An Ecological Study of Coaching Behaviors and Corresponding Player Performance and Perception and Performance for the Sport of Collegiate Ice Hockey

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AN ECOLOGICAL STUDY OF COACHING BEHAVIORS AND CORRESPONDING PLAYER PERFORMANCE AND PERCEPTION AND PERFORMANCE FOR THE SPORT OF COLLEGIATE ICE HOCKEY

by

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AN ECOLOGICAL STUDY OF COACHING BEHAVIORS AND CORRESPONDING PLAYER PERFORMANCE AND PERCEPTION AND PERFORMANCE FOR THE SPORT OF COLLEGIATE ICE HOCKEY

Joseph M. Kalinowski, Ph.D.

Western Michigan University, 1985

This study examined the methodological feasibility of administering a behavioral assessment system on coaching behaviors under actual collegiate hockey game conditions. The observation system was found to be feasible and accurate with a .866 percentage of inter-rater agreement across all 10 behavior categories coded over 300 reliability observation minutes. The predominant coaching behaviors observed over 11 complete games were found to be general technical instruction (44.3%), general encouragement (21.4%), and organization (14.2%). Reinforcement (4.51%) and punishment (3.56%) coaching behavior rates were found to be unexpectedly low. Reinforcement was found to be inversely related to punishment but positively related to encouragement. Punishment was found to be positively related to keeping control and organization. The players tended to rate their overall athletic experience as positive subsequent to a winning season. The data tended to support a relationship between winning and player-coach agreement on coaching performance variables. The data also tended to support a relationship between player-observer agreement on coaching behaviors. No support was found for a relationship between coach-observer agreement on coaching behavior rates.

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Player performance data were tabulated but were not related to coaching behaviors because these data could not be effectively isolated from other potential sources of behavioral control.
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Joseph M. Kalinowski
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CHAPTER I

INTRODUCTION

Over the past 40 years a considerable amount of psychological research has been generated in the field of athletics (Cooper, 1969; Endler, 1962; Fisher, 1975; Harlow, 1951; Henry, 1941; Kroll, 1976; Morgan, 1980; Rushall, 1973). Much of this research has come about because of a steady increase in public interest in sport. Part of this interest can be explained by increased mass media attention given to college and professional sports. As athletics gained increased public attention, it became a focus of big business. Consequently, the economic advantages for athletes began to rapidly increase. For example, the average annual salary for a National Basketball Association player is now in the $120,000 range, and it is now fairly common for the more successful professional baseball players (e.g., Reggie Jackson—California Angels; Jack Morris—Detroit Tigers) to earn annual salaries approaching $800,000 with "incentives." In addition, there is an increasing proliferation of athletes and ex-athletes into lucrative sport related businesses (e.g., announcer—Pat Summerall; Sportswear executive—Jack Nicklaus; McDonald’s Hamburger endorser—Jimmy Conners).

Professional athletes have not been the only recipients of the tremendous public interest in sport. Amateur athletes have also been affected by the benefits of this intense public interest. For example, a recent Detroit Free Press article (Gilbert, 1984)
indicated that Olympic track and field champion Carl Lewis was a millionaire before the 1984 Los Angeles Olympic Games even began.

The effects of monetary and cultural benefits upon athletes and coaches were adroitly summed up by Johnson (1969) over a decade ago. Johnson stated that:

This cascade of money had made major differences to our games and gamesmen. Our sports heroes are businessmen now, entrepreneur athletes. The money flood from TV has allowed them to earn enormous increases from the sport at which they excel and then to rise out of the playing field dust to become owners of laundry chains, haberdashery strings and sandwich assembly lines. The money from television has made professional sport an exceedingly attractive proposition even for the bright, young college graduate with ambitions for corporate life (what more rewarding career is there in corporate life than chairing the board of your own corporation?) (pp. 90-92)

While thousands of collegiate athletes hope to earn a spot on a professional team at the end of each season, other college personnel also have a stake in the big business of sport. For example, in a recent Kalamazoo Gazette article (Associated Press, 1984), athletic director Don Canham indicated that the University of Michigan's average income for a home football game is in excess of $900,000. As a result of the football gate, numerous athletic and nonathletic programs can stay in existence at Michigan. However, the majority of college teams are not endowed with the prestige, tradition, or stadium capacity of University of Michigan. Most other schools are constantly looking for an edge in the fight for recruitment of quality athletes. Consequently, there is continued interest on the part of coaches in exploring methods of assessing potential recruits and in relating these assessments to such variables as position...
placement, prediction of individual (or team) success, physical agility, visual motor acuity, coaching skill, player attitude, etc.

For many of the lesser known major college conferences (e.g., Mid American Conference, North Eastern Athletic Conference, Big Sky Conference) psychological research is seen as one possible means of gaining an edge over competitors. Many schools are interested in psychological measures that will assist in finding the potential "superstar" that more prominent universities have overlooked. In addition, many schools (such as Eastern Michigan University) are interested in accurately discovering beginning college athletes who have good previous high school athletic records but who display psychological difficulties. These difficulties could interfere with performance and be harmful to team solidarity. The assumption is made that psychological tests (particularly personality inventories) will not only help to signal the use of remedial procedures to reduce psychological problems, but will also serve as adequate player selection devices. There are problems with this assumption.

Kalinowski (1984) pointed out that there are very few personality tests that have been designed specifically for use in a given sport. Kroll (1970) rightfully asserted that assessment of athletes is almost always made on the basis of traditional personality tests. These instruments were not originally designed for an athletic population. There are serious questions about whether findings from such assessment tools can generalize to a nonpsychiatric (athletic) population. Moreover, even those personality tests designed to measure traits of athletes are of questionable validity (Kalinowski, 1978).
Lonetto (1977) developed the Athletic Apperception Test (AAT) to measure performance based on perceptions by hockey players of pictures of game-like situations. Kalinowski (1978) tested the validity of this measure using a collegiate hockey team sample, and he found that the AAT could not be used to accurately measure current self-perceptions or future performance level in collegiate hockey players.

It is the opinion of this researcher that there is a powerful alternative to the use of personality measures that are considered capable of finding "the franchise." That is, rather than looking for the one player with superior "hidden" ability, why not refine the presently available talent? This approach forsakes the use of test instruments geared toward measuring internal constructs like personality traits. Instead, it promotes the use of procedures that can assess the actual effects of environmental contingencies upon athletic performance.

Studies concerning the behavioral ecology of athletic settings are a fairly recent phenomena. Over the past 10 years a number of researchers have attempted to utilize behavioral assessment approaches to determine the environmental effects upon player productivity. Smith, Smoll, and Hunt (1977) developed the Coaching Behavior Assessment System (CBAS). This system was designed to observe the reactive (elicited) and spontaneous (emitted) behavior of youth sport coaches under game and practice situations.

The CBAS was developed over a number of years. At first the behaviors of youth (ages 6-16) soccer coaches were observed and recorded. Researchers carried tape recorders and verbally recorded
every coaching behavior that occurred utilizing a time sampling scheme. These verbal descriptions of coaching behaviors were transcribed and a number of scoring categories were developed that eventually became the CBAS. Since its inception, the effectiveness of the CBAS as a valid and reliable behavioral assessment tool has been evaluated using youth coaches with sample populations consisting of baseball (Smith, Smoll, & Curtis, 1978) and basketball (Smith, Zane, Smoll, & Coppel, 1983) teams. The results of this field research indicate that the CBAS is effective in the observation of a large range of coaching behaviors.

There have been several laboratory research studies to determine the reliability of the CBAS coding system. Smith, Smoll, and Hunt (1976) had trainees observe a videotape of 48 randomly ordered independent behaviors of an actor playing the role of a coach. In each segment the narrator described the game situation prior to the showing of a specific coaching behavior. Reliability was based upon the number of observer agreements on the occurrence of discrete coaching behaviors. The results indicated a 97.8% rate of observer agreement on the occurrence of the appropriate coaching responses.

In order to determine if accurate learning among observers had taken place, the same trainees were asked to view the film of the 48 coaching behaviors one week after the initial viewing. The trainees were not told the results of their initial viewing. The percentage of agreement on the behaviors that were scored identically between first and second video scoring sessions was measured. The results indicated a range of percentage on observer agreement between 87.5%
and 100% and a mean percentage on agreement across all trainees of 96.4%.

In addition to laboratory studies, three studies have been accomplished to determine the inter rater reliability of the CBAS in field settings. Smith, Smoll, and Curtis (1977) studied five observers who independently and concurrently coded coaching behaviors during a six inning little league baseball game. The number of discrete observations coded averaged 250 behaviors. The results yielded correlation coefficients of coding frequencies between observer pairs that were between +.77 and +.99. A mean of +.88 was determined as the interrater reliability coefficient.

Smith and Smoll (1979) undertook a second interrater reliability study to further determine the accuracy of the CBAS as a measurement tool in youth sport coaching. In this study, the two authors and 19 trained observers utilized the CBAS during a five-inning baseball game that lasted 91 minutes. The subject was a male little league baseball game coach. The average number of coaching behaviors coded for the five innings was at 208. In this study, an average interrater reliability coefficient of +.88 was obtained for the 171 observer pairs correlated.

Smith, Zane, Smoll, and Coppel (1983) studied the reliability of the CBAS when utilizing this tool with youth basketball coaches. This study is particularly significant because it represents the first attempt at systematically observing coaching behaviors in a sport where the action is continuous. The observers consisted of 7 male and 10 female undergraduate students who passed an exam on the
CBAS coding practices upon completion of a training program. In this study, the correlation coefficients of the frequencies of behavior that the observer pairs coded across 10 of the 12 CBAS categories ranged from 0.85 to 0.98 with a median of 0.96. This study demonstrated that it is possible to make accurate and reliable behavioral observations in a sport where there is a continuous high rate of behavior.

The above studies have helped to demonstrate that the CBAS can be used to reliably measure coaching behaviors in youth sport coaching. However, it should be noted that with the exception of the Smith et al. (1983) study there has been no research on the CBAS as an assessment tool for coaching in sports where high rate continuous behavioral interchange is an issue (e.g., hockey). Another equally important issue is the lack of research on behavioral observation approaches at the higher college or professional levels of competition.

One significant research effort concerned with behavioral observation methods in collegiate ranks was conducted by Tharp and Gallimore (1976). These researchers studied famed UCLA basketball coach John Wooden using a 10-category behavioral rating scale similar to the CBAS. They found that about half of Wooden's communications were instructions. Another 17% of his communications were scolds, following misplays; 8% were compliments, and 7% of Wooden's behaviors constituted encouragement. The authors did not include reactions of team members to Wooden's behaviors. Also, observations were made during practice sessions rather than in actual game situations.
Despite several behavioral observational studies in the area of youth sports, there has been a serious lack of similar research at the college level. The Wooden study in basketball is an exception, and there have been no systematic behavioral assessment studies in the sport of college hockey. Given the important role of head coach on a college hockey team, there are a number of empirical questions worth pursuing. What behaviors does the head coach emit when coaching, and how frequently does he engage in behaviors that have previously been related to success in coaching (such as encouragement, punishment, organization, and instruction)? How are behavioral categories related to one another? Also, how are observable coaching behaviors related to the collegiate hockey athletes' reaction to their organized athletic experience? Answers to these questions could represent a significant step in describing the behavioral ecology of the college hockey setting. In addition, they may also provide an empirical basis for remedial programs designed to increase the productivity of the athletes participating in the sport of collegiate ice hockey.

This study involved the naturalistic observation of coaching behaviors during the actual collegiate hockey competition. The primary goals of the study were: (a) to obtain the relative frequency and rates of specific coaching behaviors, (b) to evaluate the relationship of the categories of coaching behaviors, (c) to relate the behaviors of the coach to the players' post-season evaluations of the coach and of each other, (d) to compare the coach's self-assessment to actual observed rates of these behaviors under game conditions,
and (e) to determine the reliability of the CBAS when utilized in a continuous action sport at the intercollegiate level under actual game conditions.

Five research questions were generated to aid in obtaining an understanding of the efficiency of the behavioral observation system in describing the ecological structure of the collegiate hockey setting. The questions concerning the present study were as follows:

**Question 1:** Will negative player attitudinal responses be related to the following coaching behaviors: punishment, mistake contingent technical instruction with punishment, and non-game-related verbal coaching behaviors?

**Question 2:** Will a winning coach have accurate perceptions of his ability and will there be a relationship between his self-evaluative responses and the emitting of various coaching behaviors?

**Question 3:** Will positive player attitudinal responses toward coach and other players be related to winning?

**Question 4:** Will there be a relationship between positive player attitudinal responses and the following coaching behaviors: positive reinforcement, general encouragement, and technical instruction?

**Question 5:** Will the CBAS be found to have a high rate of reliability as an assessment tool in the coaching of collegiate hockey?

In addition to describing the behavioral ecology of the collegiate ice hockey setting and demonstrating reliability of the CBAS, this study was aimed at exploring the relationship of player
perceptions to coaching behaviors. Smith et al. (1983) authored the only study on player perceptions of various coaching behaviors using the CBAS on youth basketball coaches. Post-season attitude questionnaires administered to players were related to CBAS behavioral categories. The results indicated a highly specific relationship between player attitudes and various coaching behaviors (e.g., general instruction, positive reinforcement, punishment). In their study, the rate of coaching reinforcement was found to be unrelated to any of the attitude measures. This is a highly unexpected development and merited further consideration in the present study. Skinner (1974) has asserted that positive reinforcement leads to reports of positive emotional states. The Smith et al. (1983) study would seem to contradict this basic scientific principle of behavioral psychology. Further clarification of this issue is required if the present study and future efforts will lead to the development of effective player remedial programs to increase the productivity of the collegiate athlete.
CHAPTER II

METHOD

Subjects

Subjects consisted of 28 collegiate hockey team members, who span all four class years (5 freshmen, 9 sophomores, 9 juniors, and 5 seniors), and who in age range from 18 to 24. The mean age for players was 20.6. Fourteen of the team members were from Canada and 14 were from the U.S.A. In addition, the head hockey coach consented to be a subject for this study. The team members and their coach were asked to participate in a research study that was directed toward isolating effective forms of player coach communication in order to improve performance factors. Prior to the onset of the study, the head coach had been in his present position for a total of 2 years. Prior to his current position, he was an assistant coach for two college hockey teams that participated in the National Collegiate Athletic Association (NCAA) tournament. In his current position as head coach his team amassed a 22-18 record including a tournament win against the team that was ranked first in the NCAA at the end of the 1983-84 season.

Response Measure 1

The Coaching Behavioral Assessment System is a behavioral assessment technique developed by Smith, Smoll, and Hunt (1977).
This technique was designed to measure coaching behaviors along 12 behavioral dimensions that are divided between two response classes. Observations are typically made during practice and/or game situations. The response classes measured include reactive behaviors (the coach's responses to a player's behavior) and spontaneous behaviors (the coach's self-initiated responses that were not elicited by player behavior). The CBAS originally consisted of 12 behavior categories. These categories included positive reinforcement, non-reinforcement, mistake contingent encouragement, mistake contingent technical instructions, punishment, punitive technical instruction, ignoring mistakes, keeping control, general technical instruction, general encouragement, organization, and general communication.

For purposes of the present study, two behavior categories (nonreinforcement and ignoring mistakes) were omitted. It was believed that these two "nonbehavior" categories would be too difficult to observe and accurately code. Therefore, only 10 of the 12 original behavior categories were utilized in the present study.

The CBAS involves basic interactions between players and coaches in game situations. Smith, Smoll, and Hunt (1977) initially described the behavioral categories of the CBAS. The following descriptions of the CBAS are adapted by the researcher for the sport of ice hockey.

**Reactive Behaviors**

1. Positive reinforcement or reward (REIN). A positive reaction by the coach to a desirable performance by one or more players.
REIN may be verbal or nonverbal in nature. Examples include congratulating a player or patting a player on the back after scoring a goal.

2. Mistake—contingent encouragement (CEM). Encouragement of a player by a coach following a player's mistake. A player comes off the ice after receiving a 2-minute penalty. The coach tells him "that's okay, just try to avoid penalties next time."

3. Mistake—contingent technical instruction (TIM). Telling or showing a player who has made a mistake how to make the play correctly; an example is telling a player how to defend against an oncoming offensive opponent after the opposing player has just broken through to score.

4. Punishment (PUN). A negative response by the coach following an undesirable behavior. Like REIN, PUN may be either verbal or nonverbal. Examples include making a sarcastic remark to a player after the opposing team scored a goal, or the coach waving his hands in disgust after an icing call against his team.

5. Punitive TIM (TIM + P). Sometimes TIM and P occur in the same communication, as when a coach says, "How many times do I have to tell you to keep between their center and our goalie!" Whenever a coach gives TIM in a punitive or hostile manner, P is also scored (TIM + P).

6. Keeping control (KEC). Responses that are designed to maintain order. Such behaviors are ordinarily a response to unruly conduct or inattentiveness by the players. An example of keeping
control is when the coach tells key players to control themselves after a fight has broken out on the ice.

Spontaneous Behaviors

7. General technical instruction (TIG). A communication that provides instruction relevant to techniques and strategies of the sport in question. As in the case of TIM the purpose of these communications is to foster the learning of skills and strategies for dealing with game situations. The message must clearly be one of instruction. Unlike TIM, TIG is not a reaction to an immediately preceding mistake by a player or the team. Rather, it is coach initiated. Hockey examples include telling or showing a player where to line up just prior to a face off, telling a goalie to whom to clear the puck off to in a certain situation, or shifting the offensive or defensive line in a strategic manner.

8. General encouragement (GEN). Encouragement that does not immediately follow a mistake. GEN differs from REIN and CEM categories in that it is not a response to a specific action by the players. It relates to future hopes, rather than the behaviors of the past. It differs from technical instruction in that the coach makes requests with which the players may not necessarily be able to comply (e.g., "come on team, Skate! Skate! Work!").

9. Organization (ORG). Behavior directed at administrative organization, such as reminding the players to change lines, announcing substitutions, reassigning positions, and discussing strategies. It involves organizational behavior that is not intended to influence
play immediately. Thus, putting in a new player is scored 0, while
positioning the player closer to the crease is scored technical
instruction.

10. General communication (GEC). General interaction with
players. Interactions with players that are unrelated to game situa­
tions or team activities, such as joking with players, conversing
about school, talking about families, etc.

Response Measure 2

In a previous related study, Smith et al. (1983) devised a
questionnaire to evaluate attitudes toward coach, fellow teammates,
and sport in a population of youth basketball players. A revised
version of this questionnaire was administered to the hockey players
in the proposed study (see Appendix A). The questionnaire had four
possible responses. Scales in Items 1 and 3 ranged from "like a lot"
to "dislike a lot." The scale on Item 2 ranged from "very well" to
"very poorly." Item 4's scale ranged from "excellent" to "moderate,"
and Item 5's scale ranged from "very much" to "less." The revised
questionnaire reads as follows:

1. How much do you like playing hockey?
2. How well did the players on your team communicate?
3. How much did you like playing for your coach?
4. How helpful was your coach in teaching the sport of hockey?
5. I liked playing hockey more at the end of the season than at
the beginning of the season.
Response Measure 3

A 10-category rating scale was designed by the author to be used as an additional assessment instrument (see Appendix B). This scale consisted of questions related specifically to each category of the CBAS. These categories included: positive reinforcement, mistake-contingent encouragement, mistake-contingent technical instruction, punishment, punitive technical instruction, keeping control, general technical instruction, general encouragement, organization, and general communication.

The scale was constructed so that each statement had four possible responses: from almost always to almost never. The respondents were instructed to base their ratings on observations of interactions between head coach and players during actual game conditions. In addition, each question contained behavioral examples related to hockey game situations. In the event that a respondent felt he lacked sufficient information, he was instructed not to respond to a particular statement.

Response Measure 4

An experienced statistician recorded data on goals, shots on goal, penalties (in minutes), and goalie saves. These data were released by the university's athletic department for later analysis.
CBAS Observation Coding Sheet

In an attempt to maximize the ease and accuracy by which observations were made, the author constructed a behavior coding sheet for this particular study (see Appendix C). This form allowed for placing tally marks next to each behavioral category in 30-second time blocks. There were also spaces allotted for entering total number and percentages of behaviors in each observed behavior category. In addition, there were places to note date of observation, game number, period observed, time started, time ended, and total observation time.

CBAS Reliability Coding Sheet

This sheet was similar to the CBAS observation coding sheet. The Reliability Coding Sheet (see Appendix D) allowed for placing tally marks in 10 numbered 30-second interval spaces across all behavior categories. There were also spaces allotted for number and percentage of agreement. A space was also labeled for recording percentage of total reliability across all 10 behavior categories in the CBAS. In addition, there was room for recording date, period, name of opponent, and initials of the reliability checker.

Recording Apparatus

A Philco CM 500 wireless microphone was attached to the coach's left upper sport jacket pocket during each observation session with the power button deflected to the "on" position. This microphone was
powered by two 1.5 volt Eveready photo/calculator batteries. The transmitter was set to send signals at 90 MHz FM.

An Emerson AM-FM combination radio receiver and tape recorder was utilized to hear signals sent by the wireless Philco microphone. This receiver was also used to tape verbal coaching responses for later reliability checks. This apparatus received FM radio signals with a range of 88-108 MHz. It was operated by a power source of four Eveready (size C) alkaline batteries. The tuning dial of the radio was set to 90 MHz FM prior to the start of each game. At the start of each period the FM stereo “on” button was deflected. The receiver was connected to a set of ear phones worn by the observer during game situations. The earphones served to maximize optimum auditory reception of coaching responses. Batteries for both the wireless Philco microphone and the Emerson FM radio receiver were changed prior to each game to assure maximum power for transmission of radio signals. Also, spare batteries for both devices (microphone and receiver) were carried by the observer in case of power failure during an actual observation coding session.
CHAPTER III

PROCEDURE

An initial consultation with the head coach regarding the implementation of the study took place before the beginning of the 1984-85 hockey season. The coach agreed with the researcher that a study involving an analysis of interaction patterns during the game situations and resultant player attitudes could conceivably be of help in developing procedures to improve player productivity. However, it should be noted that specific goals, anticipated outcomes, or other detailed information about the study were not shared with the coaching staff at this time. The coach indicated that he would welcome such a study with the stipulation that the project remain largely observational in nature. The coach had a highly successful team last year and he did not want to introduce any new variable that might have a potentially adverse effect on player performance. The researcher assured the coach that his interaction with the players would be minimal. This interaction consisted of handing out rating scales at the end of the season. The coach agreed to this procedure and he indicated that he would view the researcher as another statistician.

Observational Procedure

The setting of a college hockey game can best be described as "organized chaos." The stadium holds approximately 4,000
enthusiastic fans. The presence of such a large number of spectators in an enclosed area can greatly impair one's ability to code auditory and visual player-coach interactions. In addition, the sport of hockey is continuous. This means that there are numerous incidental sources of visual and motor stimulation (e.g., equipment changes, trainer procedures, movements of medical personnel, etc.) that could compete with the observations being made. An additional concern was the fact that the player's bench (on the ice) had only a limited number of seats available for specified personnel. These seats were reserved for direct participants (e.g., players and coaches) and their back-up personnel (e.g., trainers, statisticians). This restriction made it impossible for data to be collected within direct auditory range of coach and players.

Upon careful consideration of the data collection site issue with the head coach, two possible observation areas were considered. The first site involved sitting in the press box on the opposite side of the arena and obtaining auditory access to coaching responses by way of a head phone hook up. The second possibility involved sitting directly in back of the players' bench where player-coach auditory responses could be picked up via wireless microphone attached to the head coach. Preliminary pilot data and actual game experience during which data collection was attempted supported the latter choice as the most effective observational mode. Obtaining data from in back of the player's bench had several advantages over any other potential observation area. First, it was centrally located and provided an excellent view of all activities on the ice. It was much easier to
code visual interactions from a few feet in back of the game participants than making observations from several hundred feet away in the press box. Secondly, there was less potential for distraction from those game related activities (on the bench) not involving player-coach interaction. Furthermore, the observation area directly in back of the player bench allowed for a clear view with minimal distractions (e.g., cameramen, commentators, and assistant coaches) that would impede the observation and coding of responses that occurred. In addition, this observation area allowed for maximum auditory reception. The wireless microphone placed in the upper left hand pocket of the coach's sport jacket allowed for all of his communications to be easily heard through the earphones worn by the observer. However, the maximum transmission range of this equipment was approximately 50 feet, thus further nullifying the possibility of making observations from any other area (e.g., press box). As a result of this procedure, the observer was able to hear more detailed interactions with better clarity than could have been possible under any other observational situation. Finally, although the researcher was able to see and hear all coach-player interactions, his vantage point "behind" game participants served to reduce the possibility of subjects becoming affected by the presence of the observer.

Coding of Responses and Time Sampling Procedure

The researcher recorded observations for 12 home games. During the first two games, responses were coded but the first game was not included in the final analysis of the study. The purpose of this
"practice session" was to acclimate the researcher to the audiovisual equipment and to test out the "kinks" in time sampling observational procedure. Actual observations began with the second home game. The first two games were observed from the press box. Observations for the remaining 10 games were made directly in back of the players' bench.

Time Sampling Procedure

Actual observational data were coded in a 30-second time sampling procedure for the entire duration of each 20-minute playing period. The stopwatch was activated at the face off in the first period of the first home game. At the end of each 30 seconds, there was a 30-second recording interval during which a tally mark was placed in the appropriate behavior category for each coaching behavior that occurred during that observation interval. The 30-second observation intervals were continuous, occurring at the end of each prior 30-second nonobservation interval. Observations stopped when the buzzer designating the end of each 20-minute playing period sounded. This procedure (e.g., observations occurring every other 30 seconds) reduced the possible occurrence of observer drift. In addition, pilot data obtained during the first game indicated that a 30-second observation interval following a 30-second nonobservation interval was superior to other time sampling schemes (e.g., unlimited frequency and 30/15-second duration counts). This 30-second alternating observation interval allowed for a much more even distribution of responses coded when compared to other observation schemes.
Rating Scale Administration Procedure

The attitudinal and behavior category scales were administered to the team members at the end of the season (March 11, 1985). Prior to this testing, all team members were told that the researcher was performing a research project in sport psychology. The researcher told the team members that he could not presently discuss the nature of the project with them. However, he would be pleased to go over any aspect of the study with the team members and/or coaching staff after the season was over. In addition, the coaches and athletes were assured that their anonymity would be preserved and that neither the team's name nor their individual names would be mentioned in the final write-up of the study. Also, the head coach and an assistant coach were asked to fill out the behavior category rating scale at the end of the season. They were not administered the attitudinal scale. Both coaches and all participating athletes filled out informed consent forms prior to administration of the rating scales (see Appendix E).

Observation Training Procedure

The researcher originally conducted research in assessment of athletic performance in the sport of hockey in 1978 and was familiar with the sport. In addition, the researcher has reviewed tools to assess behavioral performance in athletes (Kalinowski, 1984). He has also reviewed and discussed all of the studies involving the use of the CBAS in youth sports (Kalinowski, 1984).
In addition to this background, the researcher used the CBAS in an 8-hour pilot procedure. During this procedure the 10 CBAS behavioral categories were studied in detail and coaching behaviors (for the sport of hockey) were observed and recorded during two practice sessions with a collegiate hockey team. In addition, observations were coded during two actual games.

A second rater was trained by the researcher for purposes of later reliability studies. The researcher was able to enlist the help of an individual who held a B.S. degree in psychology from a major university. This individual agreed to study the CBAS categories and was verbally quizzed by the researcher. In addition, this individual observed and coded coaching behaviors for two 1-hour practice sessions. The information derived from these sessions was reviewed and discussed with the researcher.

CBAS Reliability Procedure

During the final home games the researcher randomly selected and taped 10 minutes of coach-player interactions per period. This information consisted of ten 30-second nonobservation intervals. Each nonobservational interval was followed by a 30-second taped observation interval. The tapes were then used by the researcher and reliability checker for purposes of establishing percentage on agreement of occurrence and nonoccurrence of coaching responses for all 10 CBAS behavior categories. Overall reliability for the study was established by calculating agreement of occurrence and nonoccurrence of responses by researcher and reliability checker for a total of 300
reliability minutes over the 10 games.

During the actual taping of the 10-minute (per period) reliability observations, the tape was turned on at the beginning of each 30-second observation interval and stopped at the end of that interval. This procedure resulted in leaving a distinct sound, which marked the beginning and end of each taped interval. These tapes were later rated separately by the researcher and reliability checker. This procedure assured that both researcher and reliability checker were rating behaviors occurring in the exact same interval.

Rating Scale Reliability

Both head coach and an assistant coach were asked to fill out a rating scale that evaluated the head coach's performance across all 10 CBAS categories. The purpose of this procedure was to establish whether the scale itself reliably measured the coaching behaviors across all 10 categories. The assistant coach chosen as a reliability checker was the individual who stayed in the players' bench area next to the head coach throughout the entire season. It was believed that he would be the most qualified choice as a reliability checker based on his direct experience of the head coach's behaviors during actual game situations. Reliability was measured on the basis of percentage agreement on the occurrence of evaluative responses on each 4-point question across all 10 items on the rating scale. Both coaches were administered the rating scales at the same time and were instructed not to confer regarding their answers until they completed and handed in the scales.
Reliability on the attitude scale administered to the players was determined by calculating Cronbach's alpha (see results section). It was hoped that information gained from the player attitude questionnaire would be helpful for the coach in evaluating his team and as a possible source of questions for future research on athlete self-perception.
CHAPTER IV

RESULTS

CBAS Descriptive Data

Data on the coaching behaviors of one collegiate head hockey coach were collected over 11 complete games or a total of 33 playing periods. There was an average of 128.4 observation minutes per game and a mean of 42.8 minutes of observation per period. A total of 12,368 coaching behaviors were observed for the study. A mean of 1,124 coaching behaviors were observed per game.

The mean rate of behavior per observation interval and percentage of responses occurring within each behavior category are presented in Table 1.

These data indicate that the head coach most frequently engaged in general technical instruction, general encouragement, and organizational behaviors during actual playing competition. These three categories accounted for 80% of the coach's total observed behavioral repertoire. Responses involving punishment (mistake contingent technical instruction with punishment and punishment) accounted for far less (approximately 4%) of the total coaching responses than had initially been anticipated. Another noteworthy finding was the fact that positive reinforcement accounted for only 4.5% of all coaching responses. The three categories comprising technical instruction accounted for 53.4% of all coaching behaviors coded. The two
behavior categories involving encouragement resulted in 22.5% of the total coaching behaviors emitted. The structuring behavior categories (keeping control and organization) accounted for approximately 19% of all coded coaching behaviors. General communication (or non-game-related verbal coaching behaviors) comprised only 0.02% of the total behaviors observed. This finding was anticipated.

Table 1
Mean Rates and Percentages of Coaching Behaviors for the 10 CBAS Response Categories Over 33 Complete Playing Periods

<table>
<thead>
<tr>
<th>Behavior category</th>
<th>Rate/Min.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforcement</td>
<td>0.433</td>
<td>4.51</td>
</tr>
<tr>
<td>Mistake contingent encouragement</td>
<td>0.104</td>
<td>1.09</td>
</tr>
<tr>
<td>Mistake contingent technical instruction</td>
<td>0.555</td>
<td>5.85</td>
</tr>
<tr>
<td>Punishment</td>
<td>0.031</td>
<td>0.33</td>
</tr>
<tr>
<td>Technical instruction (punitive)</td>
<td>0.307</td>
<td>3.26</td>
</tr>
<tr>
<td>Keeping control</td>
<td>0.435</td>
<td>4.60</td>
</tr>
<tr>
<td>General technical instruction</td>
<td>4.150</td>
<td>44.30</td>
</tr>
<tr>
<td>General encouragement</td>
<td>2.040</td>
<td>21.40</td>
</tr>
<tr>
<td>Organization</td>
<td>1.340</td>
<td>14.20</td>
</tr>
<tr>
<td>General communication</td>
<td>0.002</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Note. N = coaching responses of 1 head college hockey coach.
Correlational Data

In order to determine the degree to which the 10 CBAS coaching behavior categories were related to each other, correlations between these responses were determined (see Table 2).

This information resulted in a total of 45 correlation coefficients. The data yielded 7 correlation coefficients that reached significance at the .05 level. The remaining 38 correlations were not significant. The data resulted in an $r$ of 0.996 between mistake contingent encouragement and positive reinforcement. There was a negative relationship between mistake contingent technical instruction with punishment and reinforcement ($r = -0.423$). Negative relationships were also found between keeping control and the following two behavior categories: reinforcement ($r = -0.463$) and mistake contingent encouragement ($r = -0.464$). An additional negative relationship was found between mistake contingent technical instruction with punishment and mistake contingent encouragement ($r = -0.433$). There was a positive relationship between mistake contingent technical instruction with punishment and keeping control ($r = 0.717$). A final positive relationship between organization and mistake contingent technical instruction ($r = 0.427$) was noted. Positive relationships between general communication and three other behavior categories appeared in the data. However, consultation with personnel in the statistical lab led to the suggestion that significant correlations between general communication and any other category should be interpreted with caution. General communication accounted for only
Table 2
Pearson Product Moment Correlation Coefficients
Between the 10 CBAS Behavior Categories

<table>
<thead>
<tr>
<th></th>
<th>REIN</th>
<th>CEM</th>
<th>TIM</th>
<th>PUN</th>
<th>TIM + P</th>
<th>KEC</th>
<th>TIG</th>
<th>GEN</th>
<th>ORG</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM</td>
<td></td>
<td>0.996</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIM</td>
<td>0.273</td>
<td>0.299</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUN</td>
<td>-0.140</td>
<td>-0.146</td>
<td>0.165</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIM + P</td>
<td>-0.423</td>
<td>-0.433</td>
<td>-0.010</td>
<td>0.201</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KEC</td>
<td>-0.463</td>
<td>-0.464</td>
<td>0.099</td>
<td>0.202</td>
<td>0.717</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIG</td>
<td>0.314</td>
<td>0.318</td>
<td>0.117</td>
<td>0.040</td>
<td>0.122</td>
<td>-0.009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEN</td>
<td>-0.235</td>
<td>-0.229</td>
<td>0.149</td>
<td>-0.249</td>
<td>0.287</td>
<td>0.179</td>
<td>0.127</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORG</td>
<td>-0.049</td>
<td>-0.018</td>
<td>0.427</td>
<td>-0.077</td>
<td>0.022</td>
<td>0.009</td>
<td>-0.017</td>
<td>0.254</td>
<td></td>
</tr>
<tr>
<td>GEC</td>
<td>0.534</td>
<td>0.539</td>
<td>0.543</td>
<td>0.030</td>
<td>-0.203</td>
<td>-0.166</td>
<td>0.199</td>
<td>0.228</td>
<td>0.504</td>
</tr>
</tbody>
</table>

Note. N = 33 observed playing periods.

*p < .05. Correlations reaching statistical significance are underlined.
0.02% of the total coaching behaviors observed throughout the season. Therefore, a positive correlation between general communication and any other category is most likely a statistical artifact.

Team Record

The sample under observation (1 head coach and 28 collegiate hockey players) held a preseason ranking among the 10 most competitive teams in the nation. A glance at the postseason won-loss record indicates that the team lived up to its reputation. By the end of the season, the team tied the school record for the best won-loss record since the sport of hockey was adopted by the university. At the season's end, the overall won-loss record was 22-16-2. The team's conference record was 18-13-1. The team had a 9-1-1 record for all games observed in this study. In addition, the team finished the season in third place in one of the most competitive conferences in the country. The third place finish was another university record and the team easily qualified for postseason tournament playoff competition.

Player Attitudinal Responses and Observed Coaching Behaviors

Two of the proposed research questions involved comparisons of the players' perceptions of their overall athletic experience during the season with the observed coaching behaviors. Team perceptions were measured in two ways. The first questionnaire administered to the players dealt with their overall athletic experience (see
Appendix A). The second questionnaire measured the team's perception of the coach's performance across all 10 CBAS categories (see Appendix B).

Research Question #1 asked that if the players' attitudinal responses (Table 3) were negative, would the predominant coaching behaviors emitted throughout the 33 observed playing periods be punitive (punishment and mistake contingent technical instruction with punishment) and disinterested (non-game-related) verbal coaching responses?

<table>
<thead>
<tr>
<th>Question content</th>
<th>Mean</th>
<th>Overall group mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Liking the sport</td>
<td>1.05</td>
<td>1.97</td>
</tr>
<tr>
<td>2. Player communication</td>
<td>2.05</td>
<td></td>
</tr>
<tr>
<td>3. Liking the coach</td>
<td>2.15</td>
<td></td>
</tr>
<tr>
<td>4. Coach as teacher</td>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>5. Liking the season</td>
<td>2.25</td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 20 team members. Questionnaire response range was from 1 (like a lot) to 4 (dislike a lot).

Research Question #4 asked if the players' attitudinal responses were positive, would the most frequently observed coaching behaviors be positive reinforcement, general encouragement, and technical
In order to examine these two questions, the team means for each questionnaire were compared with percentages of coaching behaviors over the 33 playing periods. The resultant data tended to affirmatively answer the first question. That is, the players reported generally positive athletic experiences (see Table 3). The mean percentages for observed punitive and non-game-related (general communication) coaching behaviors were low (see Table 4). In addition, the players' mean ratings of the occurrence of punitive and disinterested coaching behaviors matched the relatively low levels of observed coaching behaviors (see Table 4).

For example, the mean for the players' ratings on the frequency of coach punishment responses was 3.20. The observed data indicate that, in fact, coach punishment responses accounted for less than 1% of the total behaviors observed. In addition, the players tended to rate their overall athletic experience as favorable. Similar results were found on the general communication and mistake contingent technical instruction with punishment categories.

The data also tended to affirmatively answer Research Question #4. That is, the players' positive attitudinal ratings (Table 3) compared favorably with relatively high percentages of structuring coaching behaviors (Table 4). General technical instruction accounted for 44.3% of the total observed behaviors and general encouragement comprised 21.4% of all coded coaching responses. However, the team members tended to rate the overall perception of their athletic experience as positive in spite of a relatively low mean
percentage of reinforcement responses (4.51). The players' mean ratings of the frequency of occurrence of reinforcement, general technical instruction, and general encouragement matched the observed percentages of these behaviors (relatively low for reinforcement and high for instruction and encouragement).

Table 4
Mean Team Performance Questionnaire Scores and Mean Percentages of Observed Coaching Behaviors Over 33 Periods

<table>
<thead>
<tr>
<th>CBAS category</th>
<th>Team Mean</th>
<th>% observed behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforcement</td>
<td>3.00</td>
<td>4.51</td>
</tr>
<tr>
<td>Mistake contingent encouragement</td>
<td>2.50</td>
<td>1.09</td>
</tr>
<tr>
<td>Mistake contingent technical instruction</td>
<td>1.90</td>
<td>5.85</td>
</tr>
<tr>
<td>Punishment</td>
<td>3.20</td>
<td>0.33</td>
</tr>
<tr>
<td>Technical instruction (punitive)</td>
<td>3.40</td>
<td>3.26</td>
</tr>
<tr>
<td>Keeping control</td>
<td>1.20</td>
<td>4.60</td>
</tr>
<tr>
<td>General technical instruction</td>
<td>1.90</td>
<td>44.30</td>
</tr>
<tr>
<td>General encouragement</td>
<td>1.50</td>
<td>21.40</td>
</tr>
<tr>
<td>Organization</td>
<td>1.95</td>
<td>14.20</td>
</tr>
<tr>
<td>General communication</td>
<td>3.95</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Note. N = coaching responses of 1 college hockey coach (for percentage). N = 20 college hockey players (for team mean). Questionnaire response range was from 1 (frequently) to 4 (almost never).

Overall, these data indicate that the team members' subjective perceptions of the coach's behavior tended to agree with the...
objectively observed rates of these responses.

In addition, when there were relatively low mean percentages of punitive and disinterested coaching behaviors, the players rated their athletic experience as favorable. Also, the players rated their athletic experience as positive when relatively high percentages of instructional and encouragement behaviors were objectively observed. The only unanticipated result was the fact that there were consistently positive team ratings on the quality of athletic experience in spite of relatively low percentages of observed coaching reinforcement responses. It may be the case that at the collegiate level, the act of playing is reinforcement enough. Possibly, players respond most favorably to technical help (instruction) and encouragement as their skill level increases.

Coaching Self-Perception, Team Perception of Coach, and Observed Behaviors

Research Question #2 asked if the team had a winning season, would the coach's perception of the frequency of his emitted behaviors be consistent with: (a) the team's evaluation of the frequency of the coach's behavior and (b) the coach's objectively observed behavior.

In order to compare the coach's perception of his own behavior with the team's perception of his behavior, a binomial test was utilized. This test determined whether the exact agreements between coach and player responses to the performance questionnaire were related. The results indicated that 9 of the 10 averaged player
responses matched with the coach's responses. This result was found to be significant at the .05 level (see Table 5).

Table 5

Illustration of Coach-Player Matching Results on Binomial Test for 10 Category Performance Rating Scale

<table>
<thead>
<tr>
<th>Coach's responses</th>
<th>Almost always</th>
<th>Frequently</th>
<th>Occasionally</th>
<th>Almost never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost always</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Frequently</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Occasionally</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Almost never</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*p < .05.

A second binomial test was utilized to determine whether the coach's self-performance rating was in agreement with the behaviors observed by the researcher throughout the season. In order to determine agreement, the coach's responses on the performance questionnaire were compared to a scale developed by the researcher to reflect the relative rates of observed coaching behaviors for each category (see Table 6).

The scales for Table 6 were completed after the season but before the coaching performance self-rating information was tabulated. These scales (see Table 6) were largely subjectively derived. This formulation was based on the researcher's experience of having
observed the coach's behavior for 33 playing periods. In addition, the range of coaching responses for each behavior category over the 33 playing periods was examined by the researcher and statistical consultant prior to the construction of the scale.

### Table 6
Estimated Coaching Behaviors Occurring Per Period for Each of the 10 CBAS Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Almost always</th>
<th>Frequently</th>
<th>Occasionally</th>
<th>Almost never</th>
</tr>
</thead>
<tbody>
<tr>
<td>REIN</td>
<td>101-250</td>
<td>26-100</td>
<td>9-25</td>
<td>0-8</td>
</tr>
<tr>
<td>CEM</td>
<td>61-100</td>
<td>30-60</td>
<td>6-29</td>
<td>0-5</td>
</tr>
<tr>
<td>TIM</td>
<td>101-200</td>
<td>66-100</td>
<td>11-65</td>
<td>0-10</td>
</tr>
<tr>
<td>PUN</td>
<td>51-100</td>
<td>26-50</td>
<td>6-25</td>
<td>0-5</td>
</tr>
<tr>
<td>TIM + P</td>
<td>101-150</td>
<td>61-100</td>
<td>6-60</td>
<td>0-5</td>
</tr>
<tr>
<td>KEC</td>
<td>101-150</td>
<td>61-100</td>
<td>11-60</td>
<td>0-10</td>
</tr>
<tr>
<td>TIG</td>
<td>251-300</td>
<td>101-250</td>
<td>16-100</td>
<td>0-15</td>
</tr>
<tr>
<td>GEN</td>
<td>241-300</td>
<td>101-240</td>
<td>11-100</td>
<td>0-10</td>
</tr>
<tr>
<td>ORG</td>
<td>151-210</td>
<td>61-150</td>
<td>11-60</td>
<td>0-10</td>
</tr>
<tr>
<td>GEC</td>
<td>41-50</td>
<td>20-40</td>
<td>10-19</td>
<td>0-9</td>
</tr>
</tbody>
</table>

When the scaled observations per CBAS response category were matched with the coach's response on the 10-item performance questionnaire, there were four exact matches. The binomial test indicated that the results (4 out of 10 exact matches) did not reach significance at the .05 level (see Table 7). Thus, there did not
appear to be a significant relationship between the coach's self-perception of his behavior and the researcher's objectively obtained responses.

Table 7
Illustration of Coach-Observed Behavior Matching Results on the Binomial Test for the 10 CBAS Behavior Categories

<table>
<thead>
<tr>
<th>Observed behavior</th>
<th>Almost always</th>
<th>Frequently</th>
<th>Occasionally</th>
<th>Almost never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost always</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Frequently</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Occasionally</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Almost never</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*p > .05.

These results indicate that there was a winning season as well as corresponding team-coach agreement on rating the frequencies of the coach's behavior. However, support for the idea that a winning coach's self-evaluation of his performance would match with the researcher's observations was not found. That is, the coach's self-ratings did not significantly match up with the observation results.

Winning and Player Attitudes

Research Question #3 asked if the team experienced a winning season, would the players tend to give favorable postseason ratings
on items involving teammates and coach? The data tended to answer this question affirmatively.

An examination of the team's record confirms a highly successful season. Also, as examined earlier, the team rated their overall athletic experience as positive (see Table 3). At season's end, the players not only rated their coach and teammates favorably, but they also gave relatively positive responses when asked about their liking for the sport.

The mean rating for the five questions involving liking the coach, communicating with teammates, and liking the sport was 1.97 on a 4.0 scale. The results indicated consistent reports of a generally positive athletic experience.

When asked if they liked the sport of hockey, all 20 players responded with either "like a lot" or "like." Seventeen of the team members responded with either "very well" or "well" when asked about how well the players communicated. Fourteen players responded with either "like a lot" or "like" when asked about how well they liked playing for their coach. When asked about the coach's teaching effectiveness, 12 players responded with either "excellent" or "good." Thirteen of the team members answered with either "very much" or "much" when asked if they liked the sport more at the end than at the beginning of the season. These data tend to support a trend, to rate the quality of athletic experience as positive subsequent to a winning season.
Reliability

Reliability on the CBAS observation system was based on agreement of occurrence and nonoccurrence of coaching responses (in each behavior category) between the researcher and reliability rater. Reliability data were based on 300 one-minute observation intervals, or 10 minutes of observation for each period across 30 playing periods. Actual observations took place for 30 seconds within each observation minute. Percentages of agreement between researcher and reliability checker ranged from .96 to .77 with a mean reliability percentage of .866.

Reliability for the 10-item performance rating scale was determined in two ways. First, exact agreement of occurrence of responses between head coach and assistant coach was calculated. This calculation resulted in an exact agreement percentage of .50. In addition, general agreement was determined by grouping responses in the almost always and frequently ranges into an agreement category. Also, occasionally and almost never responses were grouped into an agreement category. The percentage of general agreement between coaches was 100%.

Reliability for the 5-item attitudinal questionnaire was statistically determined by computation of Cronbach's alpha. This test is a measure of the internal consistency of the 5-indicator variables on the questionnaire. The result of this computation was an alpha of .227. This figure differs significantly from an alpha of 1.0. An
alpha of 1.0 would have been expected if the questionnaire had perfect reliability.
CHAPTER V

DISCUSSION

The intent of the present study was to examine the methodological feasibility of using a behavioral observation system to assess coaching behaviors in a continuous action collegiate sport (hockey). Once it was determined that the observation system was methodologically feasible, the reliability of this system was examined and found to be high. In addition, coaching behaviors were related to player and coach perception. Attempts were also made to relate team performance statistics to coaching behaviors. These performance data were not used in the study because it was impossible to isolate coaching responses from other factors that may have affected performance (e.g., crowd noise and the opposing teams responses).

The descriptive findings indicated that the head coach most frequently engaged in general technical instruction (44.3%), general encouragement (21.4%), and organization (14.2%) responses during actual playing competition. The percentage of reinforcement (4.51%) and punishment (3.56%) responses was far less than had been anticipated. This finding contrasts with the Thorp and Gallimore (1976) study that found punitive coaching behaviors accounting for a larger percentage (17%) of the coach's overall behavioral repertoire. The present finding also disagrees with the Smith et al. (1983) study that found reinforcement to account for a relatively high percentage (22.9%) of total observed coaching responses. All three studies
found that the instructional behavior category accounted for nearly half of the coded coaching responses.

The correlational data added support to the idea that reinforcement and punishment are at opposite ends of the same behavioral continuum. That is, when punishment occurred there was a reduction of reinforcing behavior and visa versa. Reinforcement was positively related to encouragement responses. Punishment tended to occur most frequently with coaching responses directed at keeping control of the team. Organization and punishment behaviors were also positively related. Thus, it appears that punitive behaviors are most frequently emitted when the coach structures activities (e.g., stopping fights, reducing player unruliness). Positive reinforcement and encouragement tended to be most common when used to maintain current levels of behavior (e.g., keeping a play going, ensuring that players on the bench continue to cheer on those who are on the ice).

The data obtained on player perception was noteworthy in that it is consistent with behavioral theory (Skinner, 1974). The players tended to rate the overall quality of their athletic experience as positive in the presence of relatively low rates of coaching behavior generally associated with aversive stimulation (punishment and mistake contingent technical instruction with punishment) and extinction (non-game-related verbal coaching behaviors). Conversely, the players tended to report generally positive athletic experiences in the presence of relatively high rates of coaching behaviors frequently associated with maintaining appropriate responses (instruction and encouragement). The only finding not directly consistent with
behavioral theory was the relatively high player ratings on athletic experience despite a relatively low percentage of coaching reinforcement (4.5%). This finding is similar to that of Smith et al. (1983) who found reinforcement to have no apparent influence on player attitude. It may be the case that at higher levels of athletic competition, some reinforcer's (e.g., instruction to increase player performance) play a more powerful role in controlling the athletes' behaviors than the other types of reinforcers.

The rating scale data also indicated significant coach-player agreement on the coaching behavior frequencies for the 10 CBAS categories. This information supports the conclusion that coach-player communication is effective on a successful team. That is, one important variable involved in winning may be that team members do more than blindly follow orders. It may also be important for players to understand and, to some degree, anticipate the coach.

The coach's perception of his own behavior was not found to be significantly related to the researcher's observed results. There are primarily two possible explanations for this unanticipated finding. First, it is possible that the coach need not have an accurate evaluation of his own performance in order to be effective. Secondly, the coach may have had an accurate perception of his performance, but the scale developed by the researcher (see Table 6) and used to categorize coaching behavior frequencies was inaccurate. It is possible that the latter case is true. The observation system proved highly reliable but there has been no previous research on scaling this information into behavior frequency categories. It is
quite possible that the ranges in this initial scaling attempt were too broad for accurate comparisons with the coach's self-ratings. However, examination of Table 7 shows that even though there were only 4 (out of 10) exact agreements between coach and researcher, the distances between nonagreements were quite close. That is, 4 of the nonmatches were between the "occasionally" and "frequently" ranges. Therefore, although there were only 4 exact matches between coach self-performance ratings and observed behavior results, there was obvious agreement that 4 additional (nonmatched) items were occurring at an observable rate.

The obtained findings of this study serve as a starting point in behaviorally describing the ecological makeup of the intercollegiate athletic setting. Previous research has attempted to describe personality variables of athletes (see Chapter I). However, there have been almost no systematic behavioral studies on how the environment effects player performance or perception at the college level. A full empirically derived description of the affects of environmental variables on behavior is essential if effective training procedures can be formulated.

This study has shown that it is possible to reliably observe coaching behaviors in the college hockey environment. Future studies would be most relevant if aimed at refining the now existing methods of observation in this setting. For example, a different time sampling procedure may enhance accuracy of observation. Another research idea would be to use a different time indicator (e.g., a timing light), rather than a stop watch in order to more effectively
mark the onset of observation intervals.

Future studies in the area could also focus on refining the work on scaling the frequency of coaching behaviors (per period) begun in the present study. The estimated coaching behavior frequency range (Table 6) is a vast improvement over no description of coaching behavior ranges at all. However, refinement of this scale through future research could be a primary contribution. Such a refinement could aid in assisting coaches to learn to increase certain functional behaviors (per period) while reducing the rates of less effective responses.

Additional work could also be accomplished in the area of developing standardized rating scales that measure player perception of coaching performance. The present study utilized unstandardized rating scales that were modified from research in other sports. The reliability of the two scales used was questionable. However, there are no standardized tests presently available that are relevant to the athletic experience. Research to develop standardized testing instruments of proven reliability for the area of athletics is needed.

Finally, now that the feasibility of the behavioral study of intercollegiate hockey has been methodologically verified, it would be interesting to conduct similar research with several teams concurrently. Group research may help to discover commonalities and differences in college coaching styles. This may help to expedite a variety of behavioral training procedures for athletes.
APPENDICES
Appendix A

Player Attitudinal Rating Scale Measuring Quality of Athletic Experience
Please circle the most appropriate response

Leave item blank if you are not sure of the answer.

1. How much do you like playing hockey?
   
<table>
<thead>
<tr>
<th>Like a lot</th>
<th>Like</th>
<th>Dislike</th>
<th>Dislike a lot</th>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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2. How well did the players on your team get communicate?

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<tr>
<th>Very well</th>
<th>Well</th>
<th>Poorly</th>
<th>Very Poorly</th>
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<tr>
<td>1</td>
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3. How much did you like playing for your coach?

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<tr>
<th>Like a lot</th>
<th>Like</th>
<th>Dislike</th>
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4. How helpful was your coach in teaching the sport of hockey?

<table>
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<tr>
<th>Excellent</th>
<th>Good</th>
<th>Average</th>
<th>Moderate</th>
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5. I liked playing hockey more at the end of the season than at the beginning of the season.

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<tr>
<th>Very much</th>
<th>Much</th>
<th>The same</th>
<th>Less</th>
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Appendix B

Player-Coach Attitudinal Rating Scale Measuring Coach Performance Across 10 CBAS Behavioral Categories
Please circle the most appropriate response.

Leave item blank if you are not able to circle a response for that item.

1. The coach gives a positive reaction shortly after a good play is made. Examples include congratulating a player, patting a player on the back after a good play.

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2. The coach gives encouragement even after a mistake has been made on the ice. For example, telling players not to worry "just play harder next time," after a score by the opposing team.

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<th>Almost Always</th>
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3. The coach is quick to correct mistakes you are making on the ice by telling or showing you the more appropriate technique. For example, telling or showing a player how or where to pass the puck after it's been intercepted a number of times by the other team.

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4. The coach gives negative responses immediately following mistakes during the game. For example, making a sarcastic remark when opponents have made a score or waving in disgust when a player receives a penalty.

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5. Once a mistake has been made the coach will become angry when correcting it. For example, saying "How many times do I have to tell you to stay closer to the face off."

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<th>Almost Always</th>
<th>Frequently</th>
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6. The coach is able to keep effective control in response to an unruly situation. For example, getting players to calm down after a fight has broken out on the ice.

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<th>Almost Always</th>
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7. The coach gives instructions that help you to more readily deal with game situations. Correcting player positions on the ice, giving strategies that lead to goals, providing you with new information during game situations.

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8. The coach frequently encourages players to play harder, hustle, be alert, etc.

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9. The coach organizes team members during games so that there is less confusion. For example, reminding players what line goes in next, when to be ready to go into the game, etc.

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10. The coach talks to players about non-game related situations during the actual contest.

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Appendix C

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Appendix D

CBAS Coding Sheet for Reliability Checker
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DATE OF GAME: __________

DATE OF CHECK __________

RELIABILITY CHECKER __________
Appendix E

Release of Information Form
I understand that I am participating in a psychology graduate project. I understand that neither my name nor the names of the team, university, or the coaching staff will be cited in the final write-up of the study.

Signed ______________________________

Date ________________________________
BIBLIOGRAPHY


