THE EFFECTS OF BEHAVIORAL STATISTICS

ON GAME PERFORMANCES OF SECONDARY SCHOOL

FEMALE BASKETBALL PLAYERS

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TO ANITA & HUNTER

Who accept me for what I am rather than attempting to alter
what I am not. Two individuals whose unconditional friendship,
constant encouragement, and gentle advice are the major
contributing factors to any success I may achieve.

ABSTRACT

This study was designed to assess the effects of integrating
player gathered statistics on players' performance in a senior
secondary school girls' basketball team. The nine subjects ranged
in age from 16-19 years. A multiple baseline design replicated
across behaviors and subjects was selected for the study.
Behaviors tested were; offensive rebounds, defensive rebounds, and
assists for the forwards; steals, deflections, and assists for the
guards. Each player, while on the bench, was required to collect
statistics on a playing teammate. Upon substitution, these roles
were reversed. At the conclusion of the game the coach and team
manager pro-rated the player gathered behavior rates to actual time
played. When the players had finished changing they perused their
game data and established and recorded their personal performance
standards for the next game in their notebooks. At practice between
games, and in warm-ups prior to a contest each player checked her
notebook and reminded herself of her goals. Concurrent feedback was
provided to each individual throughout the games as progress
information toward personal goal attainment.

Of the 26 behaviors tested, 20 altered with respect to increase
in magnitude. The six behaviors not achieving changes in magnitude
according to the pre-established criteria positively altered with
regard to variability. All behaviors altered due to the experimental
intervention. The effect was greater than one would expect by chance
and deemed the method of gathering behavioral statistics, establishing

goals, pro-rating the data, and providing concurrent feedback during a game to be effective for significantly altering behaviors in the subjects of the study.

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Chapter 1

INTRODUCTION

Purpose

The purpose of this study was to investigate the effects of
integrating player collected statistics on players' performances
in a senior girls' secondary school basketball team.

Significance of the Study

A majority of basketball practitioners, coaching at all levels
of the game from novice to professional players, collect statistics
at every game. These coaches believe that such data reflect the
progress of a game with respect to shooting, jump balls, rebounding,
and ball control (Madison, 1978; Thrower & Wyatt, 1977).

A great deal of time, effort, and money is devoted to the
collection and analysis of game statistics. The use of tape
recorders, video tape replay, and computers is common place.
Each year coaches develop new, more sophisticated, and complex
methods to gather and analyze game statistics. One such device
developed by Samarus (1976), virtually requires a degree in
mathematics to analyze and comprehend the data. In order to
accomplish these ends, coaches recruit statisticians and in some
instances pay handsomely for their services. The net results of
these exhaustive efforts is the construction of a variety of charts,
graphs, and percentage columns which provide a mathematical
description of individual and team performance. Many coaches believe
that posting such data in locker rooms and/or gymnasia will provide

a visual picture of each player's performance and in turn motivate him/her to strive for better scores during ensuing contests (Brown, 1978; Browning, 1980; Doll, 1981; Earl, 1980).

On the basis of the game data collected, the coach plans strategy and may reorganize practice sessions which incorporate selected skills and drills. These are intended to improve performance during future contests. Therefore, the coach is utilizing the data as an evaluative tool, as a standard against which to establish both individual and team performance goals, and as a comparative index for future performances.

Although the majority of basketball practitioners insist the collection, analysis, and display of game statistics is vital to a successful basketball program, no one suggests a viable method of assuring that the data become meaningful to the players. Posting statistics on a locker room wall does not assure that the information is read, much less understood. It is conceivable that athletes who read and misinterpret data will arrive at a false impression with regard to their performance. This in turn may result in a performance decrement. Coaches who prefer to discuss game data with individual players may not insure that the athlete comprehends the material in a meaningful fashion. Coaches and athletes do not always perceive performance and its statistical evaluation in the same manner. What may appear perfectly logical and significant to an experienced adult coach may not be meaningful or have any impact on an inexperienced adolescent athlete.

The significance of the current study lies in the fact that it

is a method of focussing the players' attention upon their own game data. It then provides a method of integrating each player's mathematical data with his/her awareness of individual performance in a single game. In this fashion, the data are communicated in a meaningful manner to each athlete. The players then become cognizant, in their own terms, as to the standard of their play. The athlete therefore, participates in evaluating and interpreting his/her own performance and is better equipped to establish performance standards for the next game.

This study is original in the fact that the data gathered will focus on specific behaviors rather than the entire game. Inexperienced, adolescent athletes who are beginning to learn basketball may find focussing their attention on total game behavior too difficult and thus become confused and be unable to gain meaningful knowledge from game statistics. In addition, it will measure the effect of specific behavior statistics on players' performances.

The current study reduces the number of non-playing personnel. Therefore, the coach is alleviated of the responsibility of recruiting and supervising such individuals.

In summary, the current study is significant because it is an original method of statistics collection. The players, not an external source, will gather the data. It is a method of integrating these player gathered statistics to focus the players' attention on specific game behaviors and thus makes the data more meaningful. The effects of this procedure on game behaviors are thus evaluated in this study.

Delimitations

This thesis was delimited to using as subjects, senior girls secondary school basketball players aged 16-19 years.

A second delimitation was the ability of the athletes to be able to collect game statistics accurately and reliably. In addition, this study was delimited to the ability of team members to utilize collected game statistics in a meaningful manner.

Unavoidable interventions included games which were postponed or rescheduled, injuries and illnesses which occurred to the subjects, and audience effects.

The investigative period was 15 weeks in duration commencing November 25, 1983 and terminating March 2, 1984.

Limitations

All subjects participated on a voluntary basis.

The research instrument was based on a player recording and information presentation procedure. The reliability and validity of the results were directly dependent upon the honesty and accuracy of the players who were recording the data and the self-awareness which each player possessed to establish realistic and achievable performance standards.

This study was limited to one basketball season, therefore, time may not have been sufficient to arrive at stability in observations; nor could results be generalized in a meaningful fashion to other athletes. The study focussed on the affects of the procedure used rather than the characteristics of the subjects.

Definitions

Control of the Ball. A player is in control when he/she is
holding a live ball or dribbling it. A team is in control when a
player of the team is in control and also while a live ball is being
passed between teammates. Team control continues until; the ball is
in flight during a try for goal; or an opponent secures control; or
the ball becomes dead. There is no team control: during a jump ball;
during a throw in; during the tapping of a rebound; or after the ball
is in flight during a try for goal. In these situations team control
is re-established when a player secures control (Official High School
Basketball Rules 1983-1984).

Assist. An assist occurs when a player passes the ball to a
teammate who completes a successful attempt for a field goal thus
scoring two points. An assist also occurs when a player passes the
ball to a teammate who misses an unhindered lay up or when a player
passes the ball to a teammate who is fouled in the act of shooting
and consequently fails to score a field goal.

Basketball Statistics. Basketball statistics are the quantitative
data gathered as a direct result of observation of the individual
player's game behavior. When analyzed and interpreted these numerical
data may be presented to the athlete to provide a meaningful
description of performance.

Bench Player. A bench player is a player named on the team roster
who is not actively participating in the game. This player may or may
not be a starter.

Defensive Rebound. A defensive rebound occurs when a player uses his/her hands to acquire control of the ball after it ricochets from the backboard or basket ring of the opponent's basket after an unsuccessful attempt for a field goal or free throw.

Deflection. A deflection is any form of batting, hitting, or touching the ball which is in the control of an opponent such that it goes out of bounds or is acquired by a teammate.

Field Goal. A field goal occurs when a player scores two points by throwing (shooting) the ball into his/her own basket. This act may be performed by any player from any position on the floor.

Goal Setting. Goal setting is the establishment of a specific standard of proficiency or performance such that it becomes the aim or objective of an action or behavior.

Non-Starter. A non-starter is a player named on the team roster who is not actively participating in the game at the onset of play starting with the centre jump at the beginning of the first quarter of a basketball game.

Offensive Rebound. An offensive rebound occurs when a player uses his/her hands to acquire control of the ball after it ricochets from the backboard or basket ring of his/her own basket after an unsuccessful attempt for a field goal or free throw.

Starter. A starter is a player named on the team roster who is actively participating in the game at the onset of play starting with the centre jump at the beginning of the first quarter of a basketball game.

<u>Steal</u>. A steal is any form of batting, touching, or hitting the
ball, which is in the control of an opponent, such that the player
performing the act gains control of the ball.

Chapter 2

REVIEW OF LITERATURE

Goal Setting

The concept. Research relating to goal setting behavior can be traced to the early work of Kurt Lewin (Widdop, Note 1). Dembo (1931), a student of Lewin's introduced the term level of aspiration, which refers to the goals an individual sets for himself. Frank (1935) defined level of aspiration as the level of future performance on a familiar task which an individual, knowing his level of past performance in a task, explicitly undertakes to attain. He introduced a quantitative technique for assessing level of aspiration. It involved informing male subjects of their performance on a preceding task and subsequently asking them to state how well they expected to perform on the next trial. Experiments similar to those performed by Frank were popular from 1930-1950.

Singer (1980) defined level of aspiration, or expectation, as the establishment of a goal. It denotes an attitude toward a task. It also indicates a level of reality; that is, whether the goal is consistent with prior success, actual present achievement, and/or ability. Level of aspiration therefore is an aspect of motivation concerned with goals. To form a goal an athlete must understand what he/she expects and establish standards of performance (Sheeran, 1976).

After the initial work, from 1930-1950, level of aspiration received little attention until industrial psychologists became interested in this area as a motivational tool. Current literature

reveals a renewed interest and a change of nomenclature. The term

level of aspiration has been replaced by the term goal setting.

Kleinkopf (1977) emphasized the importance of goal setting in

athletics when he stated, "the establishment of specific goals is

perhaps the most important personal decision an athlete must make.

Once a concrete, worthwhile goal is planted in an athlete's mind he

is on his way to success because he knows exactly where he is going".

Without a clearly defined, decisive, and attainable goal, all other

principles become meaningless (LaRose, 1982).

A simple process of goal setting with athletes can do a great

deal to clarify issues and avoid many problems which can arise when

there is confusion, misunderstanding, or discrepancies (Botterill, 1979).

With specific reference to basketball, McMahon (1981) stated that goal

setting cannot only improve individual work output and motor skills

but also significantly contribute to winning games. If done properly

there is no limit to the heights that can be achieved (Sheeran, 1976).

It would appear therefore that goal setting is crucial to success in

any endeavor including athletics (McClements & Laverty, 1979).

The literature very clearly states the importance of goal setting.

In order to pursue this method of performance enhancement coaches must

be fully aware of what goals are, and the criteria for establishing

goals with their athletes. Sheeran (1976) identified four types of goal

setting.

The first technique does not require the coach to say anything.

Sheeran considers this the most unacceptable method of establishing goals

in that it forces the athlete to set his/her own goals or lends weight

to goals that have been set for him/her by parents, peers, and significant others.

Negative feedback constitutes the second method of goal setting. The coach employs criticism based on the athlete's previous performance. This form of verbal punishment is used in the hope that the athlete will try harder. However, establishing goals in this fashion also proves to be inadequate in the fact that it increases the athlete's level of anxiety. High levels of anxiety have been shown to produce a performance decrement (Rushall, 1979).

The third technique for establishing a standard of performance is the use of qualitative goal setting. This procedure does not establish specific goals but rather encourages the athletes to do their best. 'Do your best' goals are a commonly used means to motivate athletes. They appear to be more successful and less threatening than either of the previously mentioned techniques. However, studies by Bavilas and Lee (1978), and Locke, Shaw, Sarri, and Latham (1981), indicated that 'do your best' goals are not as effective as quantitative goal setting.

Quantitative goal setting is the fourth technique. It provides the most incentive to produce the best performance due to the fact that it uses specific levels of achievement. Obtaining six defensive rebounds in a basketball game is an observable behavior in which a specific goal has been set. Establishment of specific levels of achievement places each athlete's goal on a highly personal basis, specifically identifies the desired outcomes, and forces the athlete to plan how he/she will accomplish this goal (Sheeran, 1976). It would

appear that quantitative goal setting is the best technique to use in a sporting environment.

The competitive sporting environment should be structured to provide athletes with the opportunity to satisfy their particular goals of excellence, affiliation, sensation, and success (Wood, 1980). To achieve this end the established goals must meet a number of criteria. They must be explicit, of sufficient difficulty to challenge the performer, but realistic enough to be achieved (Bird & Brame, 1978; Kanfer, 1974; Maivdsley, 1978; McClements & Botterill, 1978). Explicit goals leave little to chance. The more clear and detailed the goal the greater the tolerance of fatigue and distraction. Goal attainment is more likely to be enhanced when an athlete knows what to achieve and how to achieve it through the use of a detailed, planned competition strategy (Dimitrova, 1970). Therefore, the athlete is cognizant of what he/she is striving for and will be more prepared for the task at hand. An unhealthy situation occurs when too many successes or failures are experienced by an individual. Hence, it is desirable to have an approximate relationship between 'hoped for' performance and actual performance (Singer, 1980). When goals are set too low they are easily achieved and do not provide a target to aim for. Therefore, they lose their significance and their ability to improve performance. Both training and competition goals should possess a high probability for achievement. Unrealistically high goals will result in failure. When failure is imminent performance deteriorates (Dimitrova, 1970).

Setting realistic and high goals can serve as an incentive in itself. If, in the athlete's own terms, he/she is successful, the

goal becomes an end in itself. Thus, losing and the consequent fear of failing to meet some absolute standard are robbed of some of their devastating effects. The pressure to win can be removed when the athlete aspires to, and expects high level participation (Alderman, 1974). Constant failure to achieve the desired outcome may result in the athlete giving up. It must be remembered that unrealistic goals can be adjusted up or down should frustration or complacency be exhibited (Rushall, 1979). The skill level of the athlete, as well as the desire to improve, as demonstrated by high but attainable goals, describes an important consideration in the learning process (Singer, 1980). Challenging and attainable goals will provide a realistic appraisal of the athlete's performance (Maivdsley, 1978).

Success may be divided into two components; effort and performance. Every coach is aware of athletes who have fallen short of their potential. Sometimes this is the result of unreasonable goal setting. Other times athletes fall short of their goals because either they did not realize and generate the effort necessary to achieve their goal, or they were unwilling to do whatever was required to achieve it (McClements & Botterill, 1978). Therefore, in order to alleviate this problem, one should set a series of objective, measurable goals and evaluations.

Goals must be performance related. Rushall (1979) stated that this allows them to act as performance guidelines and for performance evaluations. He suggested that the basic factors used in setting performance goals are the individual's long term goals, the individual's current level of expertise, and the number of seasons required to achieve these ends. McClements and Botterill (1978) concurred with

Rushall's statement when they wrote that one should use all three factors to set reasonable and attainable short term goals. Short term goals do not ascribe to a definitive time line. They are directly dependent upon the athlete's expectations of his/her own performance and the level of expertise at which the player desires to compete. In this light short term goals may be seasonal, bi-weekly, weekly, a single game, or a game segment. Dimitrova (1970) found that frequent indications of progress toward a final, long term goal led to a higher probability of achievement. Therefore, it appears that frequent indications of performance progress in the attainment of immediate, short term goals maintains positive, motivated efforts in achieving the long term goal.

Wherever possible one should establish multiple goals. Although a performance outcome may be singular, that is, the height jumped, the time run, or the number of rebounds gained, the interpretation of the results of a performance can be many and varied (Rushall, 1979). Performances are enhanced when the final evaluation indicates the possible attainment of a number of positive outcomes (Atkinson & Rutman, 1956, cited in Rushall, 1979). Thus, a basketball game could be evaluated in terms of winning or losing, rebounds gained, field goal shooting percentage, assists, steals, deflections, free throw shooting percentage, plus many more interpretations. However, the point to be made here concerns the fact that multiple goals indicate that a variety of outcomes may result from a single performance.

Multiple goals are especially important for teams. Team performance, both intermediate and final, can be augmented with performance goals,

both intermediate and final, for each player (Forward and Zander, 1971, cited in Rushall, 1979). The setting of multiple goals will allow the athlete to identify objectives and aid him/her to evaluate overall performance. Through goal setting the team becomes united in its efforts to achieve goals on both an individual and team basis (Hill, 1979). If the outcome of a team's effort is positive, a re-setting of those goals is possible for the ensuing performance. If the team goals are not achieved then individual player analysis should be undertaken rather than admonishing the team (Rushall, 1979). In this fashion the game still has some positive outcomes for all concerned.

Team goals must be accepted by everyone involved and be related to all parts of the organization (Rushall, 1979). It is imperative that they reflect overall team aims and status and meet with approval from the coaching staff, athletes, parents, and administrators. When team goals do not meet with parental consent the athlete will not receive the necessary family support to help him/her fully contribute to the attainment of team goals. If an athlete's parents are in open opposition to team goals this player will find him/herself in conflict between the wishes and desires of the team and parents. This may nullify the effects of goal setting and may in fact produce a performance decrement. Therefore, team goals must be pre-planned and determined in some social context (Rushall, 1979).

Performance. In a study concerned with the relationship of intention to level of performance Locke (1966) observed a linear relationship between intention and actual level of performance. Locke found that higher levels of intended achievement resulted in higher

levels of performance. Motoividlo, Loehr, and Dunnette (1978) designed a study in which 175 university undergraduates solved mathematical problems under one of three conditions of objective probability of task success and one or two conditions of goal specificity. They demonstrated a curvilinear relationship between objective probability of task success and performance in both goal conditions such that maximum performance occurred at the intermediate probability level. In support of Locke's (1966) findings, Motoividlo et al. (1978) found an overall positive linear relationship between subjects' expressed subjective probabilities of success and performance.

In a comparison study, Locke and Bryan (1966) found that individuals, who established high standards and difficult goals, produced significantly better results than individuals who were simply asked to do their best. In support of Locke and Bryan's conclusions, Barrett (1979) found that university archery students, who recorded specific goals on a printed goal setting form, achieved significantly higher scores than students who did not set goals. The results obtained by both Locke and Bryan (1966), and Barrett (1979), are further emphasized by Vanderstock (1970). In an experimental study involving teaching swimming to college level beginners he concluded that an individual's level of aspiration is a significant indicator of performance.

Goal setting increases work output as much as 50% over that achieved when no goals are set. Where goals are not established athletes will produce efforts which do not facilitate maximal adaptation. Thus, better athletic training efforts will be achieved

when performance goals and evaluations are provided for each training item. A similar effect occurs for competition (Dimitrova, 1970, cited in Rushall, 1979). This is especially true in athletic competitions where one experiences severe fatigue or other aversive circumstances. During such events there is a stage where an athlete questions continuing at the present constant level of effort. Dimitrova termed this 'a stopping wish'. Such a phenomenon usually occurs after 80-85% of the activity has been completed, independent of the work goal. The goals which have been set for this performance should be such that, even though fatigue is evident, the probability of achieving the goal is high. When goals are established in this fashion the athlete is aware of a schedule and the procedures for continuing are clearly formulated as a detailed performance strategy (Dimitrova, 1970, cited in Rushall, 1979).

Locke, Shaw, Sarri, and Latham (1981) reviewed all the literature from 1969-1980 regarding goal setting and task performance. Their search revealed that 90% of all studies reviewed reported that specific, challenging goals led to higher performance than easy goals, 'do your best' goals, or no goals. Goals affect performance by directing attention, mobilizing effort, increasing persistence, and motivating task performance when the goals are specific, sufficiently challenging, the subjects have adequate ability, and ability differences are controlled.

Feedback. Botterill (1977), Cox (1972), and Kiesler (1971) have all expressed the opinion that very explicit goals and intentions can have a considerable impact on the motivation, commitment and

performance of individuals. Measurable goals can be used as check points for the athlete's progress. In addition, the establishment of multiple goals will allow the athlete to identify objectives and aid the player in evaluating overall performance. Maivdsley (1978) reaffirmed these opinions when he stated that setting a goal acts as a high incentive. Hence, doing well becomes as important as the consequences of doing well. It is therefore apparent that both individual and group motivation can be augmented through a systematic program of realistic goal setting and contingent reinforcement (Bird, 1978; Oxendine, 1968).

Intrinsic motivation may be considered as task motivation or task reasons. The intrinsic individual performs for the reward inherent in the doing (Garvie, 1980). Intrinsic rewards are derived directly from participation and performance in the activity. They are a function of the individual's attitudes, orientations, and perceptions toward the sport. Athletes continually rate actual performance against internal standards of excellence. The highly motivated athlete consistently modifies and escalates his/her internal standards (Chellandurai, 1981). Constrastingly, extrinsically motivated persons perform for results external to the doing. They focus their attention on gaining some associated return but not on the task action itself (Garvie, 1980). Such a focus may not be relevant to, and may contradict intrinsic immediate goals.

Feedback is the information that an individual receives as a result of a response (Kamal & Gallahue, 1980). It is essential for improving motor performance because the performer discovers whether an

action was performed as intended (Rothstein, 1981; Rotter, 1966).

Feedback serves three functions. It supplies information, reinforcement, and motivation to an individual regarding his/her performance. Kamal and Gallahue (1980) have differentiated between intrinsic and extrinsic feedback, and between concurrent and terminal feedback. Instrinsic feedback is provided to a performer as a result of the task itself. Intrinsic concurrent feedback consists of sensory information gained from the task itself and is supplied during the performance.

Extrinsic feedback is provided to the performer by an external source. Verbal cues from a teacher/coach, or a video tape replay, are two examples of extrinsic feedback. Extrinsic concurrent feedback concerns information supplied from an outside source during the performance.

Terminal feedback is supplied after a performance. Therefore it is logical that intrinsic terminal feedback occurs as a normal consequence of the performer's actions, while extrinsic terminal feedback is supplied after a performance by an outside source (Kamal & Gallahue, 1980). Terminal feedback may be in the form of knowledge of results and/or knowledge of performance. Knowledge of results provides information about the discrepancy between planned movement and actual movement. Knowledge of results is most effective when applied to an open skill such as basketball. Knowledge of performance is best suited to closed events such as shot put, discus, javelin, and gymnastics routines.

Cummings, Schwab, and Rosen (1971), in a study designed to investigate the impact of past performance and several knowledge of

results conditions on the levels of goals set, manipulated the type of knowledge of results provided to subjects. The results demonstrated that correct knowledge of results significantly increased goal levels above those generated by no knowledge of results. Incomplete knowledge of results had no significant effect on the level of goals, while erroneously low knowledge of results led to a performance decrement. These authors concluded that the greater the level of previous performance the higher the levels of goals established for future performance.

Locke and Bryan (1968) demonstrated how goal setting and knowledge of results are interrelated. Goal setting alone can affect performance; however, knowledge of score cannot. This suggests that, in cases where knowledge of results is experimentally manipulated, it will affect performance only, if and to the extent, it affects goal setting.

In opposition to Locke and Bryan, Erez (1977) stated that detailed feedback is a necessary characteristic for goal setting to affect performance. In order to accomplish this it must be related to the goals of both the coach and athlete. Rushall (Note 2) concurred that feedback is the one skill which coaches must use in order to be effective. However, he also provides evidence that it is one of the more poorly used skills in coaching. If Rushall is correct in his position then coaches are ignoring, or misusing, a great evaluative tool. Goal evaluation is a form of feedback. This in turn serves the function of reinforcement (McClements & Botterill, 1978; McClements & Botterill, 1981). It should be provided in the form of knowledge of results, the benefit of which is contingent on the desire of the individual to use

the feedback to compete against his/her own score or the score of others (Singer, 1980). Feedback, therefore, must be provided to show progress in relation to the goal.

Self-directed goal setting. Self-directed goal setting occurs when an individual establishes a specific standard of proficiency or performance for him/herself. This standard then becomes the aim or objective of the individual's action or behavior. A change in behavior should occur as a consequence of self-directed goal setting. Hence, self-directed change entails an individual working to alter his/her own behavior, thoughts, or feelings, to bring them closer to a self-established goal (Kolb, Winter, & Berlew, 1968). Successful self-directed change is motivated by an awareness of the cognitive dissonance created when an individual commits him/herself to a valid goal which is viewed as different from the present behavior (Kolb, Winter, & Griffith, 1968). When an individual is committed to a valued goal he/she is recognizing a discrepancy between actual and desired behavior.

The most effective change method is one in which the individual feels that he/she, and not some external agent, is responsible for the changes which occur (Kolb et al, 1968). A study by Locke, Bryan, and Kendall (1968) lends credibility to this statement. Their findings concluded that self-set goals were superior to experimenter set goals when the goals were appropriately difficult and specific.

Behavioral changes are greatest and most enduring when the individual perceives that he/she has fully chosen, and controls, any alteration in in his/her point of view. Successful change is a function of one's ability to maintain an awareness of the dissonance between one's ideal

self and one's current self (Kolb et al, 1968). This intrinsic concept
was supported by Singer (1979) when he stated that intrinsically
established goals, rather than externally imposed goals, better serve
this end in the fact that they are the result of the individual's self-
perception and thus will be more enduring.

Self-directed change and goal setting are very important in the
sporting environment. Athletes, by their very nature, are people who
are high in their desire for achievement. Such individuals have some
belief in their own ability or skill to determine the outcome of their
efforts (Crandall, 1962). Botterill (1979) stated that involving
athletes in goal setting and planning can be an extremely effective
motivational and leadership technique. When an athlete is involved in
the establishment of a goal he/she is likely to be much more committed
to achieving that goal than when the goal is externally imposed. Committ-
ment will be even stronger in athletes who are part of a team where all
team members deem the goal to be of great importance. An individual's
feelings, or self-determination, arising out of participation in decisions
relating to the goals and standards of achievement enhance that individual's
intrinsic motivation.

Decisions will be met with greater acceptance, and will be
implemented more efficiently, when athletes are involved in the decision
making process. This statement is emphasized by both Botterill (1979)
and Chellanduria (1981). These authors concur that, when athletes
believe they have decided to pursue a particular goal, they also come to
realize that the coach is interested in helping them attain their goals.
This in turn heightens the coach's credibility and the athletes become

more receptive to his/her ideas.

Allowing athletes to make their own decisions helps them to learn how to solve problems, both individually and within a group, and to become responsible for their own actions. Such involvement develops self-discipline, self-reliance, self-control, and the skills for self-management (Amdur, 1971; Botterill, 1979). When an athlete has developed these capabilities he/she is psychologically mature and is more capable of coping with, or adapting to, difficult and stressing circumstances. Therefore, the athlete is in a better position to maintain perspective and concentrate on the appropriate game behavior (Botterill, 1979).

In summary, self-directed goal setting is one of the most effective forms of motivation (Strong, 1963). It results in greater productivity, performance, and satisfaction than when goals are not self-established (Likert, 1967; McGregor, 1960).

Basketball Statistics

Sophisticated systems for collecting statistics concerning individual and team performance in basketball have escalated in popularity in the past number of years (Keilty, 1975). Coaches compile statistics and recognize the value of accurate records. Bussard (1975a) and Keilty (1975) stated that too few coaches take full advantage of readily available information that issues from rationally conceived, and carefully constructed, performance charts. Ellis (1979) believes that statistics are a vital part of modern athletics. They are tools which contribute to 'winning basketball' and therefore should be used

comprehensively. The coach who neglects statistics is ignoring an area that could produce a significant performance increment among his/her players (Bussard, 1975b).

The primary purpose of statistics is to aid each player to improve as an individual team member. Such data are records of progress of a game with respect to shooting, rebounding, ball control, and jump balls (Marshall, 1976). This implies that statistical charts must evaluate performance and establish goals (Madison, 1978; Thrower & Wyatt, 1977). In order to function as a proper evaluative tool statistics must provide an objective method of assessing each player and validating the coach's opinions (Marshall, 1976). Employed in this manner accurate statistical analysis of team performance can provide an advantage to one's own team over those squads which do not rely on statistics (Brown, 1978).

Next to winning, the use of statistics is basketball's greatest motivator (Donohue, 1977; McGuire, Note 3). This applies to all levels of the game but is especially true at the high school and college levels (Harvey, 1973). High school and college coaches believe that good statistics reflect good performance (Smith, 1982).

A great deal of effort, time and money is devoted to the collection and analysis of game statistics. The use of tape recorders, video tape replay, and computers is common place. Coaches recruit statisticians and, in some instances, pay handsomely for their services. The net result is the construction of a variety of performance charts, graphs, and percentage columns all designed to motivate players and build a solid basketball program (Brown, 1978; Browning, 1980; Doll, 1981; Earl, 1980). Posting the data in locker rooms and/or gymnasia is intended to provide

a visual graph indicating the impact of a particular statistic (Brown, 1978; Doll, 1981).

Some methods of statistics collection are extremely complicated. One such device, developed by Samarus (1976), virtually requires a degree in mathematics to analyze and comprehend the data.

Brown (1980), Dodd (1975), and Earl (1980), all allude to the fact that goal setting should result from statistics. However, even these authors do not mention any specific methods by which the charts, graphs, and percentage columns may be used in the establishment of goals or to provide concurrent feedback during a game. The literature appears to reflect many coaches gathering statistics, devising even more complicated means to accomplish this end, posting them on locker room walls, and expecting their mere presence to motivate basketball players to set some type of goal/goals.

Summary. Goal setting is important for affecting athletic performance. If such goals are relevant to the activity and the individual athlete, they are effective. Frequent indications of progress towards performance goals produce more sustained performances and allow an athlete to modify appreciably the on-going performance so that goals more likely will be achieved.

The structure of goals and the provision of information that concentrates on particular behaviors during a basketball game has not been reported as a coaching stategy. A method for establishing goals, providing concurrent feedback, and assessing the effects of these procedures on game performance has not been described. This thesis attempts to establish and evaluate such a method. It attempts to employ

the principles and theories of goal setting in an applied fashion in a competitive basketball setting.

Chapter 3

METHODOLOGY

Experimental Aim

The purpose of this study was to investigate the effects of integrating player collected statistics on players' performance in a senior girls secondary school basketball team.

Experimental Design

A multiple baseline design replicated across behaviors and across subjects was selected for this study.

The experiment was divided into two stages; a baseline stage and an experimental stage. Baseline stability for each behavior was considered to be achieved when three data points occurred in succession with no more than 5% variation from the mean of those three data points. The experimental stage consisted of the application of the statistics collection and information presentation procedure.

Independent and Dependent Variables

The independent variable was the statistics collection and information presentation procedure. The dependent variable was the rate of occurrence of selected basketball behaviors.

Subjects

The subjects were nine female secondary school basketball players ranging in age from 16-19 years. These subjects were members of the Fort Frances High School Senior Girls' Basketball Team which competed in the Northwestern Ontario Secondary School Athletic Association Senior

Girl's Basketball League.

Controls

The effects of extraneous variables were countered through the implementation of a number of controls.

In order to prevent confounding, trained statisticians who were in no way involved with the subjects collected the baseline data. These observers were trained during an exhibition game held November 21, 1983. The reliability of these persons to observe behaviors was checked during the exhibition game and throughout each game of the baseline stage.

The reliability of a subject's ability to collect statistics was checked during a pilot study conducted in Thunder Bay, Ontario, using as subjects, the Fort William Collegiate Senior Girls Basketball Team.

The reliability of this study's subjects to collect statistics was checked during training sessions which were conducted at practice. The reliability of the player gathered statistics compiled during the treatment condition was checked during each game.

Experimental Condition

The experiment consisted of two stages: a) a baseline stage, and b) an experimental stage.

Trained observers, who had no involvement with the subjects, collected the data regarding the behaviors of concern during game conditions throughout the baseline stage. These behaviors were; offensive rebounds, defensive rebounds, and assists for forwards; and

steals, deflections, and assists for guards.

The observer to player ratio was 1:3. The observers were located in a specified section of the stands apart from the spectators. They had a clear, unobstructed view of the entire playing surface. They gathered the data by directly observing the players actively participating in the game and by placing a check mark in the appropriate space beside the player's name. Appendix A provides an example of the game behavior sheets. The observers kept an accurate record of the time 'in' and 'out' for each player.

At the conclusion of the game the total number of occurrences for each behavior was pro-rated to the time played and recorded.

Baseline stability for each behavior was considered to be achieved when three data points occurred in succession with no more than a 5% variation from the mean of those three data points.

When baseline stability for each behavior occurred the data collection and information procedure was explained to the subjects. The explanation emphasized that the procedure was another method to enhance individual performance and stressed the importance of accuracy and reliability in collecting the data. At that time the subjects practised the procedure and reliability checks were performed.

Experimental Stage

The subjects collected the data regarding the behaviors of concern for other players in game conditions during the experimental stage.

Individual clipboards, with attached game behavior sheets and pencils, were placed on the team bench. At the beginning of the game

the non-starters picked up their paired player's clipboard and placed the remaining clipboards in a convenient position behind the bench. When play began the non-starters recorded the data by directly observing the players actively participating in the game and by placing a check mark in the appropriate space beside the player's name. Appendix B provides an example of the game behavior sheet. Each bench player kept an accurate record of the time 'in' and 'out' in the appropriate space beside the player's name. When a bench player was substituted she gave the clipboard she was using to the team manager and gave the clipboard to be used to record her data to the player who was substituted out as she was leaving the game. The player who was substituted out then used this clipboard to record the time played, and the behaviors of concern for the player who had just entered the game. At this time the player who had just left the game was informed by the team manager, in absolute terms, how she was progressing toward her chosen standard of performance. This method provided each player with concurrent feedback as knowledge of progress toward game goals.

After the game, while the players were changing, the coach and team manager collected the clipboards, pro-rated the statistics to the player's actual playing time, and recorded them in the individual player's notebooks. Appendix C provides a sample notebook page. After changing, the players perused their statistics, set their own performance standards for the next game, and recorded these standards in the space provided in the notebook. In this fashion each player was provided with immediate feedback and used this information to establish intrinsic goals. At the beginning of each practice between league games, and prior

to the warm-up preceding a game, the players were given their notebooks and reminded themselves of their performance standards for the ensuing contest. In this manner, the players were constantly made aware of the standards of performance they had chosen to achieve. Therefore this experimental procedure also included elements of public committment to goal achievement and peer facilitation.

Data Collection

The data were gathered during league games commencing November 25, 1983 and terminating March 2, 1984.

Reliability. The reliability of the method of data collection was calculated in the following manner:

$$\frac{\begin{array}{l}\text{smallest number of} \\ \text{observations for} \\ \text{category 1}\end{array} + \begin{array}{l}\text{smallest number of} \\ \text{observations for} \\ \text{category 2}\end{array} + \begin{array}{l}\text{smallest number of} \\ \text{observations for} \\ \text{category n}\end{array}}{\begin{array}{l}\text{largest number of} \\ \text{observations for} \\ \text{category 1}\end{array} + \begin{array}{l}\text{largest number of} \\ \text{observations for} \\ \text{category 2}\end{array} + \begin{array}{l}\text{largest number of} \\ \text{observations for} \\ \text{category n}\end{array}} \times 100 =$$

% agreement (Rushall, 1977)

Pro-Rating. The pro-rated frequency of behavior occurrence was established by dividing the total game time of 32 minutes by the actual time played. The resulting number was multiplied by the actual number of behavior occurrences observed during the game. Thus each player was made aware of her individual production in relation to her playing time.

$$\text{pro-rated frequency} = \text{actual frequency} \times \frac{\text{total game time (32)}}{\text{actual playing time}}$$

Data Analysis

Graphs of each behavior for each subject were constructed. The graphs for each guard were; a) steals, b) deflections, c) assists. The

graphs for each forward were; a) offensive rebounds, b) defensive rebounds, c) assists.

The data were inspected visually to determine stability. Due to the fact that some behaviors did not achieve stability, the analysis included a description of all behaviors.

Changes in performance were reviewed with respect to alterations in magnitude, variability, and trends. An alteration in magnitude was considered to have occurred if 60% of the data points, in the experimental condition, fell outside of the scope of the stable baseline data range. When a behavior did not significantly alter with respect to magnitude, that behavior was tested for alteration in variability. An alteration in variability was considered to have occurred when variability increased by 100% above the range of the stable baseline or decreased by 50% below the range of the stable baseline. If a behavior did not change significantly with respect to magnitude or variability, it was then tested for changes in trend. When, at the end of the experimental stage, three consecutive data points moved in one direction, a trend was considered to have been established.

The proportion of changes with regard to all subjects was analyzed using a binomial test to discern if that proportion was greater than one would expect by chance. If the obtained Z score was significant, then it would be concluded that the experimental condition produced significant treatment effects.

Chapter 4

RESULTS

Observer Reliability

Each player served as an observer of another player's behavior.
For all observations for each player, the inter-observer percentage
of agreements ranged from a high of 100% (Subject D.B.) to a low of
84.61% (Subject M.M.). Each subject's percentage is listed in Table 23,
Appendix G. When all reliability assessments were pooled across
subjects for each game, the inter-observer agreements ranged from
100% (game 5) to 85.71% (game 4). Each game's percentage is listed
in Table 24 in Appendix G. Table 25 in Appendix G details the subject
by game inter-observer agreements. All data indicated that the between
subjects' data gathering process was highly reliable.

Visual Inspection of Graphs

A visual inspection of the graphed data in Appendix D for all
subjects across all behaviors which were subjected to treatment
conditions revealed that all subjects demonstrated a performance
enhancement. However, the graphs also indicated that the increase
was not linear. Although generally falling above the range of the stable
baseline, the experimental data points experience noticeable
fluctuations throughout the experimental condition. These fluctuations may
have been due to the fact that the subjects participated in games
against opponents of varying degrees of skill level which moderated
the 'ease' with which behaviors could be performed.

An experimental effect was evidenced during the first game of

the treatment condition in 19 behaviors. Six behaviors demonstrated no rate of change in the first game of the experimental stage while one behavior fell below the baseline rate.

Alterations in Magnitude: Forwards

Table 1 illustrates that forwards T.H., J.C., and M.A., all of whom were starters, exhibited a 100% response rate increase above that of the stable baseline with respect to offensive rebounds and assists. In addition, starting forward M.A., demonstrated a 100% increase in defensive rebounds. Therefore, all of these behaviors exhibited a positive alteration in magnitude. Of the three starting forwards, only subject J.C., with a 14.29% response rate increment in defensive rebounds did not exhibit an increase.

Substitute forward J.B. did not achieve a stable baseline with regard to assists. Nor did a 57.13% increase in offensive rebounds qualify as a positive alteration in magnitude. However, this player demonstrated an 85.79% response rate increase above that of the stable baseline with respect to defensive rebounds. This was Subject J.B.'s only demonstrated positive alteration in response magnitude.

Forward D.B. achieved a 100% response rate increase in defensive rebounds. Neither offensive rebounds, (57.14%) nor assists (50%) demonstrated a change in magnitude.

Forward D.W. experienced an alteration in magnitude in both offensive and defensive rebounds with response rate increments of 87.50% and 100% respectively. A response rate increase of 55.55% above the rate of the stable baseline in assists did not qualify this behavior for an alteration in magnitude.

Summary: Forwards

Forward J.B. did not achieve a stable baseline with respect to assists. Therefore, 17 behaviors were included in the experimental condition for this group of six subjects. Twelve of these behaviors exhibited positive alteration in magnitude (70.50% of all behaviors for forwards).

Alterations in Magnitude: Guards

Starting guards K.M. and S.L. demonstrated a positive alteration in magnitude with respect to all behaviors. Response rate increments above those of the stable baseline ranged from 83.33% to 100% for these two subjects.

Substitute guard M.M. increased her performance in steals and deflections by 85.7% and 71.42% respectively. A performance increment in assists of 57.14% above the rate of the stable baseline was not deemed to be a significant alteration in magnitude.

Summary: Guards

All three subjects playing the guard position achieved a stable baseline in all behaviors. A total of nine behaviors were subjected to the experimental condition of which eight demonstrated a positive alteration in magnitude (88.88% of all behaviors for this group).

Team Summary

Subject J.B. did not achieve a stable baseline with respect to assists. Therefore nine subjects and 26 behaviors were included in the experimental condition and subjected to testing with respect to

changes in magnitude. Twenty behaviors (76.92% of all behaviors) demonstrated a positive alteration in magnitude.

Changes in Variability

Behaviors which did not demonstrate an alteration in magnitude were assessed for changes in variability. For five subjects there were six behaviors; two occurrences of offensive rebounds, one occurrence of defensive rebounds, and three occurrences of assists. Table 2 indicates that all behaviors exhibited a substantial positive alteration with respect to changes in variability.

Binomial Test

All behaviors were altered due to the experimental condition. Such an effect was greater than one would expect by chance and deemed the independent variable to be effective for altering behaviors in the subjects of this study.

When the proportion of changes for behaviors that were altered in magnitude (20 out of 26) was assessed using a binomial test, the proportion was shown to be significantly greater than one would expect by chance. Offensive and defensive rebounds yielded a Z = 2.45 (p = .0071), assists, Z = 2.00 (p = .0202), steals and deflections Z = 1.732 (p = .0401). All remaining behaviors were altered in variability characteristics.

Summary

The results of these analyses indicated that all behaviors which exhibited stable baselines changed as a result of the experimental intervention. This effect was deemed to be significant.

Table 1. Baseline Frequency and Percentage of Experimental Data Points Which Exceeded Stable Baseline for Each Behavior for Each Subject.

Subject	Behavior	Baseline Rate	Percentage Increase	Significant
T.H.	Offensive Rebounds	5.15	100	yes
	Defensive Rebounds	6.27	71.42	yes
	Assists	0.00	100	yes
J.C.	Offensive Rebounds	2.05	100	yes
	Defensive Rebounds	8.22	14.29	no
	Assists	2.38	100	yes
M.A.	Offensive Rebounds	2.06	100	yes
	Defensive Rebounds	4.13	100	yes
	Assists	0.00	100	yes
J.B.	Offensive Rebounds	0.00	57.14	no
	Defensive Rebounds	0.00	85.70	yes
	Assists	----	----	----
D.B.	Offensive Rebounds	0.00	44.00	no
	Defensive Rebounds	0.00	100	yes
	Assists	0.00	50.00	no
D.W.	Offensive Rebounds	0.00	87.50	yes
	Defensive Rebounds	0.00	100	yes
	Assists	0.00	55.55	no
S.L.	Steals	4.29	100	yes
	Deflections	3.15	100	yes
	Assists	4.29	100	yes
K.M.	Steals	3.06	100	yes
	Deflections	3.18	100	yes
	Assists	4.23	83.33	yes
M.M.	Steals	0.00	85.71	yes
	Deflections	0.00	71.42	yes
	Assists	0.00	57.14	no

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Table 2. Changes in Variability Between Baseline and Experimental Stages for Behaviors Which Were Not Altered in Magnitude.

Subject	Behavior	Baseline Range	Experimental Range	Difference Range	Positive Range
J.C.	Defensive Reb.	.13	8.96	8.83	yes
J.B.	Offensive Reb.	00.00	16.69	16.69	yes
D.B.	Offensive Reb.	00.00	21.32	21.32	yes
	Assists	00.00	10.66	10.66	yes
D.W.	Assists	00.00	15.00	15.00	yes
M.M.	Assists	00.00	10.45	10.45	yes

Goal Achievement

For each game players established a target number of specified behavior occurrences. These goals were evaluated as to whether they were; 1) equalled or surpassed, 2) came within one numeric value of the established goal, or 3) failed to reach either of the above two criteria. Table 3 indicates the number of occurrences of criteria one and two for each subject. The percentage of goal achievement or near achievement for each subject ranged from a high of 100% (Subject J.B.) to a low of 71.42% (Subject M.M.). Only two subjects, K.M. (76.19%) and M.M. (71.42%) fell below 80%. Two subjects, M.A. (91.66%) and D.B. (92.30%) demonstrated over 90% accuracy in achieving or coming within one numeric value of achieving their self-established performance goals.

Table 4 indicates that, for the group, when the types of behaviors above were considered, goals were achieved or nearly achieved in 91.89% of cases for offensive rebounds, 83.78% for defensive rebounds, 83.33% for assists, 77.27% for steals, and 76.19% for deflections.

The percentages of goal achievements for both methods of evaluating the data were impressive.

Table 3. Goal Setting.

Subject	Behavior	Number of Games Observed	Number of Games In Which Goal Was Achieved	Number of Games In Which Goal Came Within One Numeric Value	Goal Achievement/ Near Achievement as an Average Percentage
T.H.	Offensive Reb.	7	4	2	
	Defensive Reb.	7	3	2	86.36
	Assists	8	4	4	
J.C.	Offensive Reb.	6	5	0	
	Defensive Reb.	7	3	2	81.81
	Assists	9	5	3	
M.A.	Offensive Reb.	4	3	1	
	Defensive Reb.	4	3	0	91.66
	Assists	4	4	0	
J.B.	Offensive Reb.	7	4	3	
	Defensive Reb.	7	4	3	100.00
	Assists	-	-	-	
D.B.	Offensive Reb.	5	2	3	
	Defensive Reb.	4	4	0	92.30
	Assists	4	2	1	
D.W.	Offensive Reb.	8	7	0	
	Defensive Reb.	8	7	0	84.00
	Assists	9	3	4	
K.M.	Assists	6	3	2	
	Steals	8	3	4	76.19
	Deflections	7	4	0	

(continued)

Table 3. (continued)

Subject	Behavior	Number of Games Observed	Number of Games In Which Goal Was Achieved	Number of Games In Which Goal Came Within One Numeric Value	Goal Achievement/ Near Achievement as an Average Percentage
S.L.	Assists	7	5	1	85.71
	Steals	7	6	0	
	Deflections	7	3	3	
M.M.	Assists	7	4	1	71.42
	Steals	7	4	0	
	Deflections	7	5	1	

Table 4. Goal Setting Summary.

Behavior	Number of Observations	Number of Occurrences In Which Goal Was Achieved	Number of Occurrences In Which Goal Came Within One Numeric Value	Goal Achievement/ Neat Achievement as an Average Percentage
Offensive Reb.	37	25	9	91.89
Defensive Reb.	37	24	7	83.78
Assists	54	30	15	83.33
Steals	22	13	4	77.27
Deflections	21	12	4	76.19

Chapter 5

DISCUSSION

The experimental package employed in this thesis provided a method of establishing goals in relation to playing time, providing concurrent feedback, and assessing the effects on team performance.

Bird & Brame (1978), Kanfer (1974), Maivdsley (1978), and McClements & Botterill (1978) all concur that goals must be explicit, of sufficient difficulty to challenge the performer, but be realistic enough to be achieved. The current study showed that senior high school female basketball players are capable of establishing realistic, challenging, and attainable goals. Table 4 demonstrated that over 75% of the goals established were attained or came within one numeric value of being achieved. The performance standards (see Appendix E) indicate that the subjects were capable of adjusting their goals relevant to their previous performance, the skill level of the current opponent, and anticipated playing time. For example; Subject J.C., a starter, established a goal of four offensive rebounds against the Rainy River High School Team. She achieved a score of 15.20. However, she specified a very realistic goal of five offensive rebounds for the ensuing contest against a very highly skilled Dryden High School Team. Again she achieved her standard by attaining 7.75 offensive rebounds during the Dryden game. Subject J.C. continued this pattern throughout the experimental condition by either achieving her goal of coming within one behavior occurrence of attaining it on 81.81% of the goal setting occasions.

Subject D.W., a non-starter, demonstrated that bench athletes can realistically predict their playing time depending upon the opposition and subsequently set attainable and challenging standards. On 84% (21/25) of the goal setting occasions she either achieved her goal or came within one behavior occurrence of attaining it.

Subject M.M., also a non-starter and the least skilled team member, further illustrated that individuals regardless of skill level or playing time, could establish goals appropriate to their performance. This subject reached her self-established standard of performance or came within one numeric value of attaining it on 71.42% of the goal setting occasions.

This study indicated that regardless of playing time or skill level, the athletes were competent in establishing realistic, challenging, and achievable goals. This in conjunction with other aspects of the experimental package led to performance increments across all subjects for all behaviors. Changes in magnitude occurred in 20 of 26 behaviors. The six behaviors which did not alter with respect to magnitude positively changed with regard to variability. All behaviors were altered due to the experimental condition. This effect was greater than one would expect by chance. The method of establishing goals in relation to to playing time (pro-rating data) and providing concurrent feedback during the game was shown to be effective for altering behaviors in the subjects of this study.

A number of factors may have contributed to the positive results achieved. The goals were quantitative in nature. Sheeran (1979) found that quantitative goals provided the most incentive to produce the best

performance due to the fact they used specific levels of achievement.
Alderman (1974) stated that realistic and high goals can serve as an
incentive in themselves. Here, each subject was required to establish a
standard of performance in three specific and defined behaviors. In
order to accomplish this task, each player was forced to evaluate her
performance. All data were pro-rated to actual time played. In this
fashion the goal was directly performance related. Rushall (1979)
stated that performance related goals act as performance guidelines
and provide criteria for performance evaluations. In addition, this
author deemed it significant that each individual evaluate herself in
relation to her own capabilities rather than those of her peers.
Establishment of specific levels of achievement places each athlete's
goals on a highly personal basis, specifically identifies the desired
outcomes, and forces the athlete to plan how she will accomplish this
goal (Sheeran, 1976). Basketball statistics often are posted after a
game and misinterpreted by players. Pro-rating the statistics to actual
time played made the statistics even further quantitatively meaningful
in that they revealed a rate of production per minute. Bench players
may often feel inadequate in the fact that their statistics appear very
low in comparison to those of the starting players because they receive
less playing time. Conversely, starting players who played for a large
part of a game could inflate the quality appraisal of performance due
to the time factor. In essence, pro-rating the data was a method of
presenting them in such a manner that each individual could view them
in light of her own individual efforts regardless of skill level or
playing time. In this fashion, an athlete who played only three minutes

but acquired two offensive rebounds could realize that for the amount of time played she had in fact performed very well. Wood (1980) suggested that the competitive sporting environment should be structured to provide athletes with the opportunity to satisfy their particular goals of excellence, affiliation, sensation, and success. The pro-rating of statistics to the actual time played provides each individual with an opportunity to fulfill these criteria.

It was interesting to note that both starters and non-starters recorded carefully the actual time played and viewed their results in this light. It was noted that players became more open to discussion of their skills as they questioned why they were or were not playing. The coach was provided with the opportunity to positively explain to each individual her strengths and weaknesses and where she fit in the total team plan.

In this regard Subject J.B. was the most interesting case. As an under age, first year senior player who could have spent another year playing junior basketball, she expected to continue where she finished the previous season and be a star. It soon became evident to J.B. that this was not so but, in fact she was the sixth team player. She appeared to become sullen and unco-operative. She did not accept coaching points no matter how they were presented, nor did she make a serious effort at practice. She viewed her role as a subject in this study much in the same manner as she did her role as team player. The graphs in Appendix D indicated that there was very little alteration in her game behavior during the first three games of the experimental condition. In game 9 a substantial increase in the number of offensive

rebounds was demonstrated with a slight decrease in game 10. Games 11 and 12 showed further large increases in rates. It appeared that during game 9 Subject J.B. had realized that she could discover positive aspects in her play in relation to the amount of time she spent on the court. Although her data, with respect to defensive rebounds, did not illustrate this point as clearly, it did demonstrate an increase in productivity. The decrease in defensive rebounds in games 10 and 11 was most probably due to the fact that the coach changed the system of play and Subject J.B. was playing a defensive position which provided limited access to the backboard. It was noted that this subject displayed a noticeable reversal in attitude and work ethic during game 9. This single anecdote illustrates an effect that goal setting can have on athletic participation.

The experimental package provided a means by which each player could focus her attention on specific game features through the provision of individual concurrent feedback. This in turn produced progress information toward the final game goal which the player had established for herself. The concurrent feedback was designed to supply specific information with respect to progress toward explicit goal achievement, reinforcement, good performance, and possibly motivate the athletes to to even greater efforts. Erez (1977) and Rushall (1983b) concur that detailed goal-related feedback is an essential characteristic in order for goal setting to be effective. The positive results incurred in this thesis support those opinions.

Each subject participating in this study was required to maintain a notebook in which she recorded her standard of performance for the ensuing contest. Each player was constantly reminded of these standards

at practice and before and during games. It was assured that each athlete made a private commitment to attain a particular performance standard. In addition, each player made a public commitment to the coach and her teammates with regard to the goals that were set. This encompasses social facilitation and peer knowledge of what is being done and what is expected. Although all goals were established by each player, the goal setting in itself became an area of commonality among all team members regardless of position or degree of basketball expertise. Everyone recorded statistics for a teammate; everyone was involved then, on a public and highly personal basis in the team function and process.

The graphs in Appendix D indicated that although a performance increment above that of the stable baseline was experienced by all subjects across all behaviors, this increase was not linear. One must bear in mind that league scheduling does not consider the skill of the opposition but rather that schedules are designed to facilitate league priorities and travel arrangements. Therefore, it is conceivable that subjects experienced games against less skilled opponents resulting in high data points and games with equally or more skilled opponents resulting in lower data points. Thus, as a result of league scheduling it may have been impossible to achieve performance increases which were linear in nature.

It was also noted that Subjects T.H. and J.C. appeared to be tapering off toward the end of the experimental condition. During the last four games of the season the team experienced a bout with the flu. Some members were more adversely affected than others. Subject M.A. missed three games. Although Subjects T.H. and J.C. were capable of

playing, they were not as physically able as in previous games.

A comparison between the 'traditional' procedure for collecting basketball statistics and the schedule of this study is warranted. There were marked differences between the two, although the data that were gathered were not totally dissimilar. 'Traditional' statistics are kept over a wide variety of behaviors and produce a resultant positive or negative number summarizing overall play. The vagueness of such statistics has no specific behavior counterpart and thus, has low potential for directly affecting behavior. On the other hand, pro-rated behavior counts are relevant to particular and important game behaviors. This could be a feature which accounts for the significant effects demonstrated in this investigation. Another difference occurs when the statistics are presented to the players. Traditionally, game statistics are given well after the event and have little relevance for the next contest and no relevance for affecting what occurred during the game in which they were collected. Contrastingly, the concurrent provision of game behavior counts allowed players to adjust their rates of behavior while the game was progressing. This process has the potential to enhance a player's game performance whereas the 'traditional' delayed feedback does not.

A final comparison involves the social setting and possible social facilitation that existed in the experimental condition. With all players and the coach being unified and consistent in game performance appraisals, the provision of feedback, and the resultant interactions, the experimental treatment offered a very different social atmosphere to the traditional

'posting' or announcement of game statistics. It is contended that it is the process of this study that produced the behavior changes that were observed, not the actual statistics themselves. Numbers alone cannot alter behaviors.

The procedure of 1) players collecting meaningful, behavioral statistics on elements of game performance during a game, 2) communicating the obtained data during a game, and 3) setting personal goals for specific game behaviors in a social setting, produced consistent improvements in player performance in a female high school basketball team. This coaching action appears to warrant further assessment in basketball as well as other sports. It is contended that it is a more sound procedure for enhancing player performance than the more 'traditional' method of collecting player statistics in basketball. Replication and improvements for this study are encouraged.

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

The experimental package required that all subjects establish definitive, quantitative goals with respect of three specific basketball behaviors. Those behaviors for forwards were; offensive rebounds, defensive rebounds, and assists. The guards set goals with respect to steals, assists, and deflections. Subjects maintained notebooks to remind themselves of their chosen performance standards for games in the experimental condition. During games, each individual received concurrent feedback as a progress indicator toward previously established goals. At the conclusion of each game, the data were pro-rated to actual time played in order that all players could be viewed equitably with regard to productivity.

The study demonstrated that as a result of the experimental intervention, performance significantly increased across all subjects and all behaviors. Of the 26 behaviors tested, 20 altered with respect to increases in magnitude. The six behaviors not achieving changes in magnitude according to the pre-established criteria positively changed with regard to alterations in variability. The fact that the alteration in all behaviors, due to the experimental condition, was greater than one would expect by chance deemed the method of establishing goals, pro-rating statistics and providing concurrent feedback, to be effective for significantly changing basketball behaviors in the subjects of the study.

It is imperative that one subject all data of any scientific study to valid and reliable analysis. The data gathered in the current

study proved to satisfy stringent criteria and therefore were deemed to significantly alter the subjects' behaviors. However, in a sporting environment, any increase in an athlete's production, regardless of statistical significance, may be extremely beneficial to the team. If, by employing appropriate coaching practices, a coach can increase an athlete's play production by one behavior occurrence per game over 12 games, the athlete by the conclusion of the season has a net increase of 12 more behaviors. Regardless of statistical significance, that athlete has increased her performance and therefore is a more valuable team member. The significance of improvements demonstrated in this study were both statistical and practical. It can be concluded that the strategy employed was a worthwhile procedure for markedly increasing basketball players' performances.

Some coaches may complain that the experimental package employed in this thesis require too much time and effort to be practical. It was the author's experience that it required 1) one hour to photocopy the necessary data sheets for the entire season, 2) approximately 30 minutes to explain the study at the beginning of the experimental condition, and 3) 20 minutes at the conclusion of each game to pro-rate the data and establish goals. All the clipboards and notebooks were easily accommodated in one gym bag supervised by the team manager. The subjects very quickly became accustomed to the routine and it was accomplished efficiently and without hindrance to the coaching situation

It is this author's recommendation that the experimental package employed be replicated across other sports and across varying age groups. Would the results remain the same with junior high school players,

university players, provincial, or even national team members? Would they remain the same with male athletes? Could the experimental package be applied to other sports such as volleyball, replacing the basketball behaviors with spikes, blocks, and tips? This author believes that the significant results obtained in the current study require further investigation with respect to other sports and age groups.

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APPENDIX A

Figure A-1. Game Behavior Sheet: <u>FORWARDS</u>

GAME NUMBER: _____

DATE: _____

Fort Frances High School vs. _____

LOCATION: _____

Name	First Half					First Half Totals			
	Off. Reb.	Def. Reb.	Ass.	Time Played		Off. Reb.	Def. Reb.	Ass.	Time Played

Figure A-2. Game Behavior Sheet: <u>FORWARDS</u>

GAME NUMBER: _____

DATE: _____

Fort Frances High School vs. _____

LOCATION: _____

Name	Second Half				Second Half Totals			
	Off. Reb.	Def. Reb.	Ass.	Time Played	Off. Reb.	Def. Reb.	Ass.	Time Played

Table A-3. Game Behavior Sheet: <u>GUARDS</u>

GAME NUMBER: _____

DATE: _____

Fort Frances High School vs. _____

LOCATION: _____

Name	First Half				First Half Totals			
	Stls.	Defl.	Ass.	Time Played	Stls.	Defl.	Ass.	Time Played

Figure A-4. Game Behavior Sheet: __GUARDS__

GAME NUMBER: _____

DATE: _____

Fort Frances High School vs. _____

LOCATION: _____

Name	Second Half				Second Half Totals			
	Stls.	Defl.	Ass.	Time Played	Stls.	Defl.	Ass.	Time Played

Figure A-5. Game Summary Sheet: FORWARDS

GAME: _____

DATE: _____

Fort Frances High School vs. _____

LOCATION: _____

Name	Total				Pro-Rated		
	Off. Reb.	Def. Reb.	Ass.	Time Played	Off. Reb.	Def. Reb.	Ass.

Figure A-6. Game Summary Sheet: <u>GUARDS</u>

Fort Frances High School vs. _____

LOCATION: _____

GAME: _____

DATE: _____

Name	Off. Reb.	Def. Reb.	Ass.	Time Played	Off. Reb.	Def. Reb.	Ass.

APPENDIX B

Figure B-1. Game Behavior Sheet: FORWARDS

NAME: _____ DATE: _____ NAME NUMBER _____

Fort Frances High School vs. _____ LOCATION: _____

First Half

Off. Reb.	Def. Reb.	Ass.	Time In	Time Out	Off. Reb.	Def. Reb.	Ass.	Time Played

First Half Totals

Second Half

Off. Reb.	Def. Reb.	Ass.	Time	Time	Off. Reb.	Def. Reb.	Ass.	Time Played

Second Half Totals

Game Totals / Pro-Rated Stats

Off. Reb.	Def. Reb.	Ass.	Time Played	Off. Reb.	Def. Reb.	Ass.

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Figure B-2. Game Behavior Sheet: GUARDS

NAME: _____ DATE: _____ NAME NUMBER _____

Fort Frances High School vs. _____ LOCATION: _____

First Half

Stls.	Defl.	Ass.	Time In	Time Out	Off. Reb.	Def. Reb.	Ass.	Time Played

First Half Totals

Second Half

Stls.	Defl.	Ass.	Time	Time	Off. Reb.	Def. Reb.	Ass.	Time Played

Second Half Totals

Game Totals

Stls.	Defl.	Ass.	Off. Reb.	Def. Reb.	Ass.

APPENDIX C

Figure C-1. Performance Standards.

NAME: _____   TEAM: Fort Frances High School   POSITION: Forward

Pro-Rated Task	Game 1 vs.___	Goal For Game 2	Game 2 vs.___	Goal For Game 3	Game 3 vs.___	Goal For Game 4	Game 4 vs.___
Offensive Rebounds							
Defensive Rebounds							
Assists							

Figure C-2. Performance Standards.

NAME: _____   TEAM: Fort Frances High School   POSITION: Forward

Pro-Rated Task	Goal For Game 5	Game 5 vs. ___	Goal For Game 6	Game 6 vs. ___	Goal For Game 7	Game 7 vs. ___
Offensive Rebounds						
Defensive Rebounds						
Assists						

Figure C-3. Performance Standards.

NAME: _____ TEAM: Fort Frances High School POSITION: Guard

Pro-Rated Task	Game 1 vs.___	Goal For Game 2	Game 2 vs.___	Goal For Game 3	Game 3 vs.___	Goal For Game 4	Game 4 vs.___
Steals							
Deflections							
Assists							

Figure C-4. Performance Standards.

NAME: _____ TEAM: Fort Frances High School POSITION: Guard

Pro-Rated Task	Goal For Game 5	Game 5 vs.___	Goal For Game 6	Game 6 vs.___	Goal For Game 7	Game 7 vs.___
Steals						
Deflecti/ns						
Assists						

APPENDIX D

Figure D-1. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT MM

STEALS
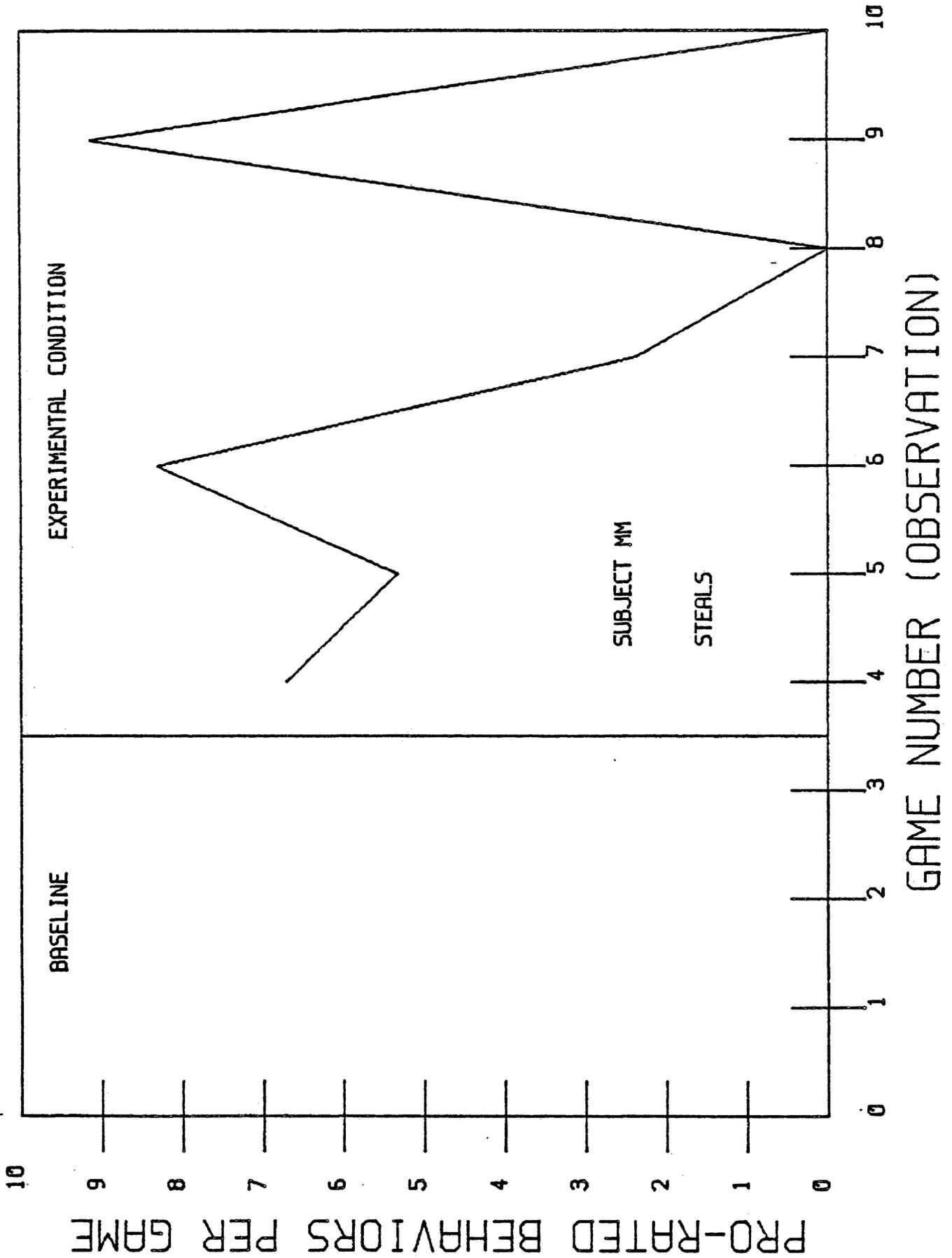
Figure D-2.   Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

BASELINE

EXPERIMENTAL CONDITION

SUBJECT MM

DEFLECTIONS

GAME NUMBER (OBSERVATION)
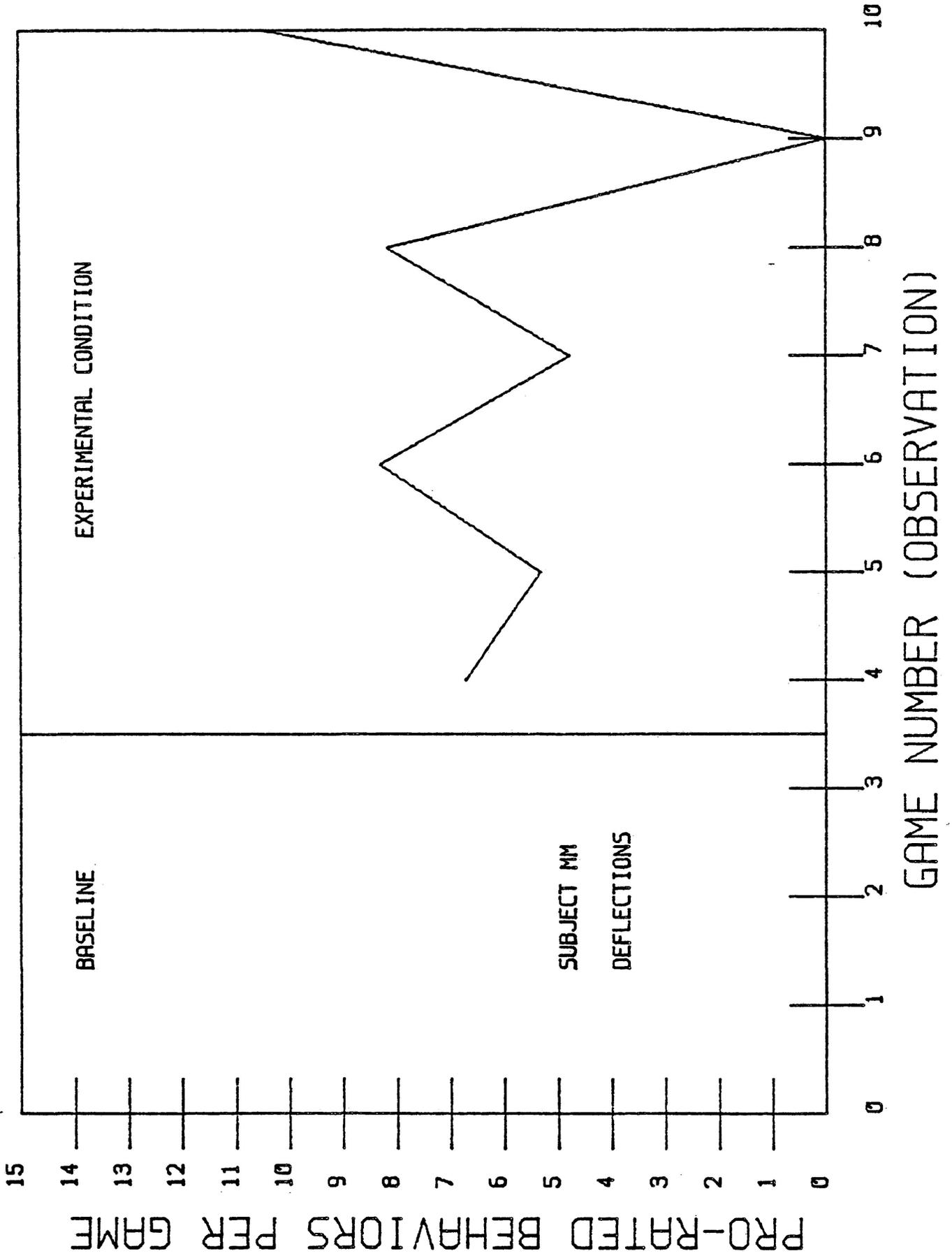
Figure D-3.   Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT MM
ASSISTS
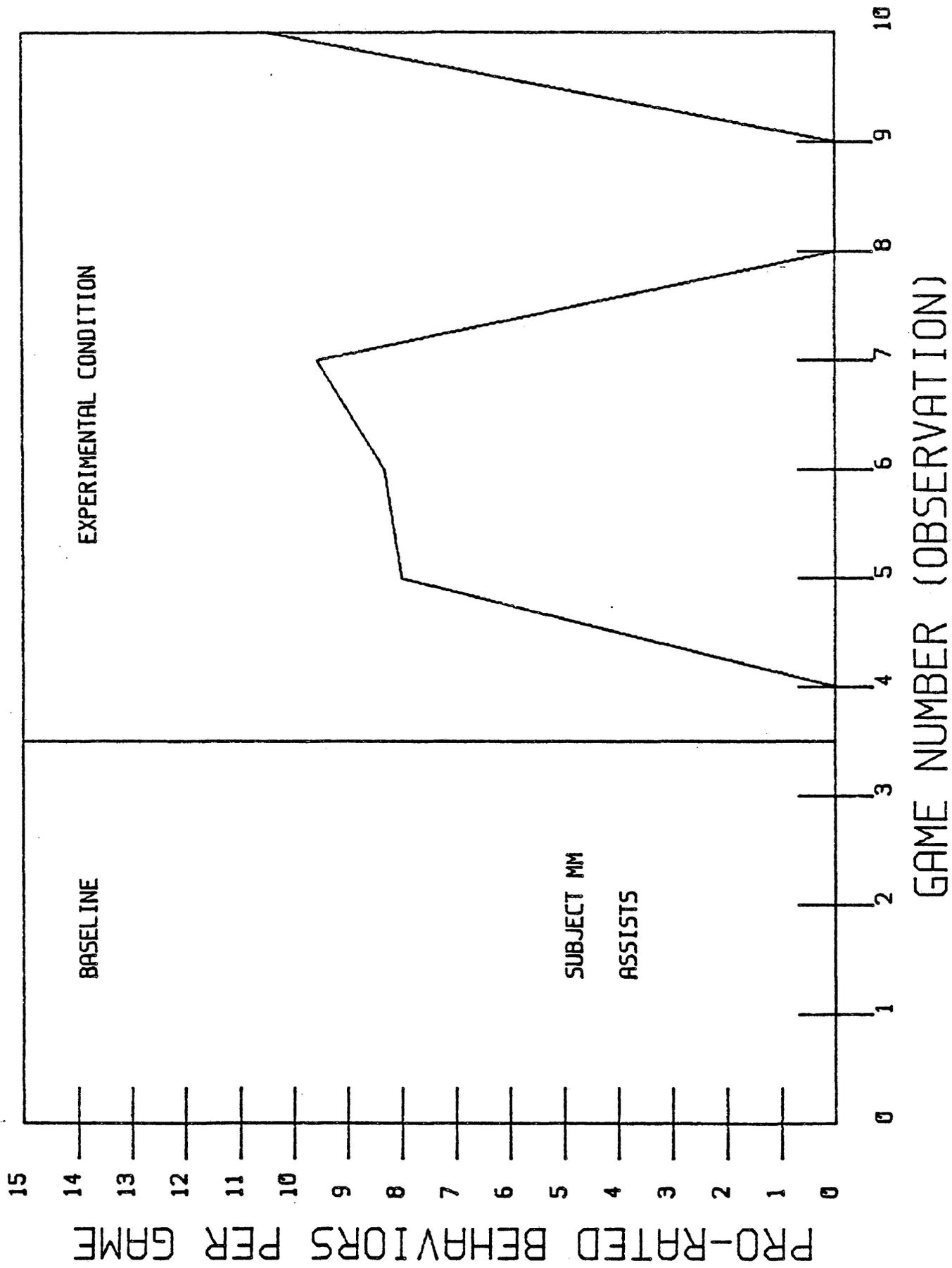
Figure D-4. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT KM

STEALS
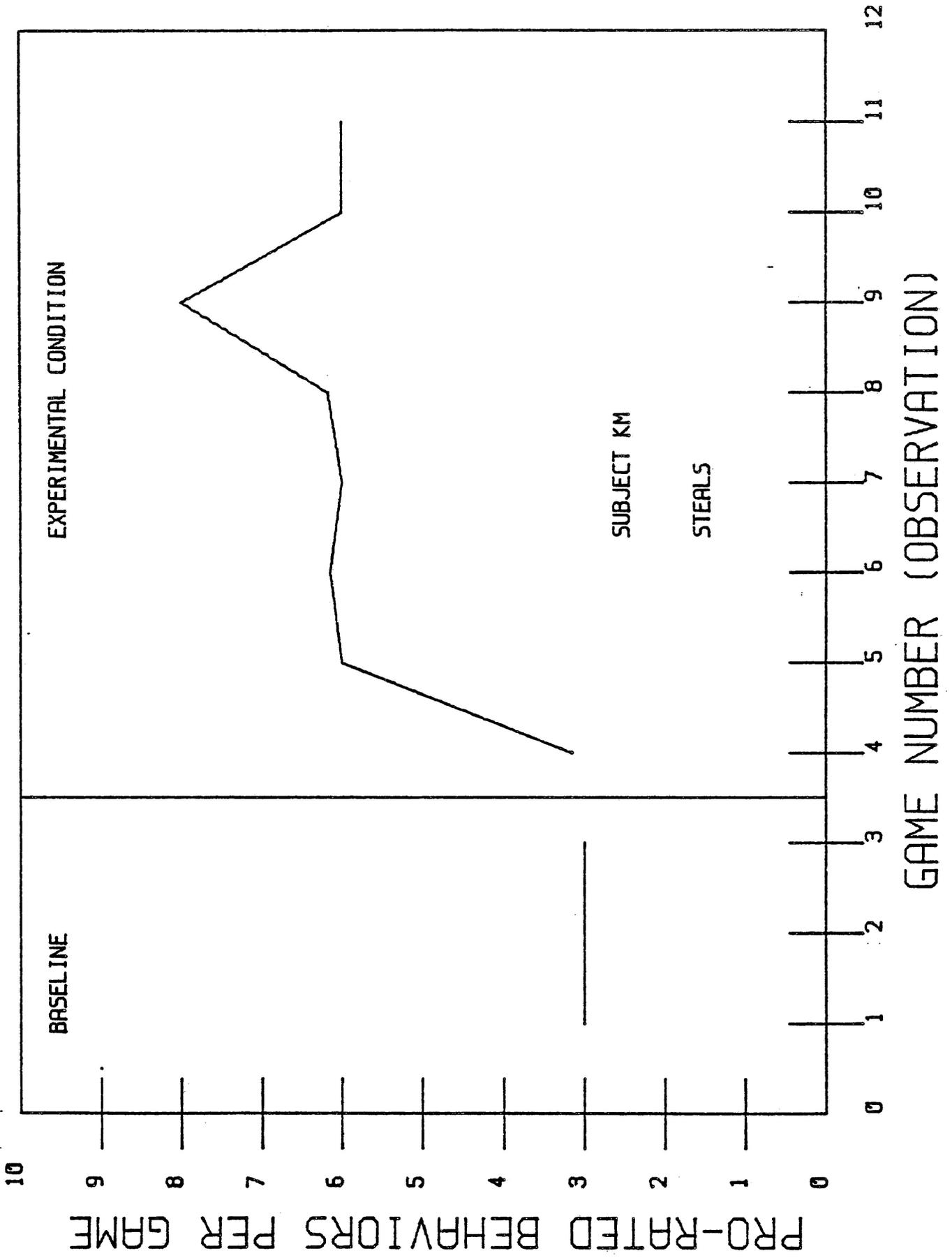
Figure D-5.   Behavioral Graphs.

BASELINE

EXPERIMENTAL CONDITION

SUBJECT KM

DEFLECTIONS

PRO-RATED BEHVIORS PER GAME

GAME NUMBER (OBSERVATION)
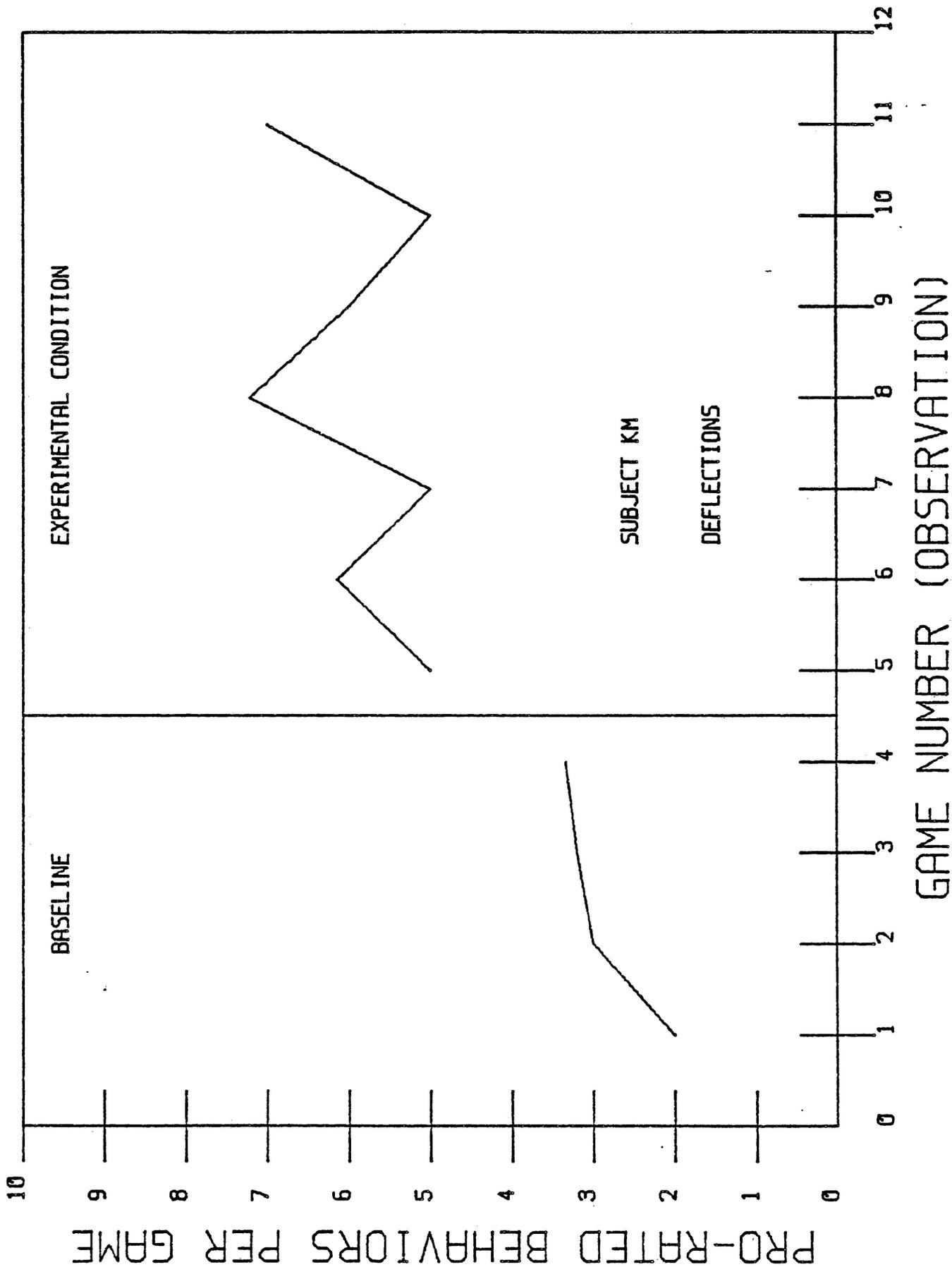
Figure D-6. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION
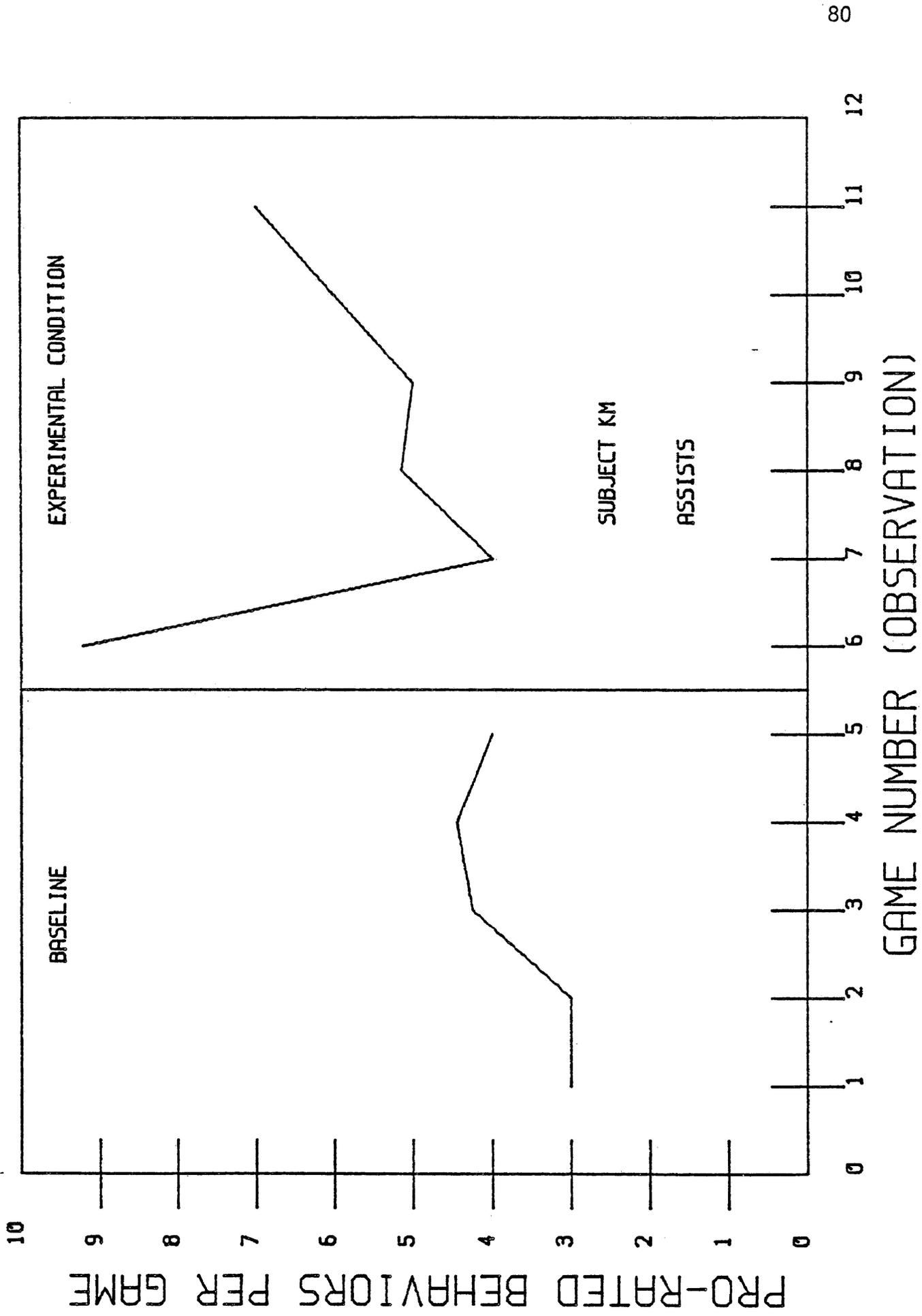
SUBJECT KM

ASSISTS

Figure D-7. Behavioral Graphs.
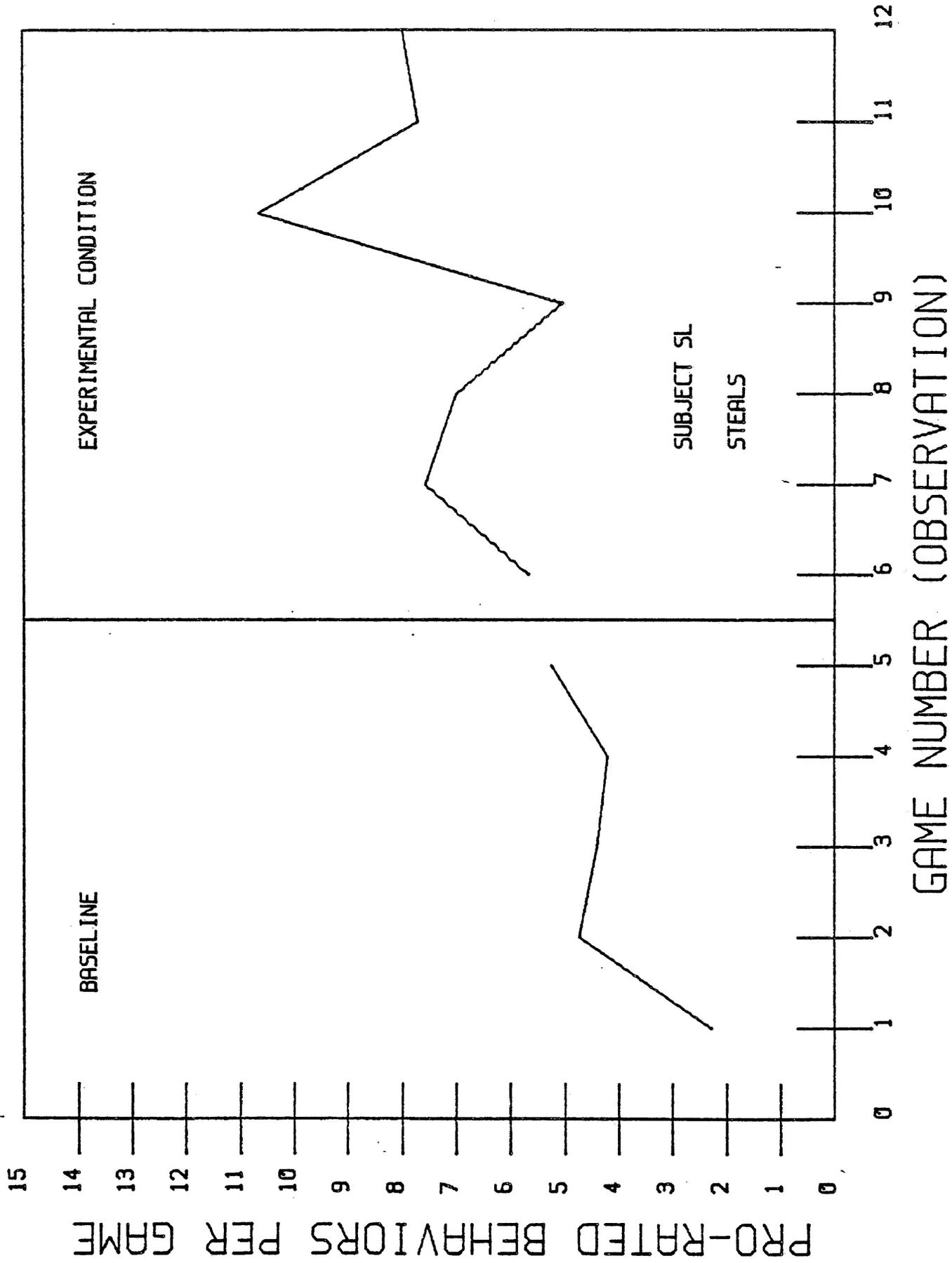
Figure D-8. Behavioral Graphs.
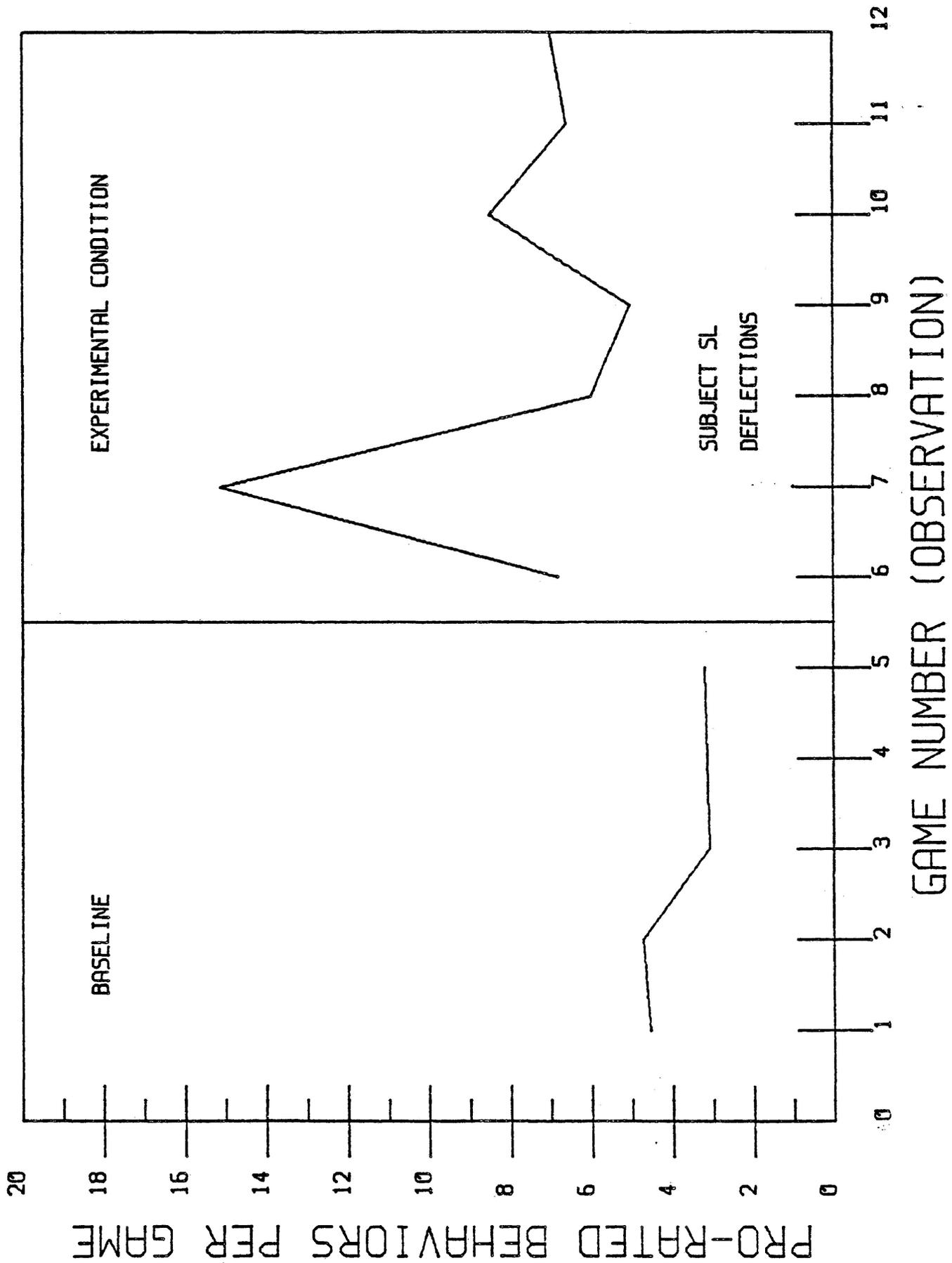
Figure D-9. Behavioral Graphs.

BASELINE

EXPERIMENTAL CONDITION

SUBJECT SL

ASSISTS

GAME NUMBER (OBSERVATION)

PRO-RATED BEHAVIORS PER GAME

84
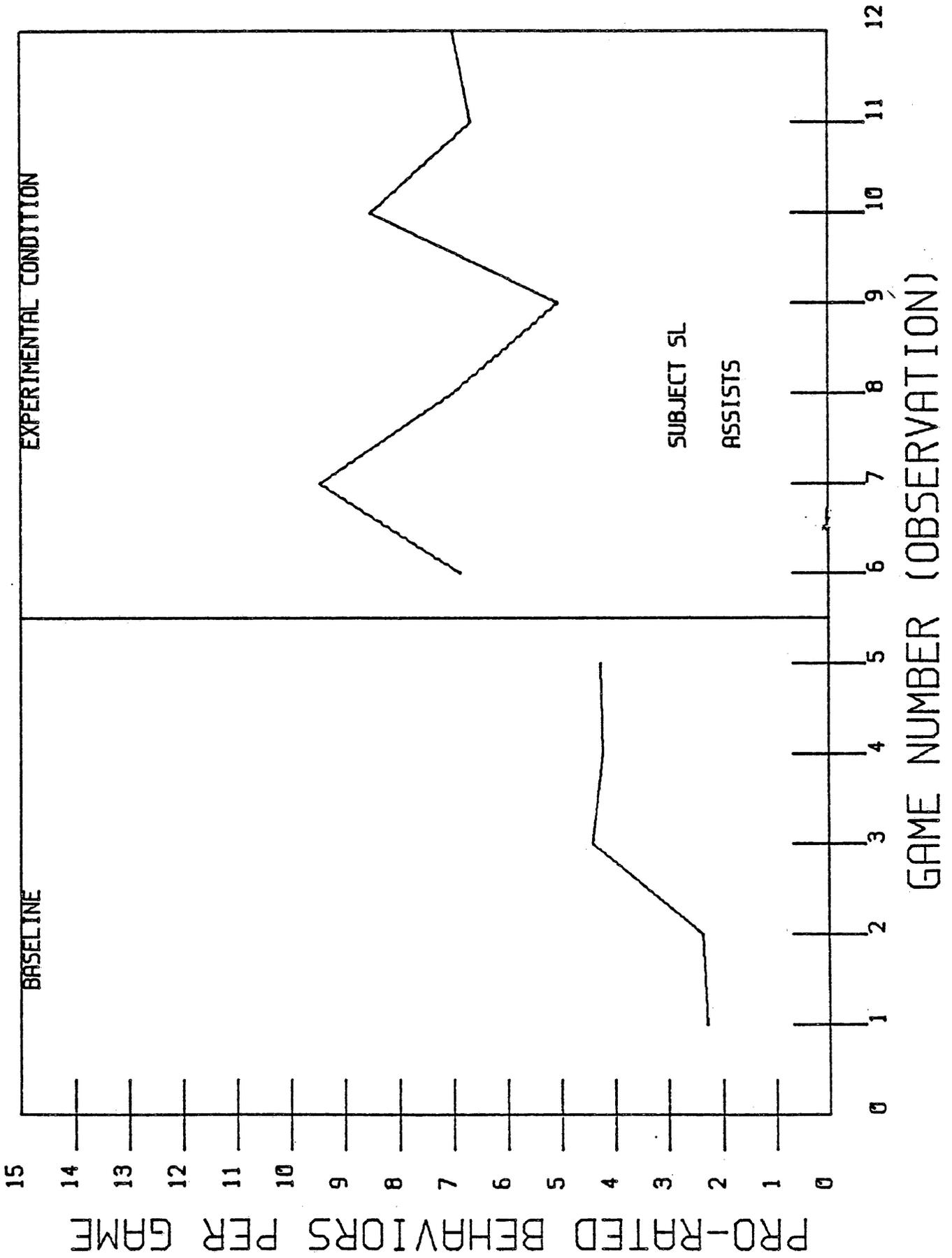
Figure D-10. Behavioral Graphs.
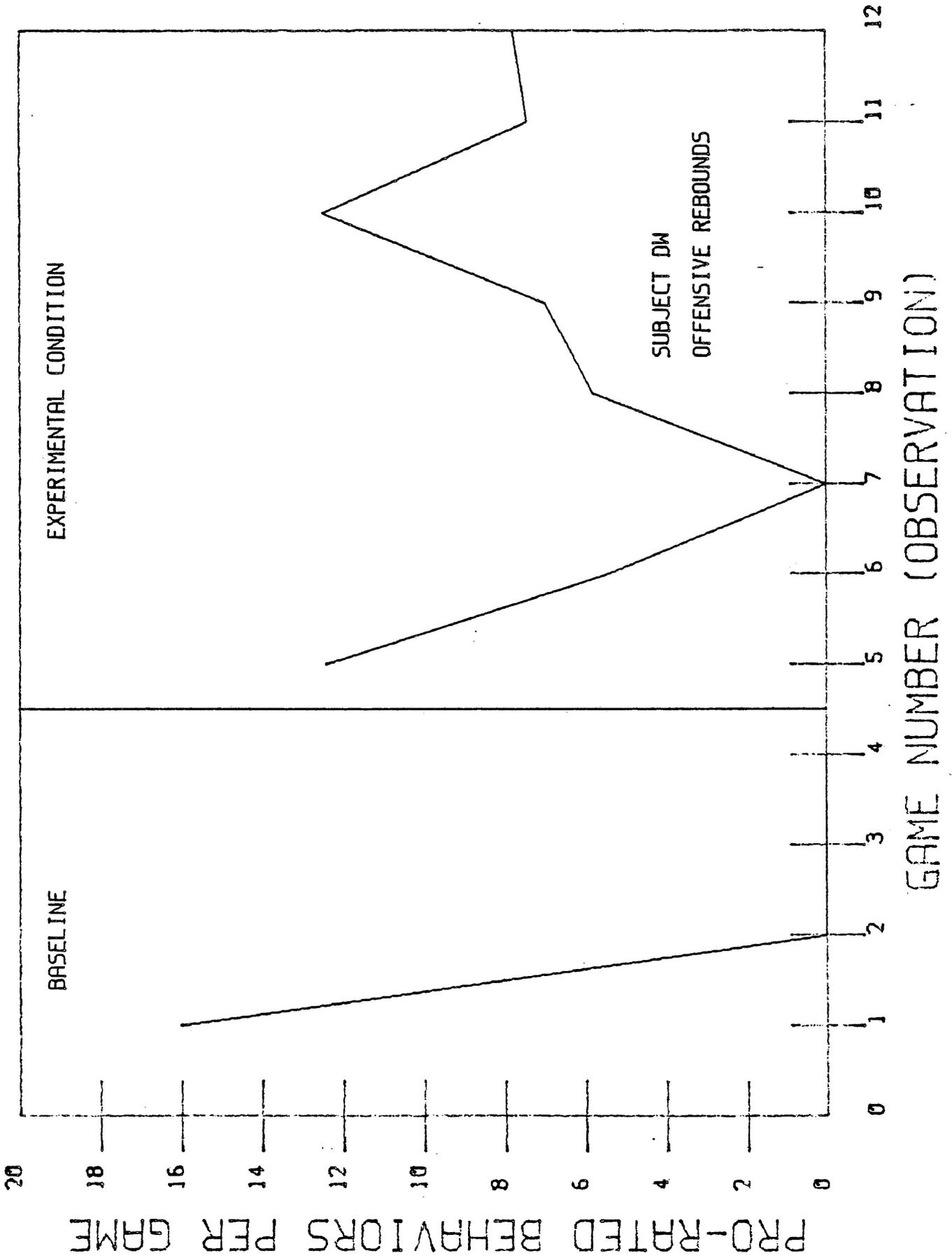
Figure D-11.   Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT DW
DEFENSIVE REBOUNDS
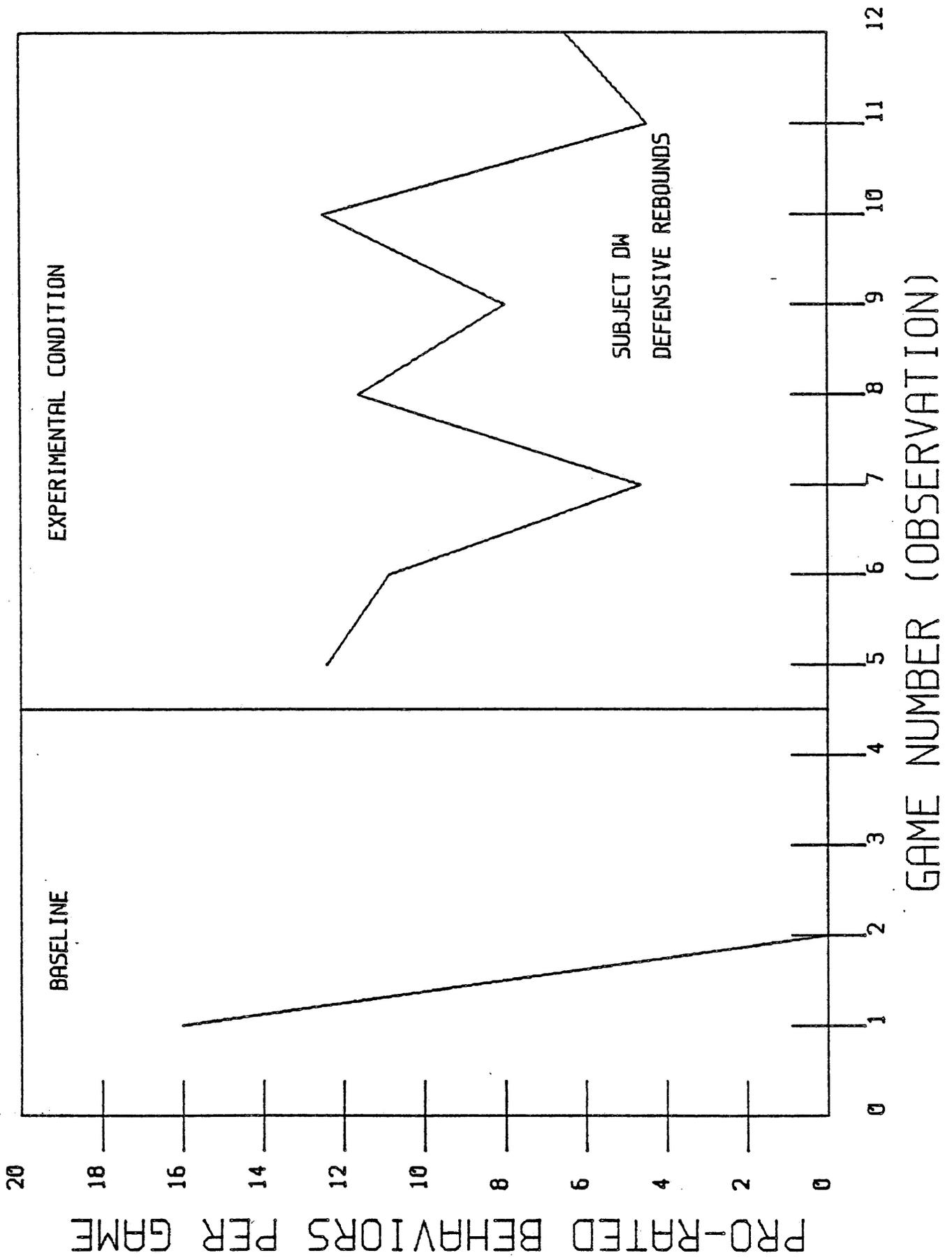
Figure D-12. Behavioral Graphs.

Figure D-13. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT DB

OFFENSIVE REBOUNDS
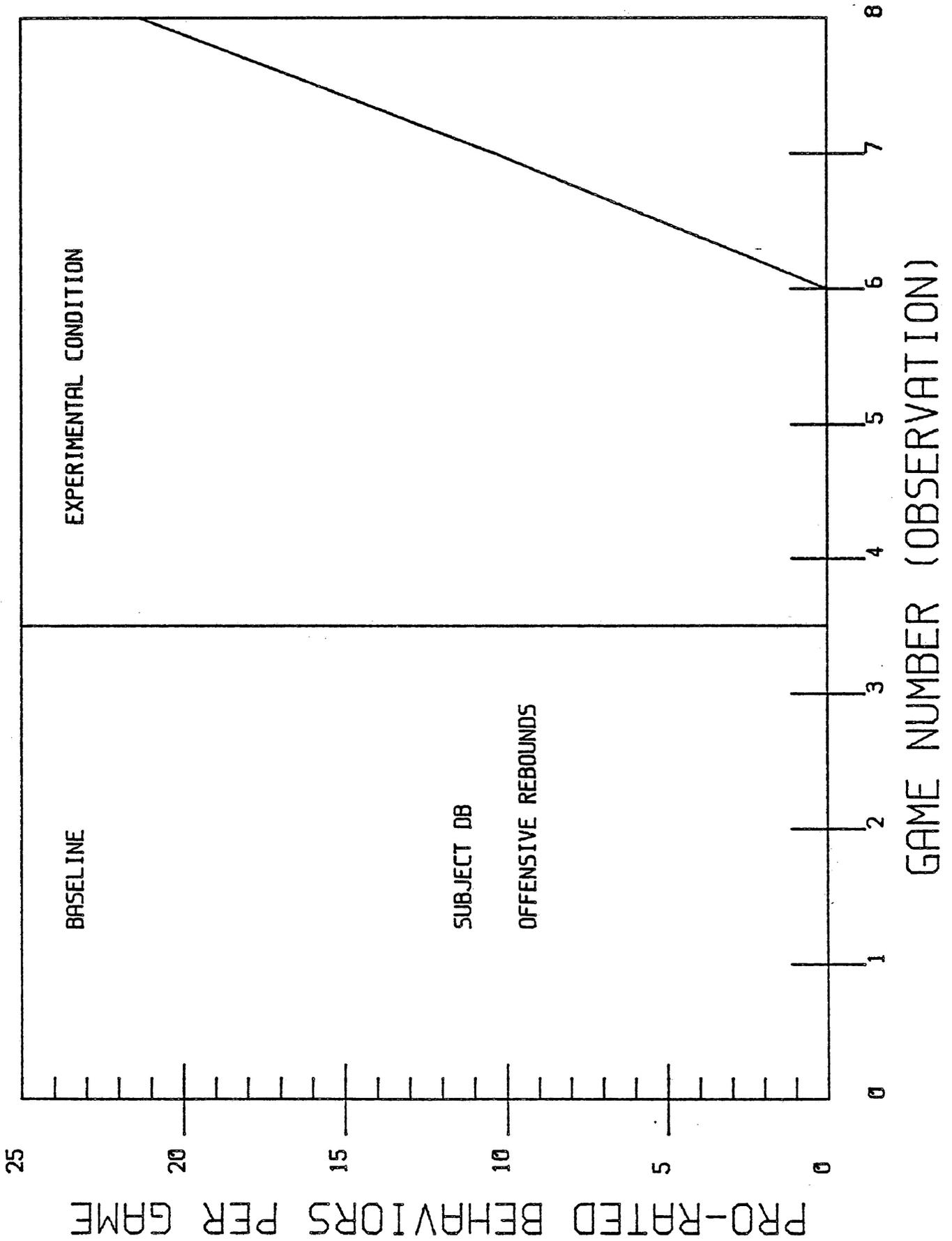
Figure D-14. Behavioral Graphs.

Y-axis: PRO-RATED BEHAVIORS PER GAME (0, 5, 10, 15, 20, 25)

X-axis: GAME NUMBER (OBSERVATION) (0, 1, 2, 3, 4, 5, 6, 7, 8)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT DB

DEFENSIVE REBOUNDS

89
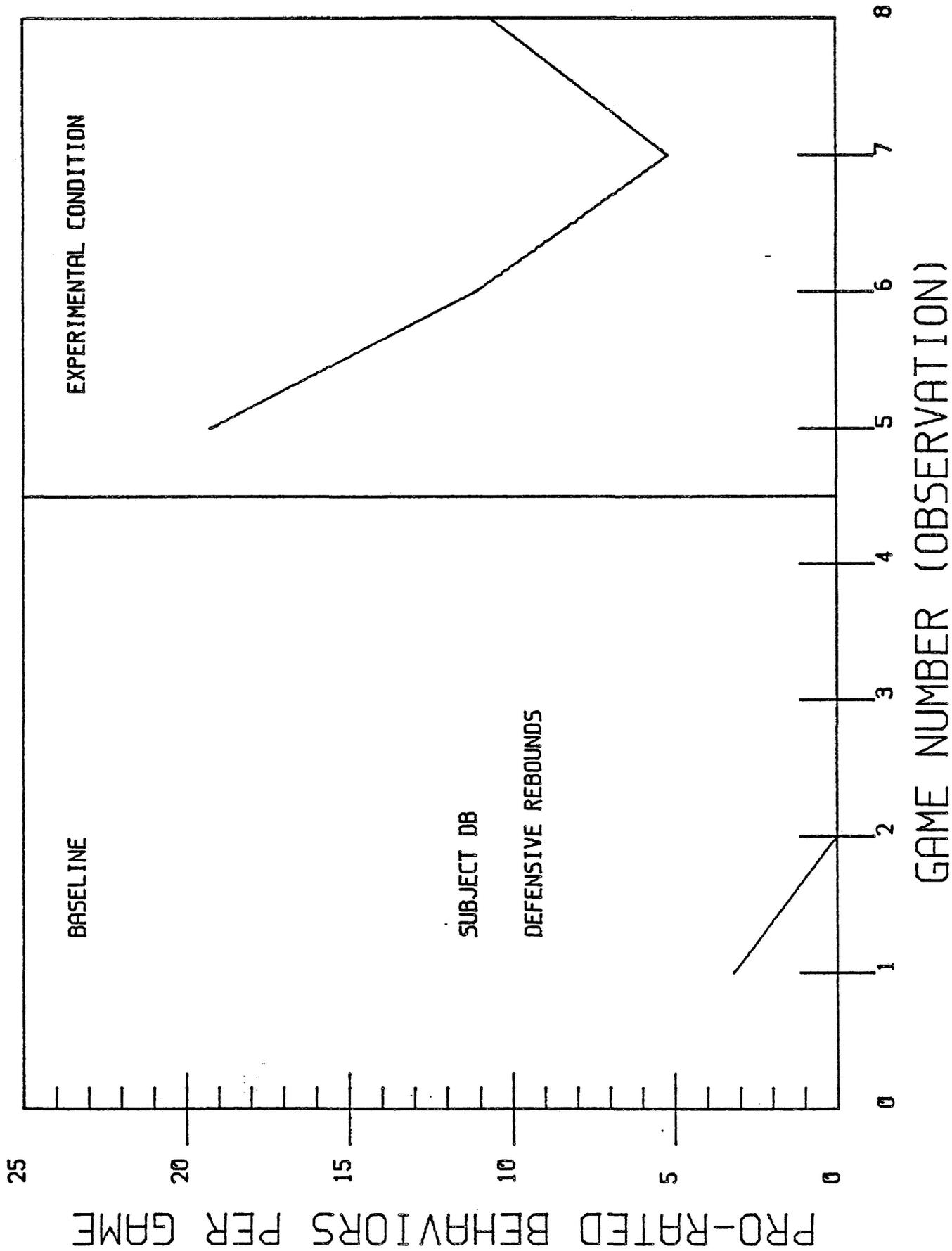
Figure D-15. Behavioral Graphs.
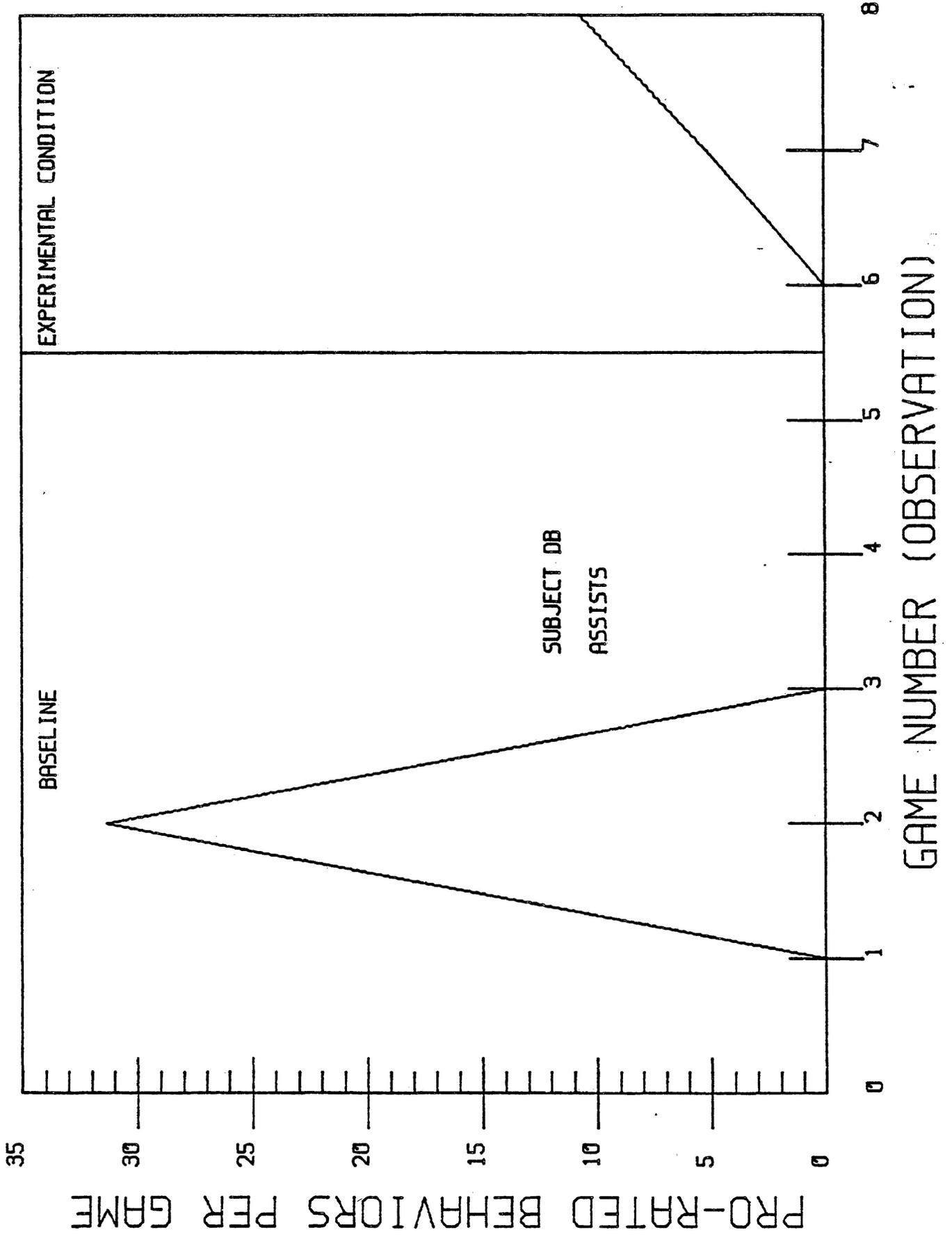
Figure D-16. Behavioral Graphs.
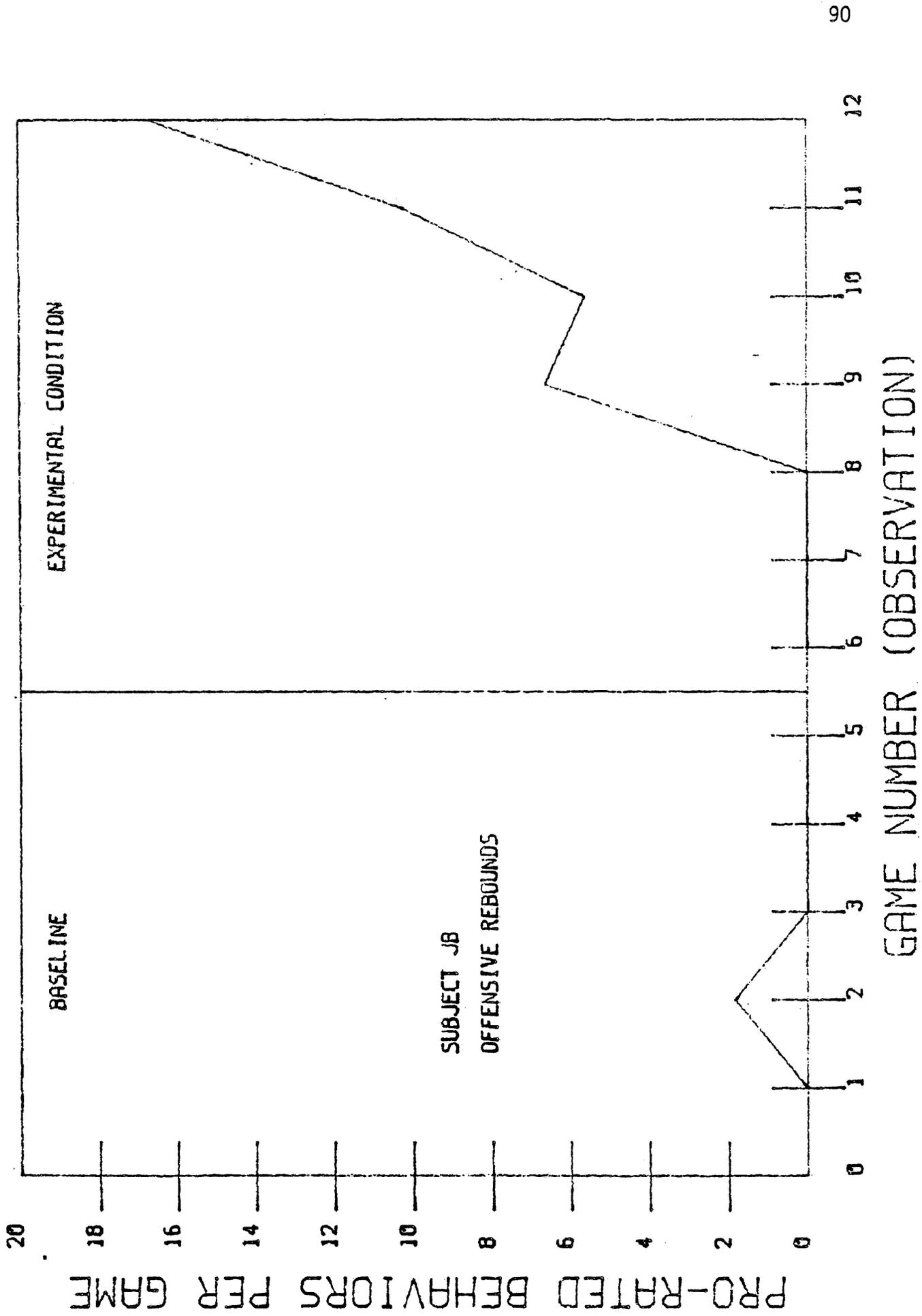
Figure D-17. Behavioral Graphs.

GAME NUMBER (OBSERVATION)

PRO-RATED BEHAVIORS PER GAME

BASELINE

EXPERIMENTAL CONDITION

SUBJECT JB
DEFENSIVE REBOUNDS
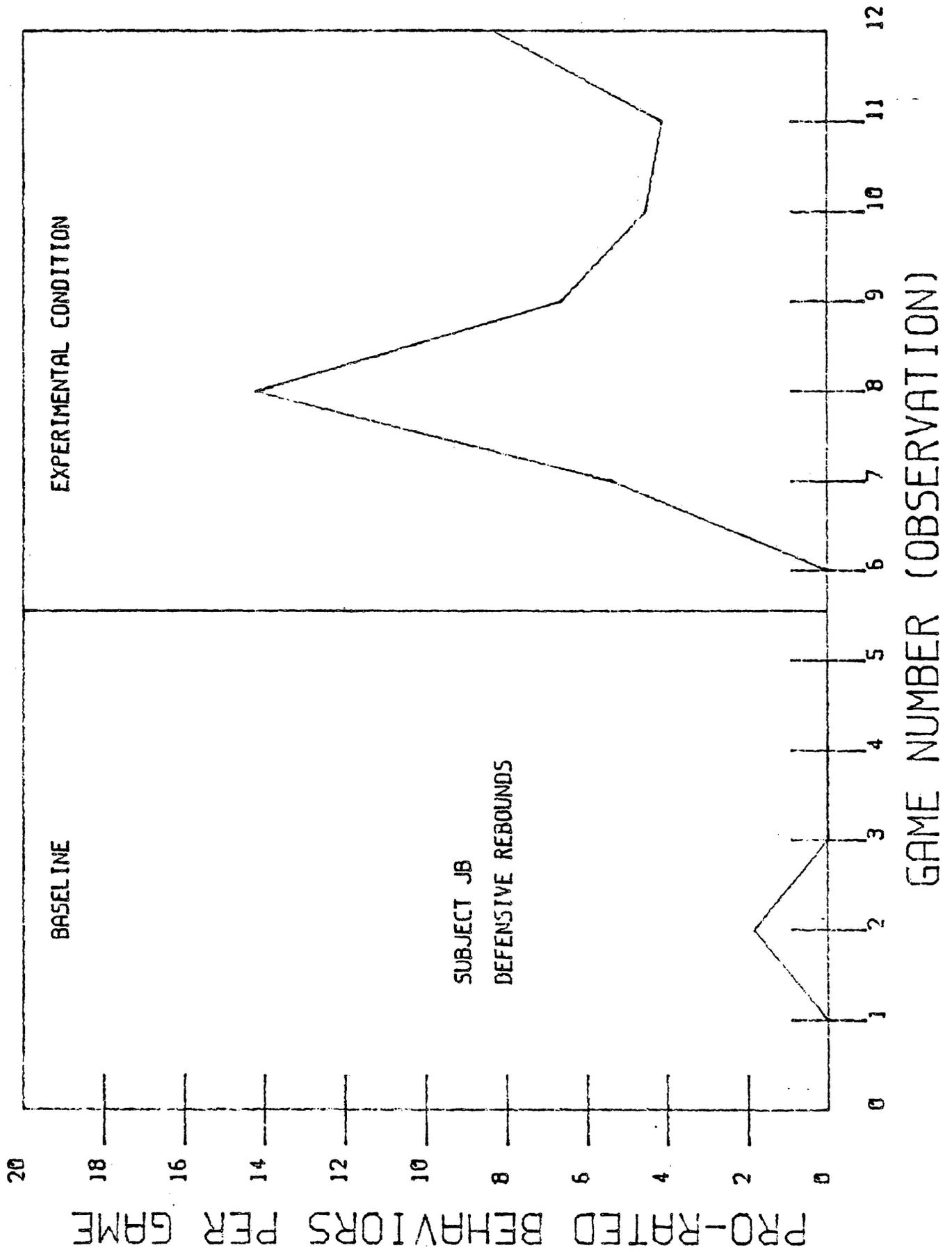
Figure D-18. Behavioral Graphs.

ATTEMPTED BASELINE

SUBJECT JB

ASSISTS

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)
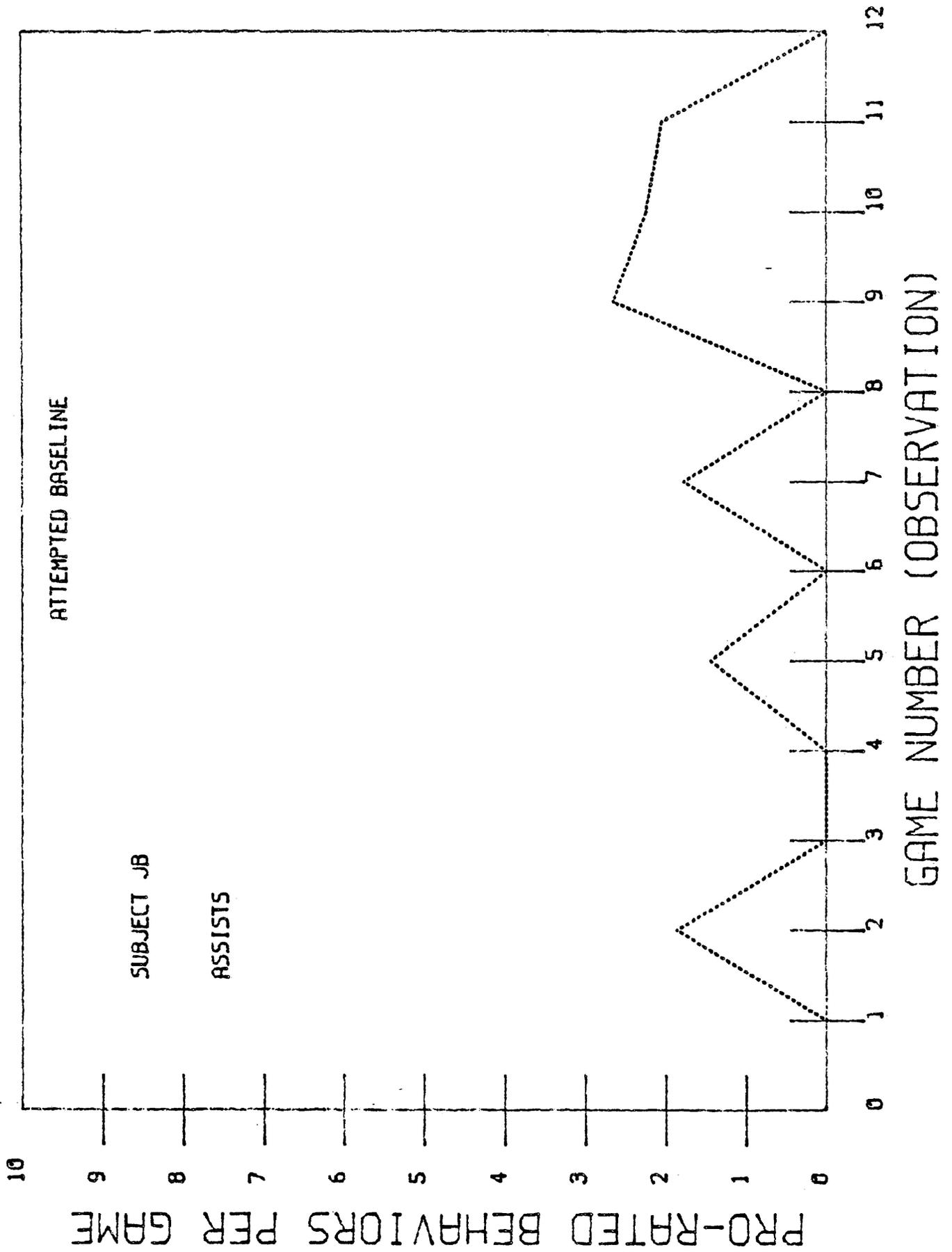
Figure D-19. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

INJURED   BASELINE   EXPERIMENTAL   ILLNESS   EXP

SUBJECT MA

OFFENSIVE REBOUNDS
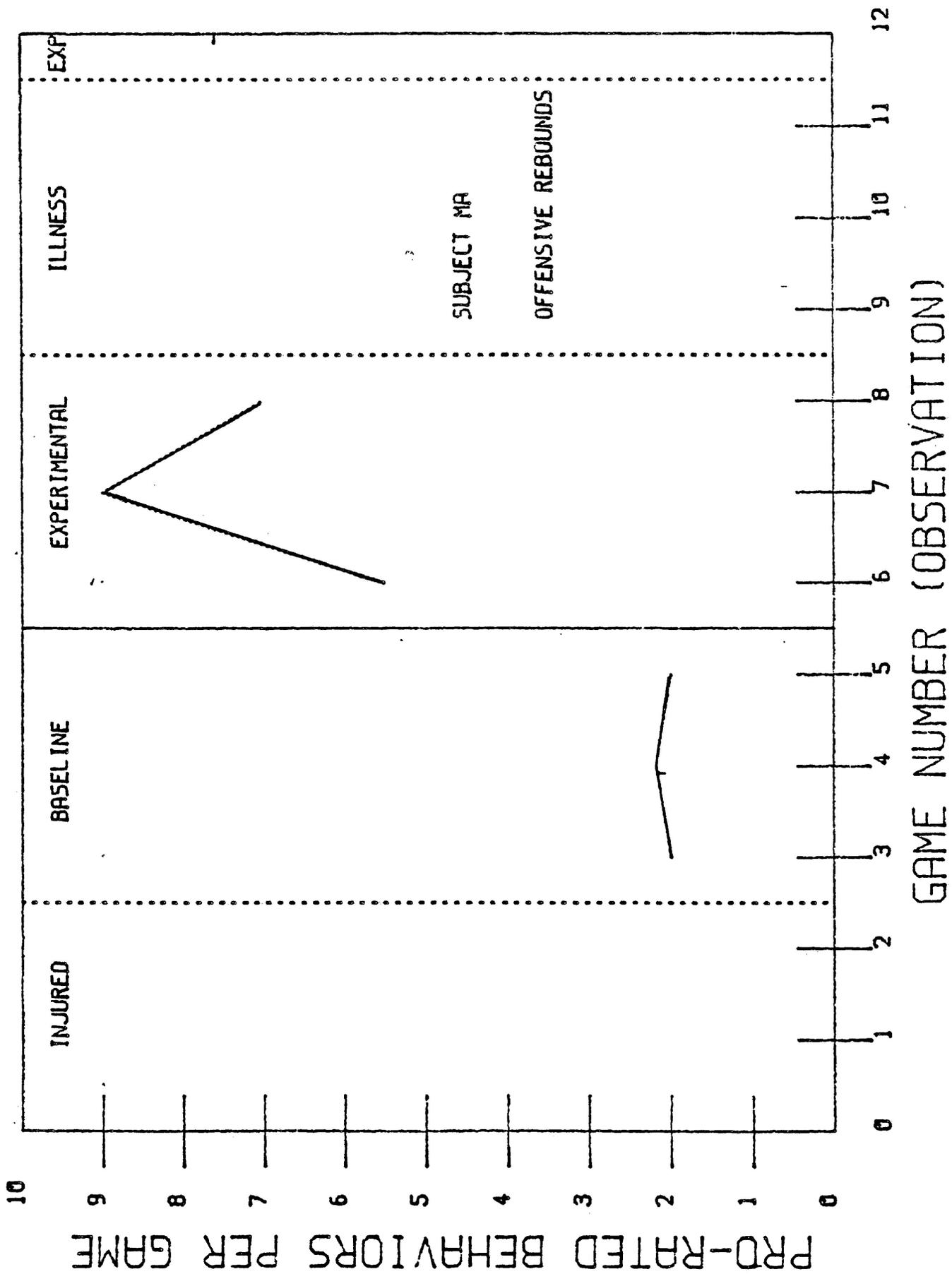
Figure D-20. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

INJURED   BASELINE   EXPERIMENTAL   ILLNESS   EXP

SUBJECT MA

DEFENSIVE REBOUNDS
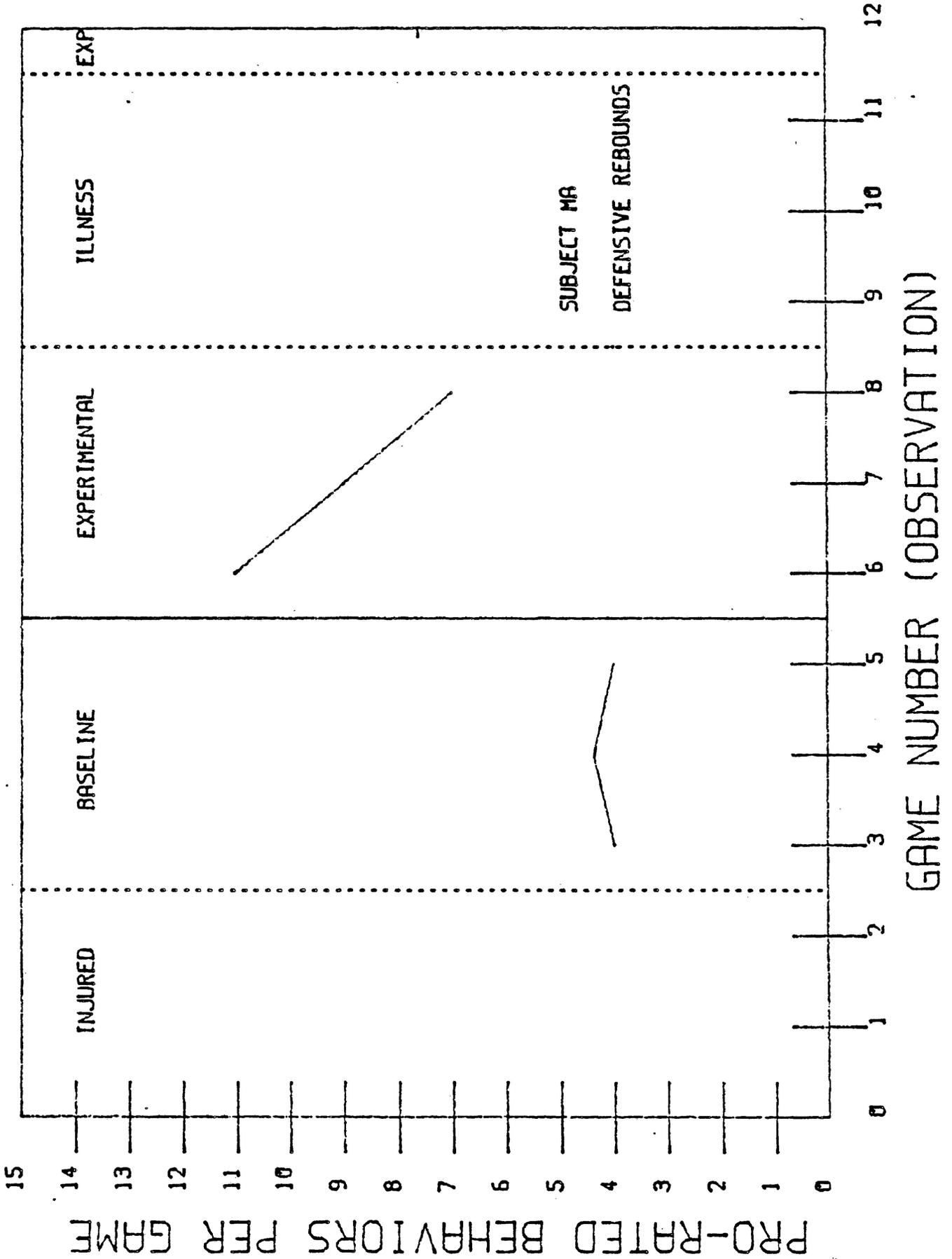
Figure D-21. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

INJURED BASELINE EXPERIMENTAL ILLNESS EXP

SUBJECT MA

ASSISTS
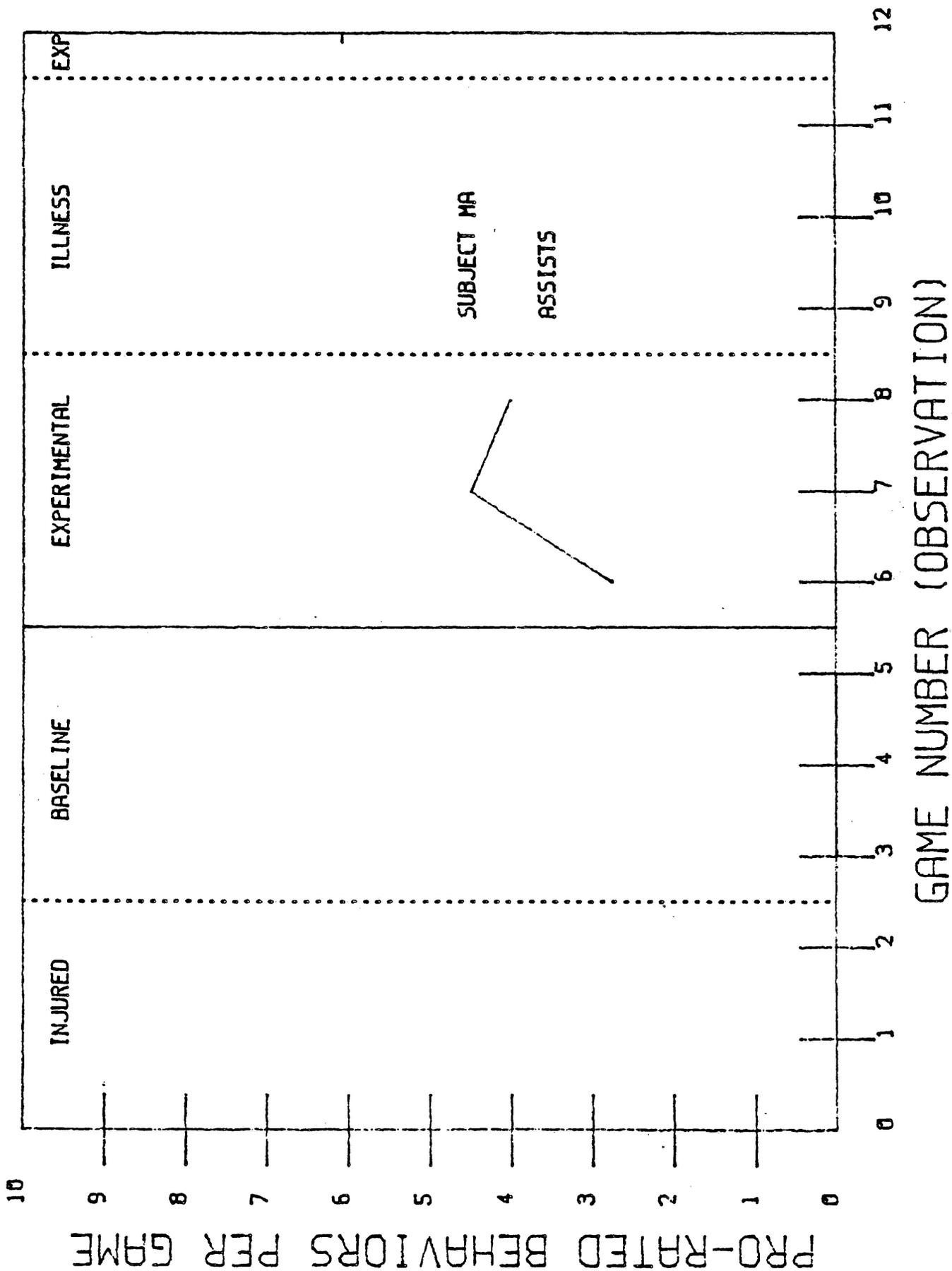
Figure D-22. Behavioral Graphs.

EXPERIMENTAL CONDITION

BASELINE

SUBJECT JC

OFFENSIVE REBOUNDS

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)
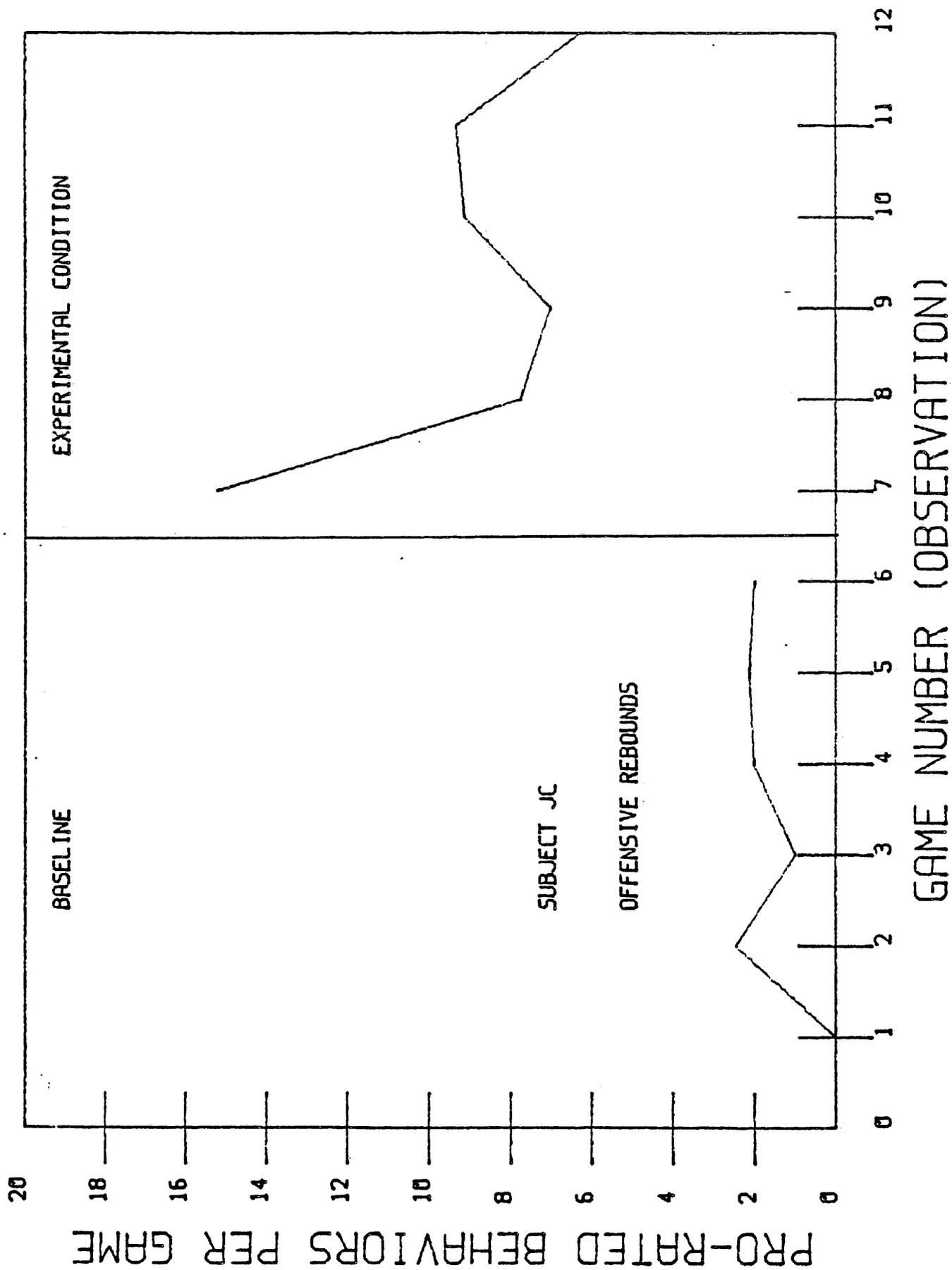
Figure D-23. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT JC

DEFENSIVE REBOUNDS
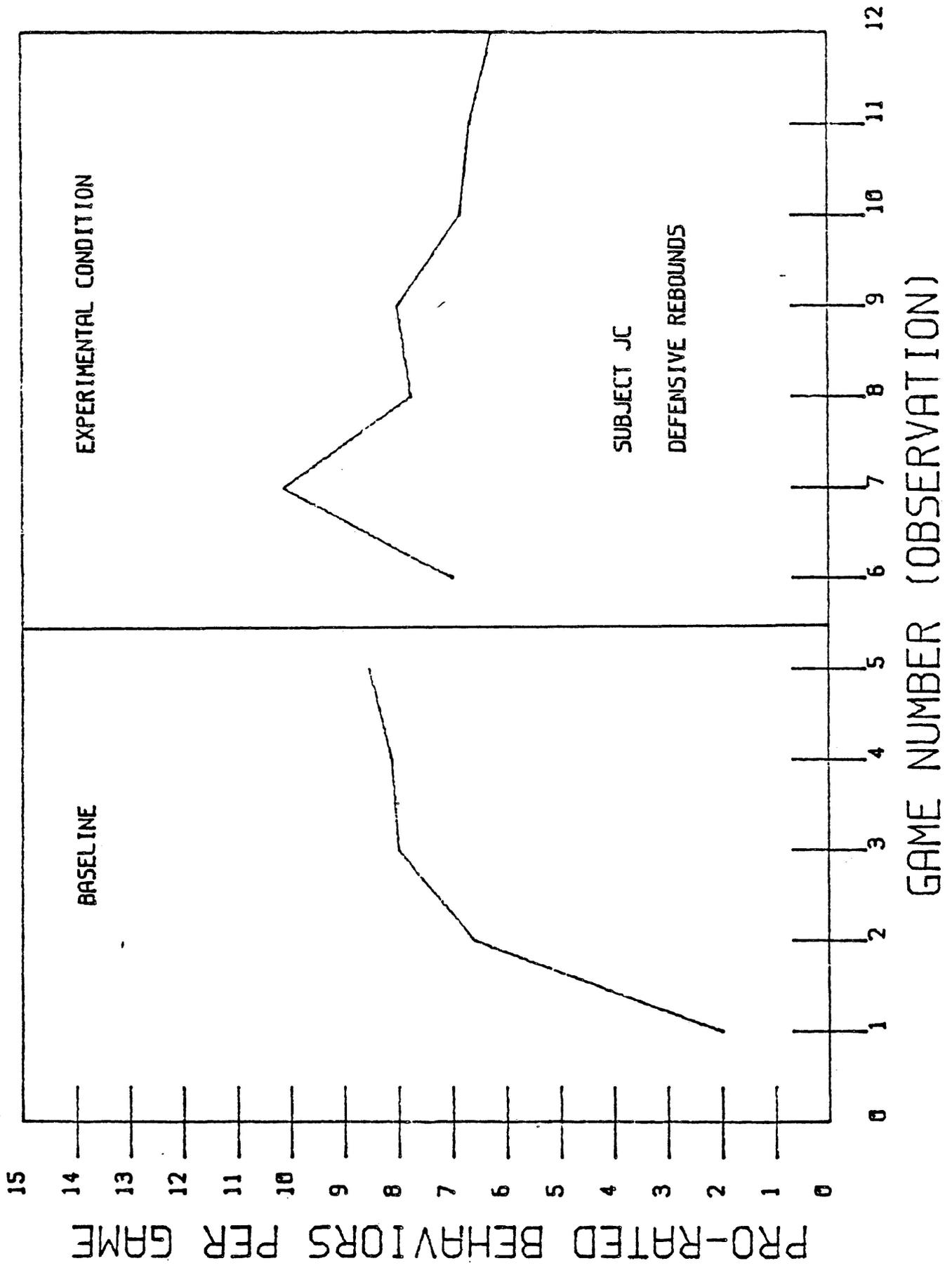
Figure D-24. Behavioral Graphs.
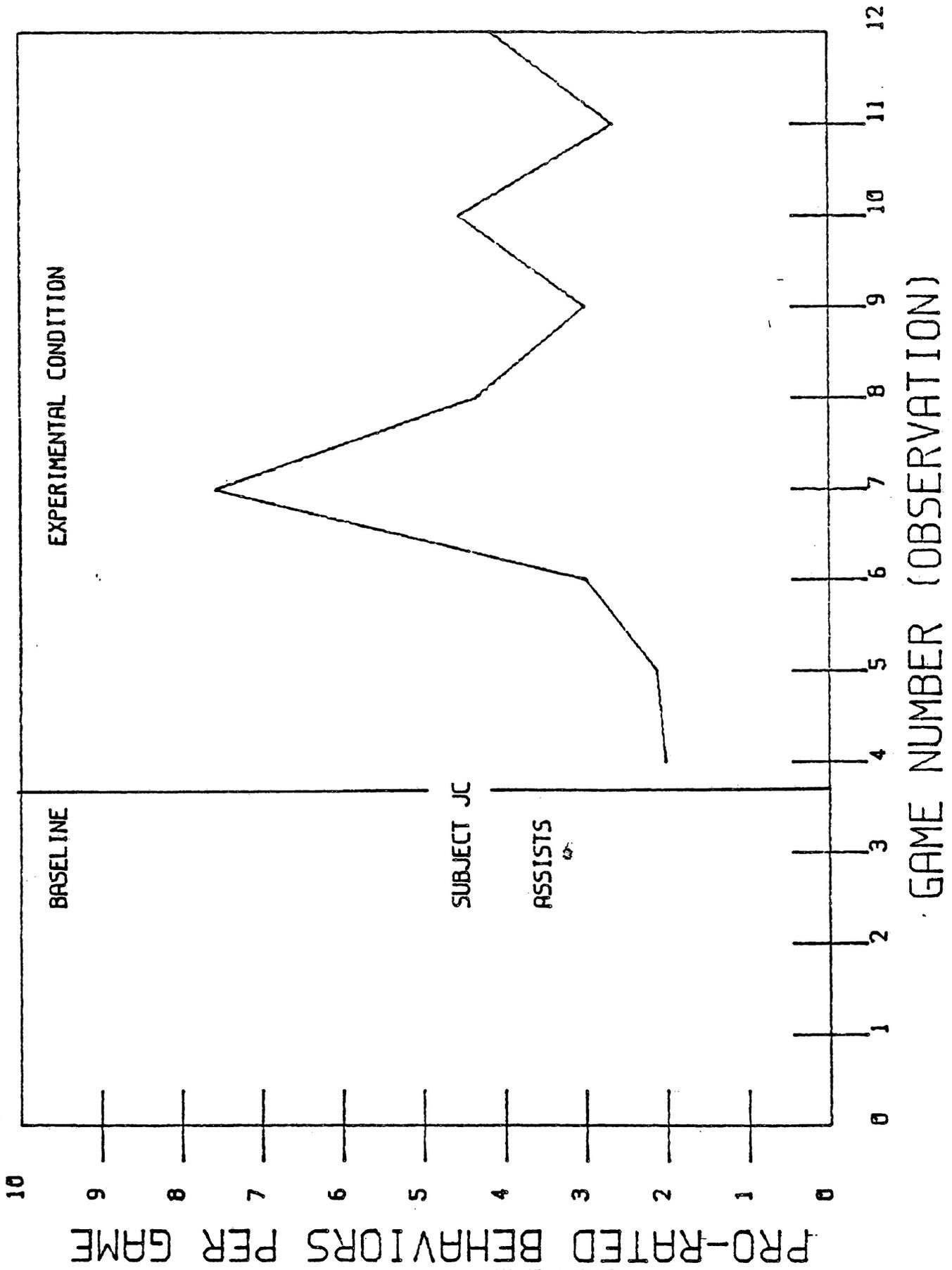
Figure D-25. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT TH

OFFENSIVE REBOUNDS
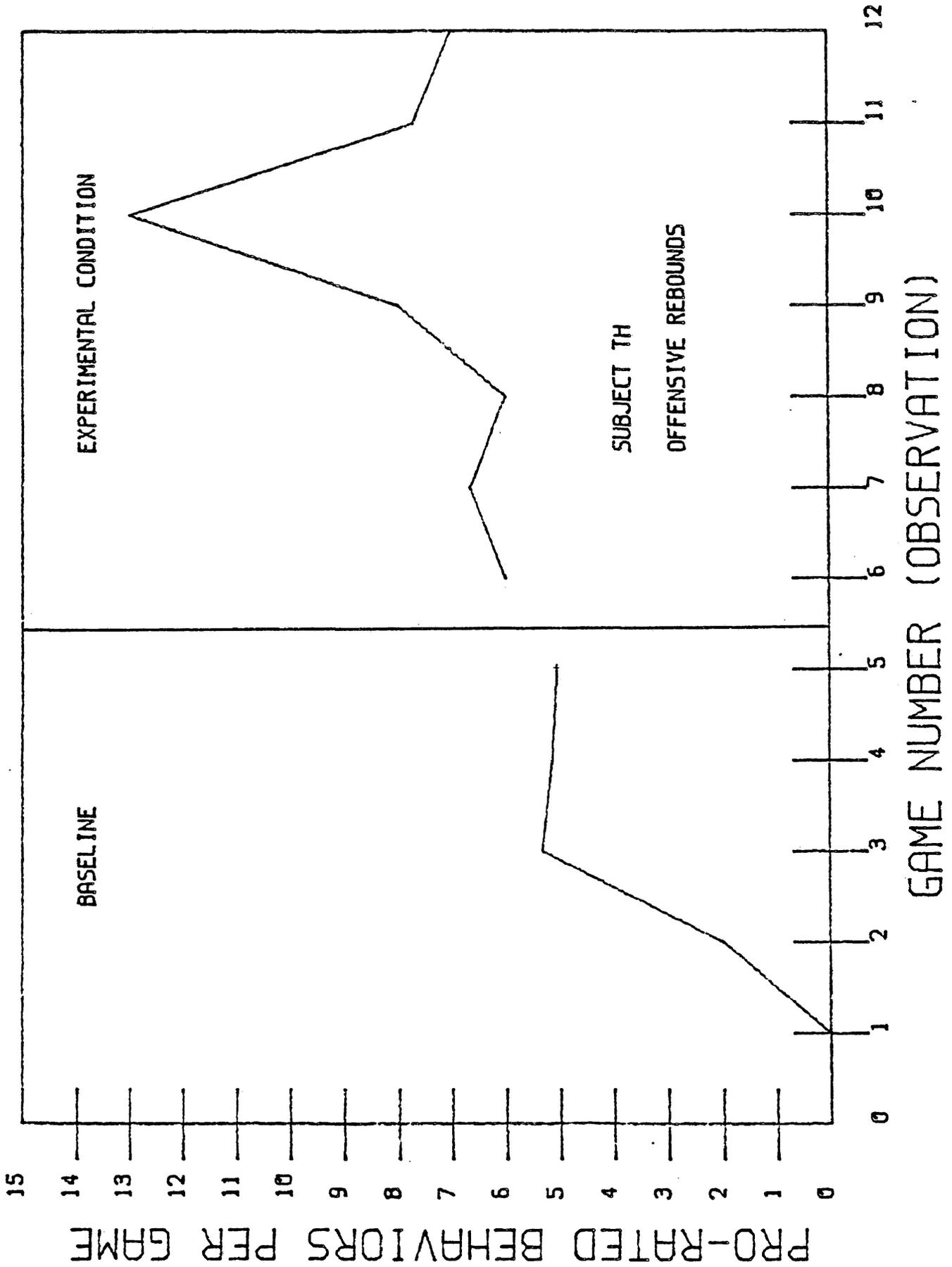
Figure D-26. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME (vertical axis, 0 to 10)

GAME NUMBER (OBSERVATION) (horizontal axis, 0 to 12)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT TH

DEFENSIVE REBOUNDS

101
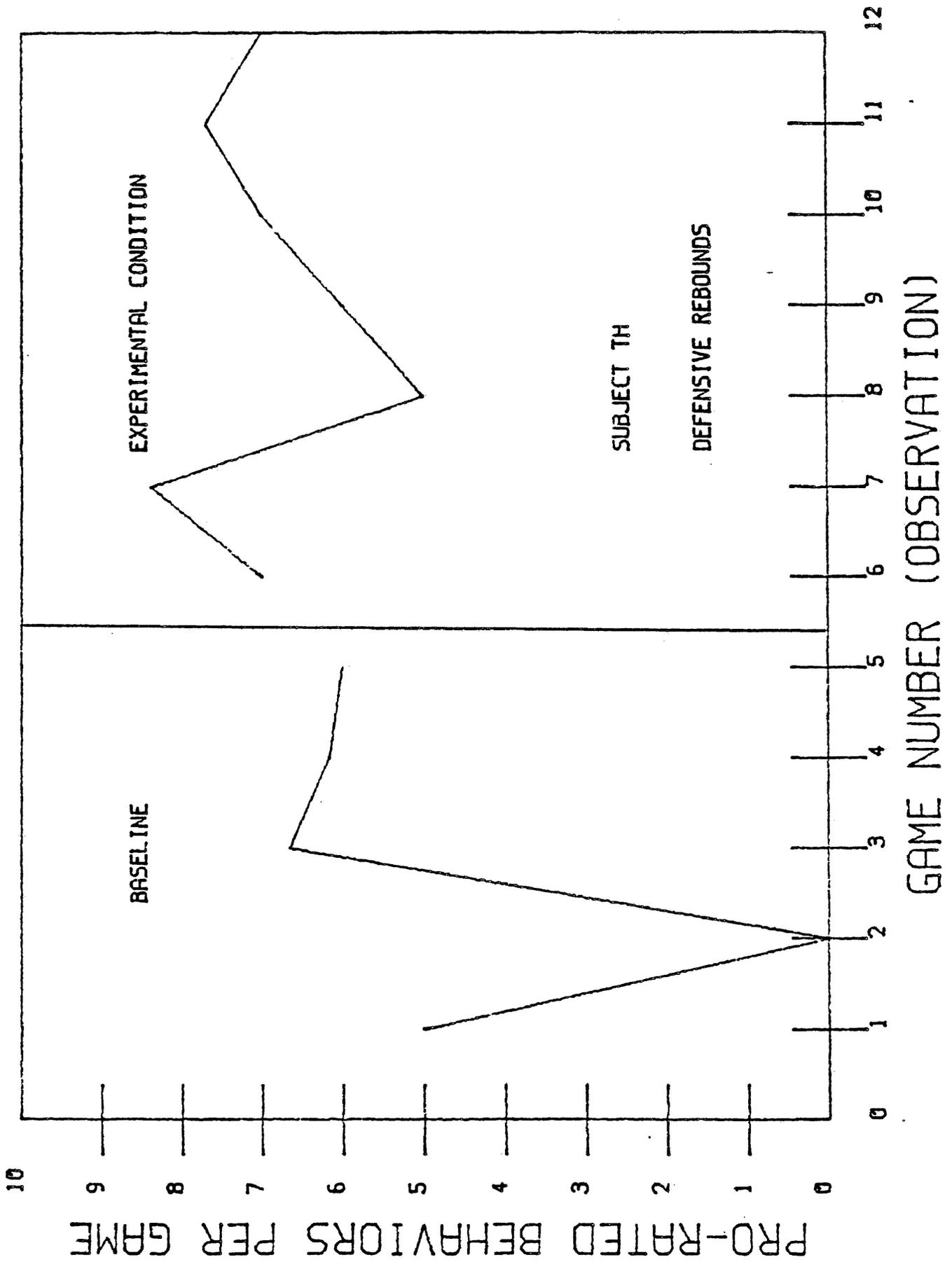
Figure D-27. Behavioral Graphs.

PRO-RATED BEHAVIORS PER GAME

GAME NUMBER (OBSERVATION)

BASELINE

EXPERIMENTAL CONDITION

SUBJECT TH

ASSISTS
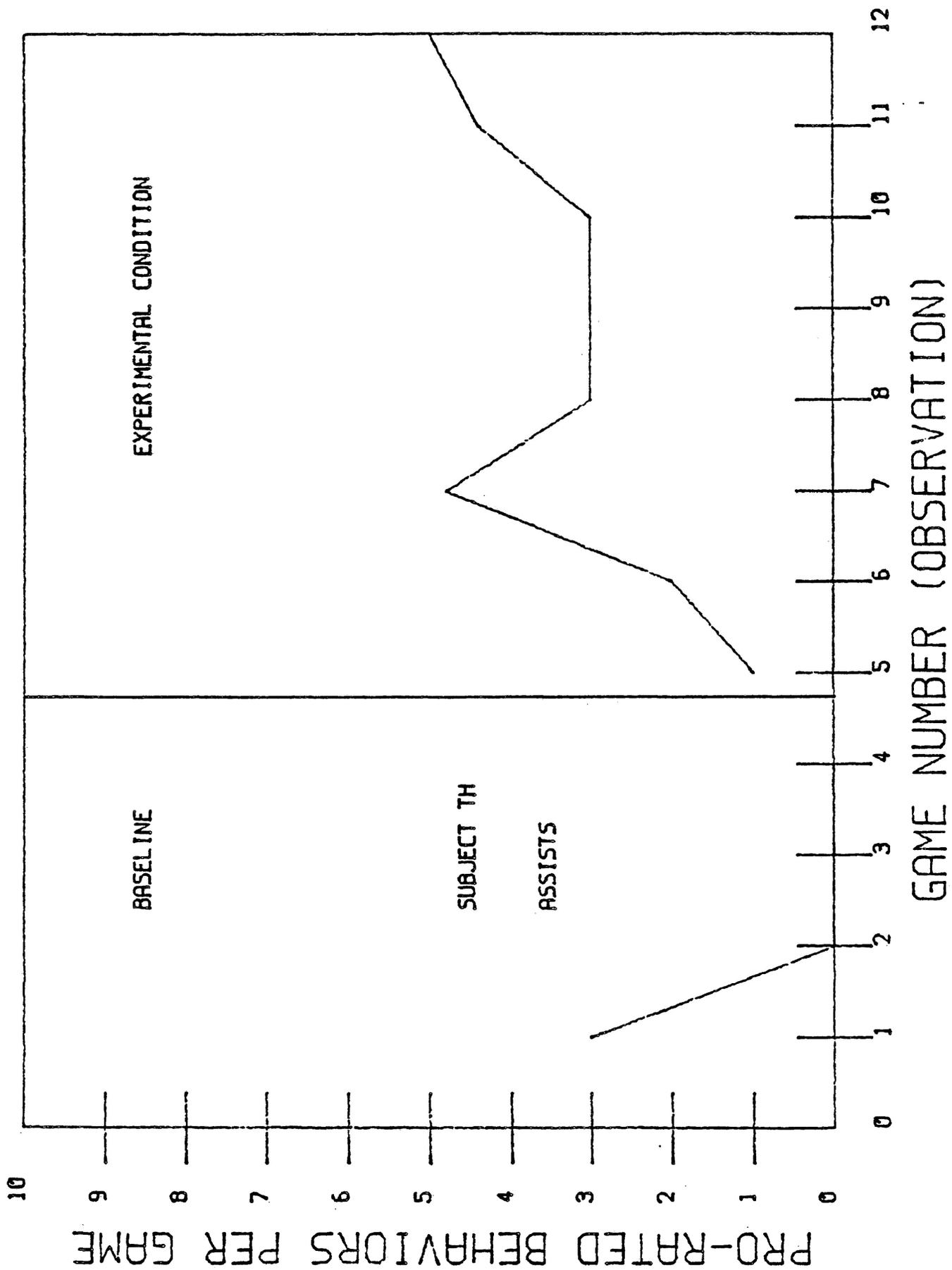
APPENDIX E

Table E-1. Performance Standards – Subject T.H.

Pro-Rated Task	Game 3 vs. R.L. T.P.	Goal for Game 4	Game 4 vs. Dry. T.P. 31:06	Goal for Game 5	Game 5 vs. Ken. T.P. 32:00	Goal for Game 6
Offensive Reb.					5	6
Defensive Reb.					6	7
Assists			0	2	1	2

Pro-Rated Task	Game 6 vs. Ken. T.P. 32:00	Goal for Game 7	Game 7 vs. R.R. T.P. 26:15	Goal for Game 8	Game 8 vs. Dry. T.P. 32:00	Goal for Game 9
Offensive Reb.	6*	7	6.66	6	6*	7
Defensive Reb.	7*	8	8.4*	7	5	6
Assists	2*	3	4.8*	4	3	4

* goal attained

Table E-1. (continued)

Pro-Rated Task	Game 9 vs. Falls T.P. 32:00	Goal for Game 10	Game 10 vs R.R. T.P. 32:00	Goal for Game 11	Game 11 vs R.L. T.P. 29:00	Goal for Game 12
Offensive Reb.	8*	9	13*	9	7.77	8
Defensive Reb.	6*	8	7	8	7.77	8
Assists	3	4	3	4	4.44*	5

Pro-Rated Task	Game 12 vs. Ken. T.P. 32:00
Offensive Reb.	7
Defensive Reb.	7
Assists	5*

* goal attained

Table E-2. Performance Standards - Subject J.C.

Pro-Rated Task	Game 3 vs. R.L. T.P. 32:00	Goal for Game 4	Game 4 vs. Dry. T.P. 31:33	Goal for Game 5	Game 5 vs. Ken. T.P. 15:00	Goal for Game 6
Offensive Reb.						
Defensive Reb.					8.53	6
Assists	0	1	2.02*	3	2.13	3

Pro-Rated Task	Game 6 vs. Ken. T.P. 32:00	Goal for Game 7	Game 7 vs. R.R. T.P. 12:38	Goal for Game 8	Game 8 vs. Dry. T.P. 22:00	Goal for Game 9
Offensive Reb.	2	4	15.20*	5	7.75*	7
Defensive Reb.	7*	8	10.20*	8	7.75	8
Assists	3*	4	7.59*	5	4.35	4

* goal attained

Table E-2. (continued)

Pro-Rated Task	Game 9 vs. T.P. 32:00	Goal for Game 10	Game 10 vs R.R. T.P. 28:00	Goal for Game 11	Game 11 vs. R.L. T.P. 24:00	Goal for Game 12
Offensive Reb.	7*	8	9.12*	9	9.31*	9
Defensive Reb.	8*	9	6.84	7	6.65	8
Assists	3	4	4.56*	5	2.66	4

Pro-Rated Task	Game 12 vs. Ken. T.P. 15:23
Offensive Reb.	6.24
Defensive Reb.	6.24
Assists	4.16*

* goal attained

Table E-3. Performance Standards - Subject M.A.

Pro-Rated Task	Game 3 vs. R.L. T.P.	Goal for Game 4	Game 4 vs. Dry. T.P.	Goal for Game 5	Game 5 vs. Ken. T.P. 32:00	Goal for Game 6
Offensive Reb.					2	4
Defensive Reb.					4	6
Assists					0	1

Pro-Rated Task	Game 6 vs. Ken. T.P. 23:07	Goal for Game 7	Game 7 vs. R.R. T.P. 14:11	Goal for Game 8	Game 8 vs. Dry. T.P. 32:00	Goal for Game 9
Offensive Reb.	5.52*	6	9*	8	7	8
Defensive Reb.	11.04*	9	9*	9	7	9
Assists	2.76*	2	4.5*	4	4*	5

* goal attained

Table E-3. (continued)

Pro-Rated Task	Game 9 vs. T.P. ---	Goal for Game 10	Game 10 vs R.R. T.P. ---	Goal for Game 11	Game 11 vs. R.L. T.P. ---	Goal for Game 12
Offensive Reb.	---	---	---	---	---	7
Defensive Reb.	---	---	---	---	---	6
Assists	---	---	---	---	---	4

Pro-Rated Task	Game 12 vs. Ken. T.P. 20:57
Offensive Reb.	7.6*
Defensive Reb.	7.6*
Assists	6.08*

* goal attained

Table E-4. Performance Standards - Subject J.B.

Pro-Rated Task	Game 3 vs. R.L. T.P.	Goal for Game 4	Game 4 vs. Dry. T.P.	Goal for Game 5	Game 5 vs. Ken. T.P. 22:00	Goal for Game 6
Offensive Reb.		1			0	1
Defensive Reb.		2			0	1
Assists						

Pro-Rated Task	Game 6 vs. Ken. T.P. 3:00	Goal for Game 7	Game 7 vs. R.R. T.P. 17:52	Goal for Game 8	Game 8 vs. Dry. T.P. 4:30	Goal for Game 9
Offensive Reb.	0	1	0	1	0	1
Defensive Reb.	0	2	5.37*	3	14.22*	4
Assists						

* goal attained

Table E-4. (continued)

Pro-Rated Task	Game 9 vs. T.P. 24:00	Goal for Game 10	Game 10 vs R.R. T.P. 28:20	Goal for Game 11	Game 11 vs. R.L. T.P. 15:34	Goal for Game 12
Offensive Reb.	6.65*	4	5.64*	5	10.25*	5
Defensive Reb.	6.65*	5	4.51	5	4.1	5
Assists						

Pro-Rated Task	Game 12 vs. Ken. T.P. 3:50
Offensive Reb.	16.69*
Defensive Reb.	8.34*
Assists	

* goal attained

Table E-5. Performance Standards - Subject D.B.

Pro-Rated Task	Game 3 vs. R.L. T.P. 1:30	Goal for Game 4	Game 4 vs. Dry. T.P. :54	Goal for Game 5	Game 5 vs. Ken. T.P. 1:40	Goal for Game 6
Offensive Reb.	0	1	0	1	0	1
Defensive Reb.	2		0	1	19.27*	2
Assists	1		0		0	1

Pro-Rated Task	Game 6 vs. Ken. T.P.	Goal for Game 7	Game 7 vs. R.R. T.P. 5:45	Goal for Game 8	Game 8 vs. Dry. T.P.	Goal for Game 9
Offensive Reb.	---	1	0	1	---	1
Defensive Reb.	---	2	11.13*	3	---	3
Assists	---	1	0	1	---	1

* goal attained

Table E-5. (continued)

Pro-Rated Task	Game 9 vs. T.P. ---	Goal for Game 10	Game 10 vs R.R. T.P. 6:12	Goal for Game 11	Game 11 vs. R.L. T.P. 3:00	Goal for Game 12
Offensive Reb.	---	1	10.32*	2	21.32*	3
Defensive Reb.	---	3	5.16*	4	10.66*	5
Assists	---	1	5.16*	2	10.66*	3

Pro-Rated Task	Game 12 vs. Ken. T.P. ---
Offensive Reb.	---
Defensive Reb.	---
Assists	---

* goal attained

Table E-6. Performance Standards - Subject D.W.

Pro-Rated Task	Game 3 vs. R.L. T.P. 2:00	Goal for Game 4	Game 4 vs. Dry. T.P. :27	Goal for Game 5	Game 5 vs. Ken. T.P. 2:35	Goal for Game 6
Offensive Reb.			0	1	12.40*	2
Defensive Reb.			0	1	12.40*	2
Assists	0	1	0	1	0	1

Pro-Rated Task	Game 6 vs. Ken. T.P. 5:53	Goal for Game 7	Game 7 vs. R.R. T.P. 13:45	Goal for Game 8	Game 8 vs. Dry. T.P. 5:30	Goal for Game 9
Offensive Reb.	5.53*	3	0	3	5.8*	4
Defensive Reb.	10.86*	3	4.65*	3	11.63*	4
Assists	0	1	2.32*	2	0	2

* goal attained

Table E-6. (continued)

Pro-Rated Task	Game 9 vs. T.P. 8:00	Goal for Game 10	Game 10 vs R.R. T.P. 12:45	Goal for Game 11	Game 11 vs. R.L. T.P. 21.22	Goal for Game 12
Offensive Reb.	7*	5	12.5*	6	7.45*	4
Defensive Reb.	8*	5	12.5*	6	4.47	3
Assists	4*	3	15.00*	4	1.49	2

Pro-Rated Task	Game 12 vs. Ken. T.P. 24:30
Offensive Reb.	7.8*
Defensive Reb.	6.5*
Assists	3.9*

* goal attained

Table E-7. Performance Standards - Subject K.M.

Pro-Rated Task	Game 3 vs. R.L. T.P. 30:00	Goal for Game 4	Game 4 vs. Dry. T.P. 28:44	Goal for Game 5	Game 5 vs. Ken. T.P. 00:00	Goal for Game 6
Steals	3.20	4	3.16	4	---	4
Deflections		5	3.34	5	---	5
Assists						

Pro-Rated Task	Game 6 vs. Ken. T.P. 32:00	Goal for Game 7	Game 7 vs. R.R. T.P. 20:48	Goal for Game 8	Game 8 vs. Dry. T.P. 32:00	Goal for Game 9
Steals	6*	6	6.15*	7	6	7
Deflections	6*	6	6.15*	7	5	7
Assists	4	5	9.22*	6	4	6

* goal attained

Table E-7. (continued)

Pro-Rated Task	Game 9 vs. Falls T.P. 30:52	Goal for Game 10	Game 10 vs R.R. T.P. 32:00	Goal for Game 11	Game 11 vs. R.L. T.P. 32:00	Goal for Game 12
Steals	6.18	7	8*	8	6	7
Deflections	7.21*	8	6	7	5	6
Assists	5.15	6	5	6	6*	7

Pro-Rated Task	Game 12 vs. Ken. T.P. 32:00
Steals	6
Deflections	7*
Assists	7*

* goal attained

Table E-8. Performance Standards - Subject S.L.

Pro-Rated Task	Game 3 vs. R.L. T.P.	Goal for Game 4	Game 4 vs. Dry. T.P.	Goal for Game 5	Game 5 vs. Ken. T.P. 30:00	Goal for Game 6
Steals					4.26	5
Deflections					3.20	4
Assists					4.26	5

Pro-Rated Task	Game 6 vs. Ken. T.P. 28:09	Goal for Game 7	Game 7 vs. R.R. T.P. 16:54	Goal for Game 8	Game 8 vs. Dry. T.P. 32:00	Goal for Game 9
Steals	5.68*	6	7.57*	7	7*	8
Deflections	6.81*	6	15.14*	7	6	7
Assists	6.81*	6	9.46*	7	7*	8

* goal attained

Table E-8. (continued)

Pro-Rated Task	Game 9 vs. T.P. 29:03	Goal for Game 10	Game 10 vs R.R. T.P. 15:00	Goal for Game 11	Game 11 vs. R.L. T.P. 28:51	Goal for Game 12
Steals	5.05	6	10.65*	7	7.7*	8
Deflections	5.05	6	8.52*	7	6.66	8
Assists	5.05	6	8.52*	7	6.66	7

Pro-Rated Task	Game 12 vs. Ken. T.P. 32:00
Steals	8*
Deflections	7
Assists	7*

* goal attained

Table E-9. Performance Standards. Subject M.M.

Pro-Rated Task	Game 3 vs. R.L. T.P. 3:00	Goal for Game 4	Game 4 vs. Dry. T.P. 4:46	Goal for Game 5	Game 5 vs. Ken. T.P. 12:00	Goal for Game 6
Steals	0	1	6.71*	3	5.33*	4
Deflections	0	1	6.71*	3	5.33*	4
Assists	0	1	0	1	8*	4

Pro-Rated Task	Game 6 vs. Ken. T.P. 3:51	Goal for Game 7	Game 7 vs. R.R. T.P. 13:23	Goal for Game 8	Game 8 vs. Dry. T.P. 00:00	Goal for Game 9
Steals	8.31*	5	2.39	3	---	3
Deflections	8.31*	5	4.78	4	---	4
Assists	8.31*	5	9.56*	6	---	3

* goal attained

Table E-9. (continued)

Pro-Rated Task	Game 9 vs. T.P. 3:55	Goal for Game 10	Game 10 vs R.R. T.P. 3:30	Goal for Game 11	Game 11 vs. R.L. T.P. 3:04	Goal for Game 12
Steals	0	2	9.14*	4	0	3
Deflections	8.18*	5	0	2	10.45*	4
Assists	0	3	0	2	10.45*	4

Pro-Rated Task	Game 12 vs. Ken. T.P. 00:00
Steals	---
Deflections	---
Assists	---

* goal attained

APPENDIX F

Table F-2.   Pro-rated statistics - Subject J.C.

Game	Offensive Rebounds	Defensive Rebounds	Assists
1	0*	2*	0*
2	2.46*	6.16*	0*
3	1.00*	8*	0*
4	2.02*	8.11*	⁻2.02
5	2.13*	8.53*	2.13
6	2*	7*	3
7	15.20	10.12	7.59
8	7.75	7.75	4.35
9	7	8	3
10	9.12	6.84	4.56
11	9.31	6.65	2.66
12	6.24	6.24	4.16

* baseline condition

Table F-1.   Pro-Rated Statistics - Subject T.H.

Game	Offensive Rebounds	Defensive Rebounds	Assists
1	0*	5*	3*
2	2*	0*	0*
3	5.33*	6.66*	0*
4	5.14*	6.17*	⁻0*
5	5*	6*	1
6	6	7	2
7	6.66	8.4	4.8
8	6	5	3
9	8	6	3
10	13	7	3
11	7.7	7.7	4.4
12	7	7	5

* baseline condition

Table F-3. Pro-rated Statistics - Subject M.A.

Game	Offensive Rebounds	Defensive Rebounds	Assists
1	injured	injured	injured
2	injured	injured	injured
3	2*	4*	0*
4	2.19*	4.39*	0*
5	2*	4*	0*
6	5.52	11.04	2.76
7	9	9	4.5
8	7	7	4
9	ill	ill	ill
10	ill	ill	ill
11	ill	ill	ill
12	7.6	7.6	6.08

* baseline condition

Table F-4. Pro-rated Statistics - Subject J.B.

Game	Offensive Rebounds	Defensive Rebounds	Assists
1	0*	0*	0*
2	1.87*	1.87*	1.87*
3	0*	0*	0*
4	0*	0*	0*
5	0*	0*	1.45*
6	0	0	0*
7	0	5.37	1.79*
8	0	14.22	0*
9	6.65	6.65	2.66*
10	5.64	4.51	2.25*
11	10.25	4.1	2.05*
12	16.69	8.34	0*

* baseline condition

Table F-5. Pro-rated Statistics - Subject D.B.

Game	Offensive Rebounds	Defensive Rebounds	Assists
1	0*	3.2*	0*
2	0*	0*	31.37*
3	0*	0*	0*
4	0	0*	-0*
5	0	19.27	0*
6	-	-	-
7	0	11.13	0
8	-	-	-
9	-	-	-
10	10.32	5.16	5.16
11	21.32	10.66	10.66
12	-	-	-

* baseline condition

Table F-6. Pro-rated Statistics - Subject D.W.

Game	Offensive Rebounds	Defensive Rebounds	Assists
1	16*	16*	0*
2	0*	0*	0*
3	0*	0*	0*
4	0*	0*	⁻0
5	12.40	12.40	0
6	5.43	10.86	0
7	0	4.65	2.32
8	5.8	11.63	0
9	7	8	4
10	12.5	12.5	15
11	7.45	4.47	1.49
12	7.8	6.5	3.9

* baseline condition

Table F-7.   Pro-rated Statistics - Subject S.L.

Game	Steals	Deflections	Assists
1	2.28*	4.56*	2.28*
2	4.74*	4.74*	2.37*
3	4.41*	3.10*	4.41*
4	4.22*	3.16*	4.22*
5	4.26*	3.20*	4.26*
6	5.68	6.81	6.81
7	7.57	15.14	9.46
8	7	6	7
9	5.05	5.05	5.05
10	10.65	8.52	8.52
11	7.7	6.6	6.6
12	8	7	7

* baseline condition

Table F-8.   Pro-rated Statistics - Subject K.M.

Game	Steals	Deflections	Assists
1	3*	2*	3*
2	3*	3*	3*
3	3.20*	3.2*	4.26*
4	3.16	3.34*	4.45
5	ill	ill	ill
6	6	5	4*
7	6.15	6.15	9.22
8	6	5	4
9	6.18	7.21	5.15
10	8	6	5
11	6	5	6
12	6	7	7

* baseline condition

Table F-9. Pro-rated Statistics - Subject M.M

Game	Steals	Deflections	Assists
1	0*	0*	0*
2	0*	0*	0*
3	0*	0*	0*
4	6.71	6.71	0
5	5.33	5.33	8
6	8.31	8.31	8.31
7	2.39	4.78	9.56
8	---	---	---
9	0	8.18	0
10	9.14	0	0
11	0	10.45	10.45
12	---	---	---

* baseline condition

APPENDIX G

Table G-1.   Inter-observer Agreements for all Observations for
             Each Subject.

Subject	Percent Reliability
T.H.	95.41
J.C.	96.93
M.A.	96.49 -
J.B.	94.44
D.B.	100.00
D.W.	94.91
K.M.	95.08
S.L.	95.34 .
M.M	84.61

Table G-2. Inter-Observer Agreements for all Subjects in Each Game.

Game	Percent Reliability
4	85.71
5	100.00
6	97.33
7	90.81
8	97.80
9	92.22
10	96.26
11	94.73
12	100.00

Table G-3. Inter-observer Percentage Agreements by Game by Subjects.

Game	Subject								
	K.M.	M.M	J.C.	D.B.	D.W.	T.H.	S.L.	M.A.	J.B.
4	100	100	50	100	100				
5	--	100	100	100	100	100			
6	100	100	100	--	100	93.75	100	93.33	100
7	93	66.66	92.30	100	75	95	94.44	100	80
8	93.75	--	100	--	75	93.33	95.23	94.44	100
9	94.44	100	100	--	100	88.88	88.23	--	90
10	90.47	100	100	100	94.11	95.83	100	--	100
11	94.44	66.66	100	100	90	100	90.47	--	100
12	100	--	100	--	100	100	100	100	100