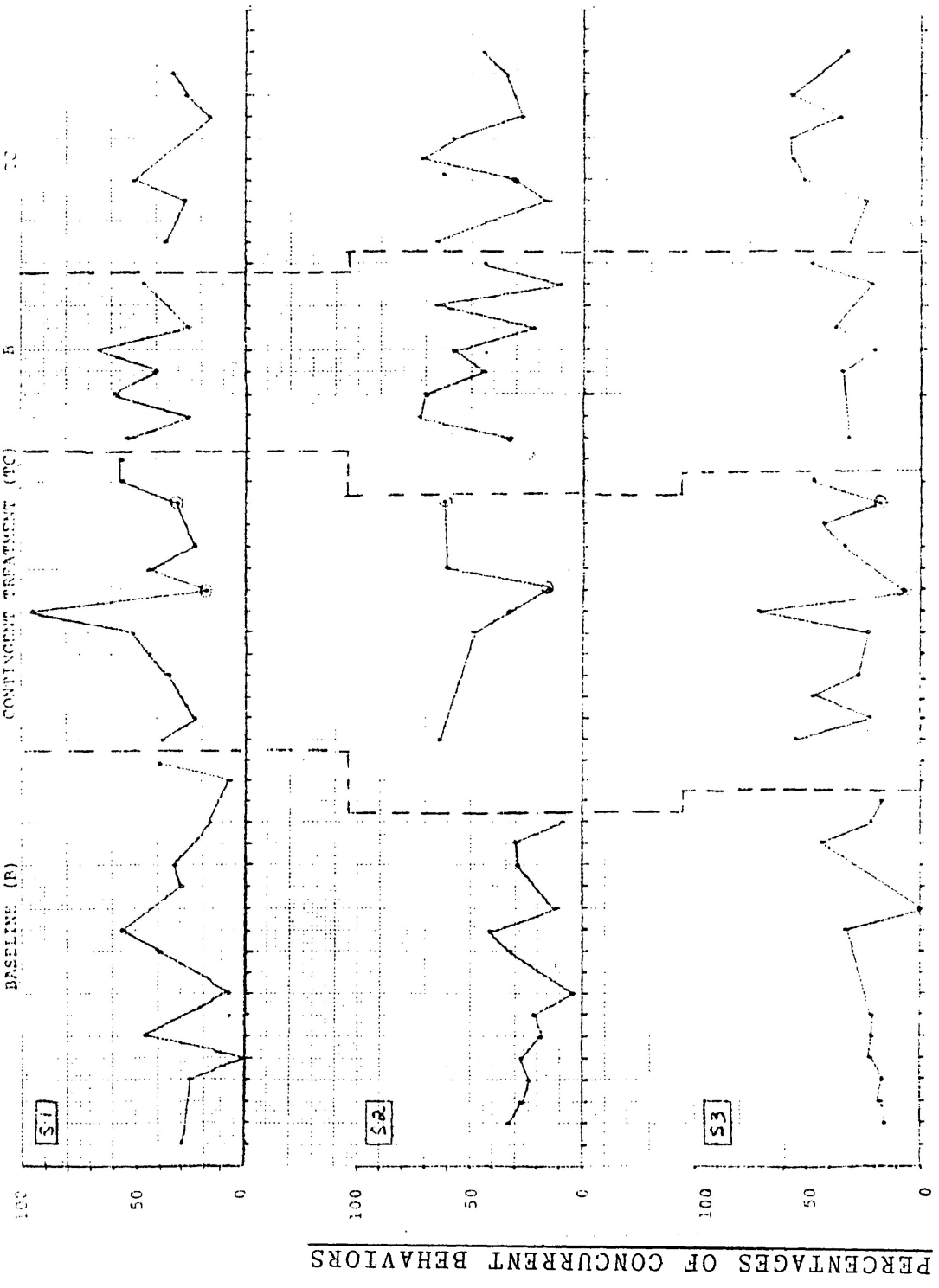

BASELINE (B)
CONTINGENT TREATMENT (TC)
B
TC
S1
S2
S3
100
50
0
PERCENTAGES OF CONCURRENT BEHAVIORS
SESSIONS

FIGURE 7

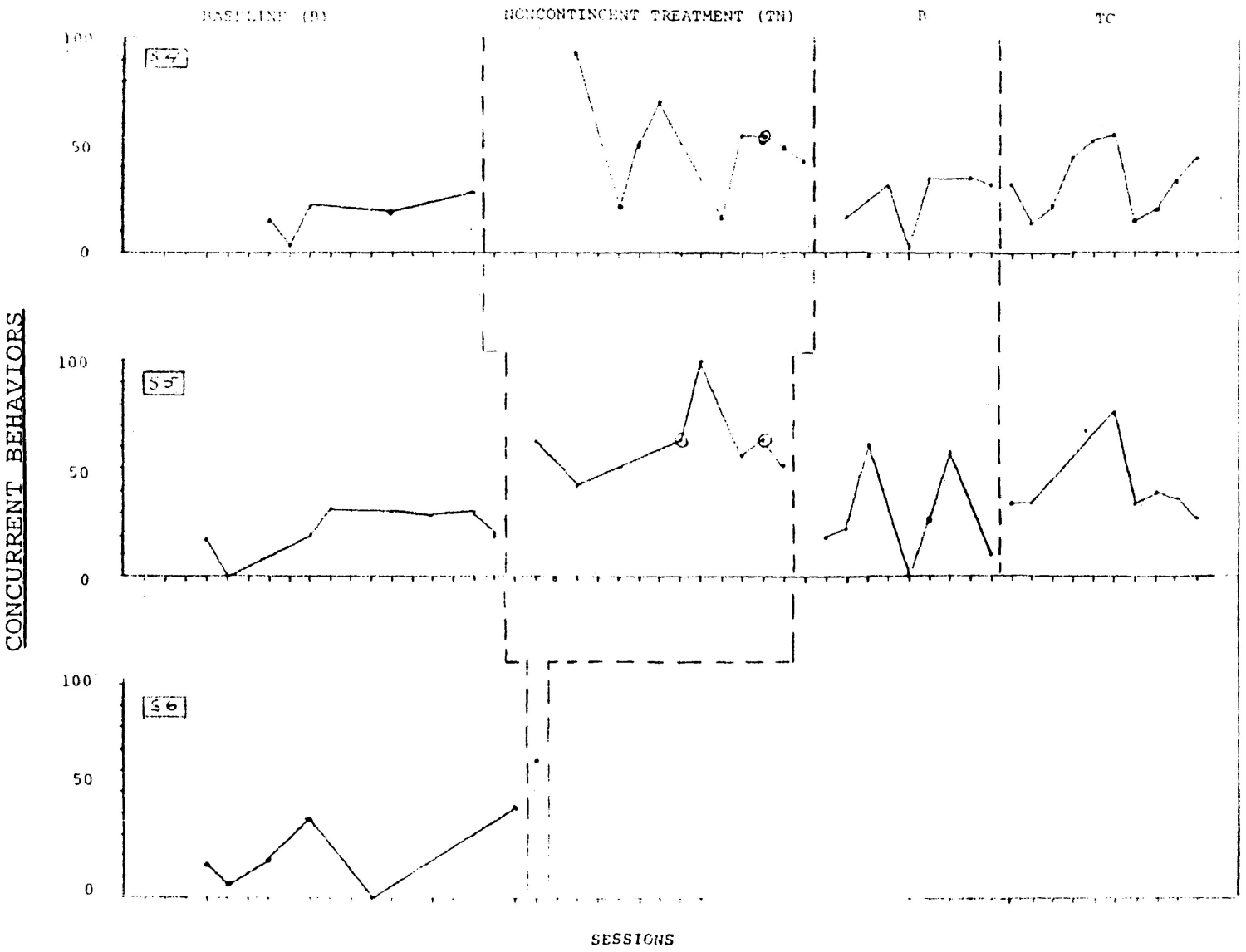
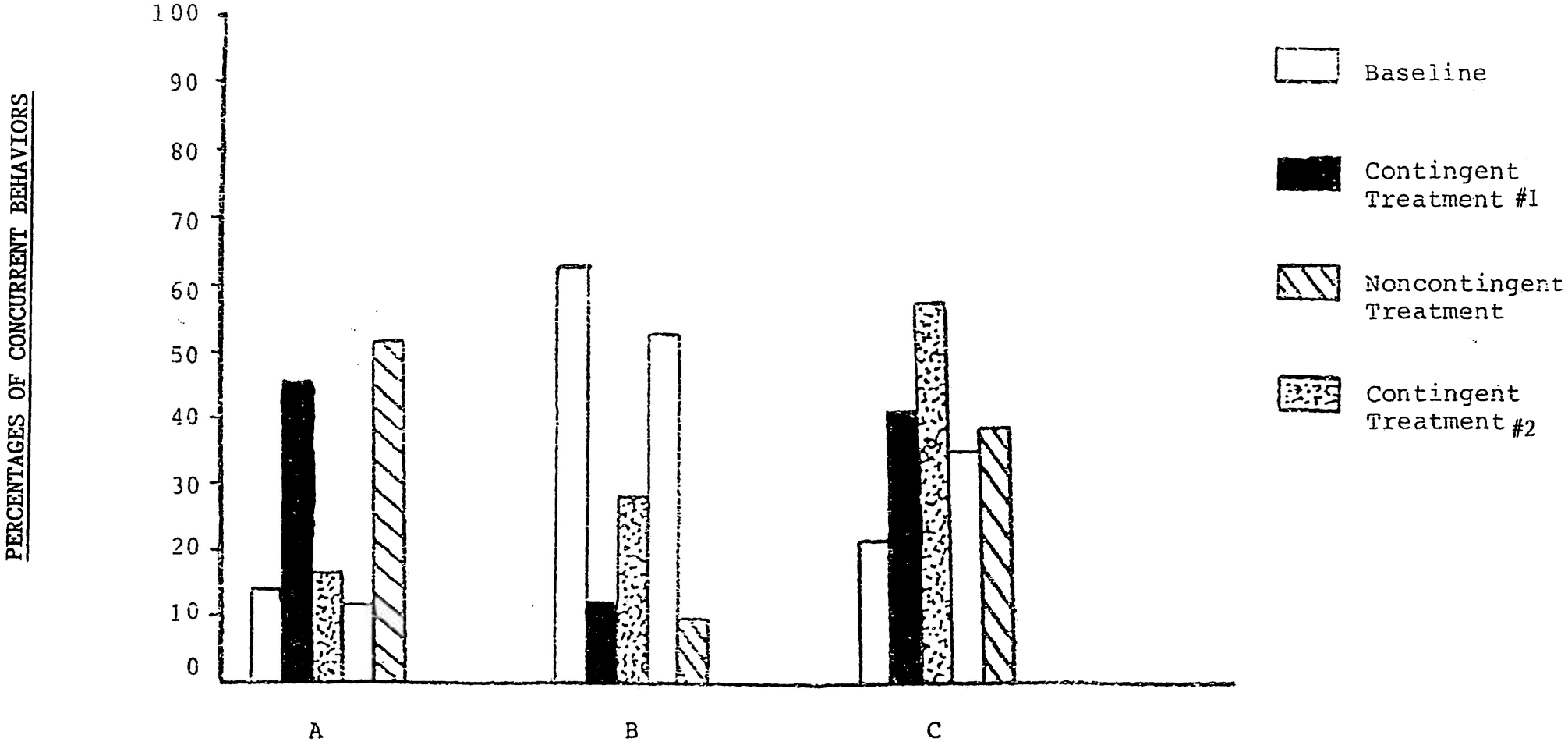

BASELINE (B)
NONCONTINGENT TREATMENT (TN)
B
TC
S4
S5
S6
100
50
0
CONCURRENT BEHAVIORS
SESSIONS

FIGURE 8



A = Appropriate Behaviors

B = Inappropriate Behaviors

C = Concurrent Behaviors