AN ABSTRACT OF THE THESIS OF

THOMAS VAUGHN WALKER for the degree of DOCTOR OF PHILOSOPHY in EDUCATION presented on March 28, 1979.

Title: AGGRESSION IN SPORT: A STUDY OF FOULING IN UNIVERSITY BASKETBALL

Abstract Approved: Redacted for privacy

Dr. Vern Dickinson

Oregon State University's conference varsity basketball games for the seasons 1976-77 and 1977-78 were examined for the occurrence of aggressive actions (fouls). Official play-by-play score sheets and Official National Collegiate Athletic Association Box Score Sheets were used to gather the data.

The purpose of the study was to determine differences in the occurrence of aggressive actions (fouls) under several conditions evident in basketball contests. The intent was to examine the possibility of predicting aggressive actions throughout the game.

Meinhart Volkamer, a German behavioral scientist, assume' that the sports team contains the frustrations, rewards, and interactions seen in social groups. His findings, with soccer as the activity, indicate that at least four variables influence fouling: (a) whether the team is at home or away; (b) whether the team is winning or losing; (c) whether the team is ranked high or low in the standings; and (d) whether the score difference in
the game is large or small. Volkamer's findings opened
the door for investigation in other sports and settings.

Twenty-eight Pacific-Eight Conference varsity
basketball games were examined for the occurrence of
duels. These twenty-eight games represented two con-
ference seasons for Oregon State University with its
PAC-8 opponents (University of Oregon, Washington State
University, University of Washington, Stanford University,
University of California at Berkeley, University of
California, Los Angeles, and University of Southern
California).

The dependent variables used for the investigation
were the sums and differences in the total number of fouls
committed by the opponents of Oregon State University.
Independent variables again from the seven opponents
consisted of the following: court (home and away), year
(1976-77 and 1977-78), score (difference at the end of
the game), opponent (the seven listed previously), standing
(top half and bottom half), and time (early season and late
season).

The data were subjected in a whole to a reduced model
approach for analysis. This is a method by which an inde-
dependent variable is separated from the whole model to
determine if a significant difference exists in the
models. When a significant difference was discovered,
the independent variable that was removed caused a
significant difference in the whole model.

For all tests (F) of the eight hypotheses, the minimum level of confidence was the .05 level of significance. The statistical techniques applied in the analysis included a factorial analysis of variance, one-way analysis of variance, regression techniques, and a quadratic fit.

Of the eight null hypotheses examined, two were rejected. A significant difference existed in the number of fouls committed and the final score. As the range of the final score increased, the number of fouls committed increased at the rate of one foul for each four point increment.

During the first and last five minutes of the second half, a significantly larger number of fouls were committed, with the last five minutes of the game having the greatest increase.

Differences in court, year, half, standing, time of season, intervals after time-out periods, and interactions were all insignificant in determining fouling behavior in basketball. The results indicate that the frustrations of the situational conditions of the game, especially during the second half, are major factors in fouling behavior in basketball.

The findings of this investigation indicate that fouling is predictable when the range of scoring increases,
and during the first and last five minutes of the second half.

The implications associated with the findings are the following:

(A) The frustrations of the game situation causes aggressive behavior.

(B) No cathartic effect is apparent as a result of displaying aggressive actions.

(C) Several factors contribute to the occurrence of fouling behavior in basketball games including accidents, intentional fouls, coach requested fouls, and over-aggressiveness by players.
Aggression in Sport:
A Study of Fouling in University Basketball

by

Thomas Vaughn Walker

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To my mother Mary, my father Thomas, and most especially to my wife Cheryl who have sacrificed and have provided much of the inspiration, encouragement, understanding and love so needed--it is to them that this thesis is dedicated.
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Aggression in Sport:  
A Study of Fouling in University Basketball

CHAPTER I

INTRODUCTION

Some sports require the participant to exhibit a substantial amount of physical force which is directed toward or against one's opponent or is displaced into other objects such as the ball or other physical elements in the immediate environment. Other sports and games require a much greater control of the physical force to demonstrate successful performance. Sports require, through their rules, that individuals aggress within structured rules and specified conditions. Cratty (1973) explains that in many sports, a stressful situation occurs when all-out aggression is succeeded by periods of total absence of action. Thus, in sport as in life, one problem is to encourage an optimum amount of aggression when called for and to enable athletes to suspend aggression when that is called for.

Fouling in basketball or committing a penalty in other sports is the result of several factors. One of these factors appears to be the displaying of aggressive behavior at inappropriate times during the contest.
Purpose

The intent of this investigation is to determine the extent to which fouls or aggressive actions can be predicted in University varsity basketball contests. Although numerous researchers have been involved in the problem of aggression and its effects on performance and learning, relatively few have developed a model to predict when aggressive acts (fouls) will occur during actual athletic competition.

The results of this study will provide information that relates to the seemingly tremendous increase or influx of violent aggressive acts in athletics. These results may well provide an additional means of establishing the psychological and sociological climate in educational and recreational arenas to elicit optimum performance and learning.

Importance of the Study

In the search of the literature no previous study was discovered in which fouls or other types of aggressive behaviors have been predicted in basketball. Volkamer (1972) predicted, in most cases correctly, just when aggressive acts would occur in soccer contests.

Studies relating to aggression have been quite limited in their approach, and this has created some problems. Husman (1972) states that the major problem in studying aggression lies in finding an acceptable universal
definition for the term. Most psychologists describe aggression in terms of behavior, but like many psychological terms, it is difficult, if not impossible, to isolate it from other forms of motivated behavior.

In this investigation aggression is operationally defined as fouling behavior. Fouling may result from factors other than the building up to a behavior resulting in an overt aggressive act. Conditions such as intentional or coach-requested fouling, poorly conditioned performers, lack of motor ability or skill, accidents, poor officiating, and other factors undoubtedly account for some fouling behavior. A major factor leading to a large number of the fouls that occur in a college basketball contest, however, are the result of some psychological, emotional, or other factor which drives the individual to commit an unnecessary and undesired aggressive act.

It is not the purpose here to acknowledge a complete acceptance of the central thesis of the frustration-aggression hypothesis formulated by Dollard, Miller, Doob, Mowrer, and Sears (1939) in their classic monograph, *Frustration and Aggression*. The 1939 statement that "the existence of frustration always leads to some form of aggression, and the occurrence of aggressive behavior always presupposes the existence of frustration" has generally been shown to be much too broad for research purposes. Berkowitz (1969) believes that a frustrating event
increases the probability that the thwarted organism will act aggressively. This relationship between frustration and aggression has been recognized in many different species, including man.

If a sport is to survive in a society, the aggressive behaviors of the participants must be controlled and directed into appropriate channels within the rules. An investigation which examines the occurrence of aggressive behaviors will provide information which may help in the development of rule changes to prevent unwanted and unnecessary aggressive action.

**Statement of Methods**

Oregon State University varsity basketball games from the seasons 1976-77 and 1977-78 have been examined for the occurrence of fouls. Data were gathered from official play-by-play score sheets and Official National Collegiate Athletic Association Box Score Sheets. Only official varsity game data were used. Data from all Oregon State University basketball opponents in the Pacific Eight Conference were examined.

The data were collected from more than 80 varsity college male basketball athletes. These athletes represent some of the most highly trained and advanced college basketball players in the world. (Chapter III contains a more complete description of the methods applied.)
Data Gathering Conditions

Many of the factors relating to performance, especially in a competitive situation, could not be duplicated under artificial laboratory conditions. The availability and utilization of actual competitive game data were especially appealing because of the nature of this investigation.

Research Questions

1. Are patterns of aggression identifiable in University varsity basketball contests?

2. Is aggression predictable?

3. To what extent is the Frustration-Aggression Hypothesis an adequate explanation for the occurrence of much of the fouling and other aggressive behavior exhibited in basketball?

4. Is a situation such as the team's standing an important factor in the occurrence of aggressive behavior?

5. Is the catharsis theory relevant in this situation?

6. Does the home court or familiar surroundings have any effect on the amount of aggression displayed?

7. Does the difference in the number of points scored by teams have an effect on aggressive behavior?

8. Are there any effects identifiable as a result of time-out periods as to the occurrence of aggressive behavior?

With the above questions in mind, the following hypotheses were developed. Answers to these questions will be addressed in Chapter V.
Null Hypotheses

1. No significant difference exists between playing on their own or familiar court and playing on visiting courts as to the number of fouls (aggressive acts) committed.

2. No significant difference exists between the number of fouls in a game and the score at the end of a game.

3. No significant difference exists as a result of the team's standing as to the number of fouls committed.

4. No significant difference exists in the number of fouls that occur in the first half and the second half of the contest.

5. No significant difference exists in the number of fouls that occur during the first and last five minutes of each half.

6. No significant difference exists in the number of fouls that occur during designated intervals of the playing season (early season, late season).

7. No significant difference exists in the number of committed fouls between the 1976-77 and 1977-78 seasons of play.

8. No significant difference exists in the number of fouls committed in two-minute intervals following selected time-out periods.

Definition of Terms

1. Frustration-Aggression Hypothesis--"... the occurrence of aggressive behavior always presupposes the existence of frustration and, contrariwise, that the existence of frustration always leads to some form of aggression." (Dollard, et al., 1939)

2. Catharsis--a purification or purgation that brings about spiritual renewal or release from tension; a purification or purgation of the emotions (as pity and fear). (Webster, 1967)
CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The amount of research generated in the area of aggression since the 1939 Frustration-Aggression Hypothesis has been enormous. Many different theories relating to the causes of aggressive behavior have evolved with evidence to support some aspects of several theories. Indeed, there is a tremendous debate over the definition of aggression when terms such as drive, anxiety, motivation and activation are considered. For the purposes of this study the review of literature will focus primarily on aggression in sport settings. A few studies in other areas, those which contain an aspect relevant to this investigation, are also included.

In general, aggression in this study is defined as fouling behavior, with the assumptions and exceptions cited in the first chapter.

Cratty (1973) describes aggression for the athlete as "what an athlete does, to himself or to his opponents, about his fears and needs." To aggress decisively one must usually be highly activated, whereas fearful feelings may be accompanied by either high or low levels of activation.
He defines activation as an "underlying syndrome of physiological and behavioral signs that indicates the degree to which the athlete is ready to act; whereas anxiety refers to the fear he may hold about the forthcoming contest, himself, his capacities and the capacities of his opponents."

Atkinson (1964) states that motivation deals with variables that incite or direct a person toward activity, and ultimately toward a specific goal. He insists that certain behavioral reactions can be predicted when certain motives are present, but it must be remembered that the human organism's reactions are also influenced by previous experiences, present expectancies, and other individual differences.

The Volkamer Study

In a careful search of the literature, only one study has been found which relates directly to the topic under discussion here. In fact, this study is the primary investigation which stimulated the development of this topic. Although the investigation involved German soccer teams, it suggested probabilities for examination of aggressive behavior among athletes in a variety of settings. The author, Volkamer (1972), predicted, in most cases correctly, just when aggressive acts would occur in soccer contests. He examined the records of 1,986 soccer games
in Northern Germany, 720 in one amateur league and 1,266
in another amateur league. He points out that fouls can
occur because of coordination problems, etc., and may not
always be the result of excessive aggressive behavior.

Volkamer's major findings were as follows:

1. In relation to the total number of fouls
   committed per game, the losing team was
   found to commit a significantly greater
   portion at the .01 level.

2. Home field teams commit fewer fouls than
   do the visiting teams, also significant at
   the .01 level.

3. Fouls are less frequent when a high number
   of goals or points are being scored than
   when few points are scored in a game.
   (Significant at the .05 level.)

4. The greater the goal difference between the
   two teams, the less the total number of fouls
   that occur. (Significant at the .01 level.)

5. No significant difference was found in the
   total number of fouls committed in each half.

Other findings which are interesting and possibly
relevant to this basketball investigation included the
following:

1. Teams lower in standings commit more fouls
   than those higher in standings. He further
   found that lower-ranking teams act more
   aggressively even when winning a game.

2. When a high-ranking team and a low-ranking
   team play, the high-ranking team commits
   more fouls. This finding does not contra-
   dict the results in the previous statement.
   It appears that when two low-ranking teams
   play more fouls are committed than when two
   high-ranking teams play, but when a very
   low-ranking team plays a high-ranking team
the high-ranking team commits more fouls than the low-ranking team.

Cratty (1973) cites an example of such a situation that occurs when teams ranked 8th and 9th are playing, the 8th ranked team fouls more than the 9th ranked team. When the 12th and 13th ranked teams are playing, a similar pattern of fouling is seen. However, the sum of the fouls committed by teams ranked 12th and 13th is greater than the sum committed by the 8th and 9th ranked teams.

3. Fewer fouls are committed at the beginning of each half than at the end, but this increase of fouls picks up about two minutes sooner in the second half.

4. After half-time and other time-out periods, fewer fouls are committed for about a two-minute period.

According to Cratty (1973), Volkamer suggests that aggression (fouling) is sociologically and psychologically "normal" on athletic teams. Cratty points to several problems with regard to aggression in sports as evidenced by the foul count. For example, he points to the "chaining effect" of aggressive fouls—once a game is started with a serious foul, a series of fouls often follows.

A Brief Overview of the Concept of Aggression

Husman (1972) does one of the most outstanding jobs of setting the tone for the evolution of theories on aggression. The Latin root of the word aggregēri means to "go forward, to approach." Primarily this means "to approach someone for counsel or advice." Second,
according to May (1972) it means "to move against" or "to move with intent to hurt." The opposite of aggression then is not reaching out for friendly affirmation or to hurt, but isolation—the state of no contact. Webster (1964) defines aggression as "aggressing or inclined to aggress, starting fights and quarrels" or "full of enterprise and initiative, bold and active." Funk and Wagnalls (1968) define it as "an unprovoked attack; encroachment" or "a tendency toward hostile action, generally associated with emotional states."

Husman (1972) writes that definitions such as these form the basis for two diverse theories of aggression. He describes it as the following:

One group of psychologists and psychoanalysts believe that aggression is a social psychological phenomenon which is learned. Here, aggression is defined as an attack upon an object, person or individual, where the goal response is to injure or do harm. Another group of biopsychologists, ethnologists, and psychoanalysts propose that aggression is instinctive. Here, aggression is defined as drive, a drive related to survival.

Rubinstein (1975) defines aggression as any act that causes pain or suffering to another. He also further points out that some psychologists believe that aggressive behavior is instinctual to all species, including man, while others believe that it is learned through the processes of observation and imitation.

As one begins to look at a study of aggressive behavior, no single approach seems totally adequate.
Johnson (1972) points out that one of the difficulties with many theories of aggression is that their proponents tend to concentrate on their own discipline and ignore contributions from neighboring disciplines. He sees the result as an abundance of over-simplified, sweeping generalizations, of which the following are examples:

(a) aggression is a universal instinct; (b) aggression is a single underlying motivational process; (c) aggression has some single antecedent or cause, such as pain or frustration; (d) all aggression is bad; (e) killing members of the same species always involves aggression while killing between species does not; (f) humans are by far the most aggressive of all animals; (g) the study of aggression in animals contributes little toward the understanding of human aggression.

It is his opinion that all of these statements are totally or partially false.

As suggested by Johnson (1972) aggression in this basketball investigation is considered a "multidimensional concept." There are many different kinds of aggressive behavior, and as a result, there can be no single, satisfactory definition. Therefore, for the purposes of data collection in this investigation, as in the Volkamer study, aggression is operationally defined as fouling behavior excluding the intentional foul as a game tactic.

Research on Aggression in Sport

Generally, studies of aggression in sport have centered around single aspects of the issue. Often these
studies have actually been studies of motivation or other such approaches. Most often no follow-ups to the investigations exist. It should be noted that very often the setting, sport, level of competition, age and sex of the participants, etc., make direct comparisons misleading. Indeed, comparing the Volkamer soccer study to this basketball investigation should be approached with caution because of the differences in setting (another country), sport (soccer), type of competition (amateur non-school leagues), and several other distinct differences.

Aggression--The Catharsis Approach

A. Supportive Literature. Martin (1976) designed a study to investigate the effects of winning and losing competition upon the aggressive responses of intercollegiate basketball players and wrestlers. It was felt that an analysis of aggression in an individual sport (wrestling) and a team sport (basketball) might aid the coach and physical educator to better understand the personality dynamics of various groups of participants.

The Rosenzweig Picture-Frustration Study was administered to 32 Springfield College athletes under the following three conditions: during a normal emotional state, after winning a contest, and after losing a contest.

Direction of aggression included (a) extrapunitive--
aggression directed outwardly toward the environment, (b) intrapunitive--aggression is turned by the subject upon himself, and (c) impunitive--aggression is evaded in an effort to gloss over the frustration. Type of aggression included (a) obstacle-dominance--the barrier which causes the frustration is prominent in the response, (b) ego-defense--attention is focused on the protection of the thwarted individual, and (c) need-persistence--the response emphasizes the solution to the frustrating problem.

Scores for all subjects under each treatment were computed and analyzed by means of a 2X3 factorial ANOVA with repeated measures across one factor. The acceptable level of significance was .05. The significant findings of the study were as follows: (a) Following winning competition, the normal level of extrapunitive aggression was reduced significantly for basketball players; (b) After losing, wrestlers showed a significant increase in extrapunitive aggression; (c) For all subjects extrapunitive aggression was higher during the normal state than it was following winning competition. The results revealed that athletes in individual sports experience greater frustration when losing than do team sport athletes. "On the basis of this study, it would appear that participation in a team sport (basketball) should be viewed quite differently from participation in an individual sport.
(wrestling) in relation to effects of winning and losing competition."

Martin concludes that this research tended to lend support to the catharsis theory of aggression for intercollegiate basketball players, following participation in a winning contest.

Although the emphasis by Martin was more related to aggressive tendencies and expressions rather than aggressive acts, this relationship is so closely aligned to actual acts of aggression that it is presented here. To act aggressively is the result of having the opportunity to display aggressive tendencies and feelings.

Berkowitz (1962) states that there are very few quantitative examinations of the effects of combative sports upon the instigation to aggression. In a review of the literature, he finds no conclusive evidence one way or another as to the consequences of aggressive contests. Available findings seem to point more to an aggressive-anxiety (and/or guilt) reaction to sports and games, than to pleasant feelings following the discharge of hostile impulses. He sees better evidence in that an angered individual often obtains some tension reduction (catharsis) if he can injure his frustrator in some way "(i.e., if he can aggress against him)" without feeling guilty or anxious. His review reveals the following:
The pleasure signifying such a tension reduction may arise from the fulfillment of a "completion tendency." As long as he is angry and set to aggress against the instigator the individual has within him an "activated" aggressive response sequence. Injuring the instigator is the goal response terminating the aggressive sequence. Interrupting the sequence may heighten tension, or at least prevent (or perhaps delay) the lessening of the internal excitement and the individual does not complete the sequence--which will lower tension--until he perceives that he has injured the instigator physically or psychologically, or that an acceptable substitute has done so.

Buss (1961) in attempting to expand on the concept of a catharsis writes that "the expression of aggression is called catharsis, and the diminution in the tendency to aggress as a consequence of such expression of aggression is called the cathartic effect." He further states that in anger there is a temporarily heightened psychological state, a preparedness for aggressive action. If no aggressive response ensues, this tension state will gradually subside. If there is an aggressive response, the tension state will dissipate faster. Thus when an attacking response occurs in the presence of anger, there is a cathartic effect that drops tension back to its resting level. When an aggressive response occurs in the absence of anger, there is no drop in tension level; since tension (anger) level is at its low point, it cannot be lowered. When an aggressive response occurs in the absence of anger, therefore, there is no cathartic effect.

It should be pointed out here that this position
is in contrast to the Dollard, Miller and their colleagues (1939) position. They predicted that there is a cathartic effect whenever an aggressive response has been made, not only when anger is present.

Goldstein (1975) states that observing violence tends to stimulate aggression rather than providing evidence for a reduction or catharsis. His findings reflect data gathered mainly from spectators at athletic contests and others viewing violence in the media. He finds that it is conceivable that a kind of catharsis does occur under some, as yet unspecified, conditions. He further states that research on aggression should measure at least one nonaggressive response in order to determine whether the effects observed are specific to aggressive behavior or not. This can be accomplished by attempting to isolate as many of the different responses as possible, and then observing for specific effects.

Goldstein finds that many of the laboratory experiments on imitation of media violence have been criticized on methodological grounds, largely because the research laboratory is an artificial environment and because most laboratory experiments use excerpts of violent scenes taken out of context from the film or TV program.

Goldstein feels that when discussing aggression in sport, it is well to keep in mind that sports have many
levels, only one of which may be aggressive. His point of view is one that aggression of any sort may be totally absent from a great many sports and games. He explains his position in the following way:

... with respect to those sports which require bodily contact between participants of opposing teams, it is possible that for some (or even all) players and for some spectators (but certainly not all), the aggression inherent in contact sports is peripheral to other facets of the game. It is reasonable that for some players and perhaps for some spectators, the violence of say, a football game, can be transcended through involvement in the game and in this way have little effect on the spectator's or player's levels of aggression. For a great many spectators and players, however, aggression in contact sports does have an effect.

It is impossible to know whether Goldstein would or would not consider the sport under consideration here, basketball, a contact sport. The game was invented as a non-contact sport, the rules specify non-contact as an essential aspect, yet it would appear that a great deal of physical contact does occur and even often is allowed.

May (1972) is more direct and specific in describing the meaning of aggression. Not speaking specifically about aggression in sport, the positions taken are quite striking and sound incredibly precise. The author writes the following:

In contrast to self-assertion, which may be simply a hold fast—"Here I stand; you can come this far and no farther"—aggression is a moving out, a thrust toward the person or
thing seen as the adversary. Its aim is to cause a shift in power for the interests of one's self or what one is devoted to. Aggression is the action that moves into another's territory to accomplish a restructuring of power. This... occurs because of the individual's or group's conviction that the restructuring cannot come by self-affirmation or self-assertion.

It would appear that aggression, as described here by May, is the same whether it be in a sporting event or between nations at war. The focus of May's description of aggression becomes quite interesting when basketball is substituted as the activity. May continues in this framework with the following comments:

Perhaps the aggressor wants land and resources, as nations do when they annex the other's territory in war. Or perhaps the aggressor has an intellectual stake in the change, as Mondrian did in his new art forms. Or perhaps the aggression grows out of a hatred of injustice, like that of Frantz Fanon in calling the blacks of Africa to rebel; or has a spiritual aim, like that of the abolitionists. Whatever the aim and motive may be, and without reference at the moment to when it is justified and when it is not, aggression itself consists of the endeavor to seize some of the power, prestige, or status of the other for ones self or for the ideas to which one is devoted.

In May's statement, there appears to be a sense of satisfaction received by the aggressor as a result of aggressing. Although no specific reference is made to this effect as a catharsis, it seems that it must clearly be just that approach.

Kaufmann (1970) explaining his position on the
concept of a catharsis and cathartic effect states that an aggressive act is quite often followed by subsequent relief. Many psychologists and psychiatrists advocate catharsis as a very useful remedy against "building up" mounting intensities of "need to aggress." It was observed that a person who is badgered, annoyed, or thwarted in some way becomes angry and commits aggression. After having committed the aggressive act, or after having had an emotional outburst, he feels better, and shows his relief in a variety of ways.

Kaufmann sees that a necessary step in verifying the notion of catharsis and cathartic effect lies in determining whether, after catharsis has occurred, aggression is less intense than before. He states the following:

... but even if we do observe what appears to be such a relationship, we must then ask whether it is really of the type asserted by the hypothesis, namely an invariant relationship between aggression, or the alleged draining-off of aggressive energy through catharsis and subsequent aggression; or whether it is possible that the relationship occurs at times, but can be ascribed more economically to different causes than those asserted by the hypothesis.

In an attempt to determine whether the catharsis approach really works, Baron (1977) points to existing evidence which offers relatively strong support. The discussion is directed to a series of studies conducted by Jack Hokanson and his colleagues (1962, 1970, 1963, 1966, 1961). In these studies, subjects (typically,
female college students) were first provoked by the experimenter and then were provided with an opportunity to aggress in one of several ways against this person or against other individuals. Participants' blood pressure was measured prior to the provocation, following these procedures and again after aggressing and, in general, results provided evidence for catharsis: when permitted to aggress in a relatively direct fashion against the person who provoked them, subjects evidenced sharp reductions in arousal. Hokanson and Burgess (1962) explain in greater detail the procedures used.

Baron (1977) believes that the fact that aggression against others often yields reductions in physiological arousal does not in any sense guarantee corresponding reductions in the likelihood of further assaults. The sequence is described by Baron as follows:

An individual is strongly provoked and aggresses against his or her tormentor. As a result of such actions, the unpleasant arousal he or she experiences is reduced. Such reductions, in turn, serve as positive reinforcement, thus strengthening this person's tendency to aggress on future occasions when annoyed by others. Thus, the occurrence of emotional catharsis in no way assures that successful attacks against others will lessen the future likelihood of such behavior, indeed quite the opposite result may be produced.

In explaining the results of aggression and its effect on later avoidance of aggression, Baron suggests that the evidence is not very encouraging. It seems
that such effects occur only under highly specific conditions and circumstances.

It would be a gross injustice if some additional reference was not given to the Yale University group who are largely responsible for much of the research that has been conducted as a consequence of their 1939 monograph, *Frustration and Aggression*. The authors Dollard, Miller, Doob, Mowrer and Sears (1939) state that "occurrence of any act of aggression is assumed to reduce the instigation to aggression." Presumably this reduction is more or less temporary and the instigation to aggression will build up again if the original frustration persists. Also the repetition of a mode of release may presumably produce learning of it. Throughout this hypothesis, both the role of temporal factors and the influence of learning present problems acutely in need of detailed solution.

Dollard and his colleagues state that one of the joint implications of the principles of catharsis and displacement is immediately obvious: "with the level of original frustration held roughly constant, there should be an inverse relationship between the occurrence of different forms of aggression." This implication follows because when any response of aggression is inhibited, its instigation should be displaced to the other responses of aggression, and, conversely, when any response of aggression is expressed, its cathartic effect should lessen the
instigation to the other aggressive responses.

Larsen (1976) defines displaced aggression as the phenomenon of focusing on a target different from the instigator of frustration. Reasons for displacement include fear of punishment following the aggressive act.

In basketball games, it appears that the athlete learns to displace some of the aggressive tendencies which might prevail especially when it is more likely the threat of punishment is strong (for example, his fifth foul and total elimination from the game).

Larsen suggests that displacement may be based on perceptual similarity: the more similar the substitute target is to the original target, the more likely it is to be selected as a target for aggression. The basic idea is that displacement will result in a "draining off of energy," lowering the aggressive drive. If this be the fact, then the frustrated athlete would almost as likely foul another player if he could not aggressively foul the aggressor. Larsen is quick to point out that the research indicates the evidence is not clear--there is no one-to-one relationship between displacement and lowered energy; any cathartic activity may lead to stronger habits of aggression if rewarded.

Dollard, Miller, et. al. (1939) state that "the expression of any form of aggression which is not dangerous to the society should have a cathartic effect and tend to
reduce the strength of the instigation to other, more socially dangerous forms of aggression." It would be advantageous to any society, therefore, to permit the expression of certain forms of aggression. This position would encourage certain forms of aggression to be expressed in basketball games.

Husman (1954 and 1955) attempted to determine the effect of college boxing and wrestling upon aggression. Three projective type tests, the Rosenzweig P-F study, six selected pictures of the Thematic Apperception Test and a twenty-item Sentence Completion Test were administered at intervals in the competitive season to four groups of boxers, wrestlers, cross-country runners, and control subjects. The TAT showed the boxers to have significantly less fantasy aggression than the other groups, and the P-F study showed that the boxers' aggression tended to be more intrapunitive than was true for the other groups, with the cross-country runners being extrapunitive, suggesting guilt and anxiety associated with the more aggressive sport of boxing. This difference was especially pronounced in tests given less than two days after a boxing match. Husman interpreted the findings as supporting the catharsis theory of aggression.

They were among the few investigators who looked into the physiology of catharsis. While several aspects have been tested, systolic blood pressure was found to be the most reliable indicator of this arousal. In addition, they found that the direct physical and verbal expression of aggression towards the frustrator consistently resulted in a return of systolic evaluations to pre-frustration levels. Aggression following frustration was found to be tension-reducing. Those individuals who were frustrated and not allowed to aggress were found to maintain their systolic elevations.

Wells (1970) attempts to replicate essentially the major findings of Hokanson as well as extension of his work. Three responses to frustration were investigated: (1) counter-aggression against a frustrator; (2) having no opportunity to aggress following frustration; and (3) the discussion of frustration. The efficacy of these responses in reducing tension and the overall effect of these three responses to frustration upon subsequent aggressiveness was determined.

It was predicted that counter-aggression and discussion of frustration would be found to be equally effective in reducing frustration-produced tensions. Also it was hypothesized that the counter-aggression would result in an increase in subsequent aggressiveness, while the discussion would be followed by no change in aggressiveness.
Hokanson's major findings were replicated. In addition, the discussion of frustration was found to be as effective as counter-aggression in reducing frustration-produced tensions. Insofar as subsequent aggressiveness was concerned, counter-aggression was found to increase it, while the discussion of frustration produced no change in it.

In a study designed to clarify the conditions under which the amount of aggression directed by an angered individual at his tormentor may be decreased, Konecni (1973) found that annoyed subjects gave more shocks than nonannoyed ones did. The primary emphasis in the study was on the expression of aggression and its capacity to bring about a decrease in subsequent aggression (the cathartic effect).

Several experiments were applied but the major investigation involved the following procedure: (a) Stage One--one-half of the subjects were annoyed and frustrated by a confederate, while the other half were treated in a neutral manner; (b) Stage Two--one-third of all subjects gave shocks to the confederate, another third simply waited, while the remaining third worked on mathematical problems. The main dependent measure was the number of shocks administered to the confederate in the final stage of the experiment. In addition to annoyed subjects giving more shocks, the annoyed-wait and
annoyed-math subjects decreased the amount of subsequent aggression relative to the passage of time. The annoyed-math subjects gave fewer shocks than the annoyed-wait. In an interpretation of the findings, Konecni states that the preceding annoying incident was minimized, and the amount of subsequent aggression reduced because the math subjects were engaged in an absorbing activity.

Konecni interpreted the results in terms of a bi-causal relationship between the level of anger and the amount of subsequent aggression, given certain constraints. The following were the conclusions drawn:

The level of anger—an important determinant of the amount of aggression—is apparently affected by the cognitive interpretation of the situation, and by various factors which have an effect on arousal. Although the expression of aggression is only one of such factors, it appears to be particularly efficient in reducing the level of arousal (anger), and, consequently, in decreasing the amount of subsequent aggression.

The purpose of a study by Green (1974) was to evaluate the effectiveness of a cathartic procedure ("Ventilation"), a cognitive restructuring procedure ("Reinterpretation"), and a combination of both procedures ("Ventilation and Reinterpretation") in reducing the instigation to angry human aggression.

The subjects, undergraduate males, participated in the Buss Aggression Machine (BAM) procedure in which they taught a visual concept to the confederate using
punishment for incorrect responses. The punishment was an electric shock which the subject could vary in intensity at his discretion. Several other procedures were administered during the experimental procedure. Significant in the conclusions drawn which relate to the present investigation was the fact that a catharsis procedure ("Ventilation") and a cognitive restructuring procedure ("Reinterpretation") combination with one another was most effective in reducing the instigation to angry human aggression as measured by the BAM procedure.

Canaris (1973) conducted a study to determine whether instrumental catharsis was more effective than catharsis or no catharsis in decreasing frustration-instigated aggression and improving frustration-impeded performance.

The research was based upon the assumption that frustration increases aggression and lowers performance. Subjects were divided into ten, sexually homogenous groups and two to three subject groups. Each of these groups was taken by a trained assistant to a separate location where they either:

1. Expressed verbal reaction toward their frustration and saw that their reactions were responsible for removing their frustration (instrumental catharsis);

2. Expressed verbal reaction toward their frustration and had their frustration removed (catharsis-frustration removal);
3. Expressed verbal reaction toward their frustration but did not have their frustration removed (catharsis-frustration retention);

4. Did not express verbal reaction toward their frustration but had their frustration removed (no catharsis-frustration removal);

5. Did not express verbal reaction toward their frustration and did not have their frustration removed (no catharsis-frustration retention).

The Buss-Durkee Hostility-Aggression Inventory (BIHS), a descriptive-graphic rating scale (SCALE), and the Performance Scale of the Wechsler Adult Intelligence Scale (WAIS) were applied following the catharsis and frustration treatments.

Canaris' results indicated the following: (a) that instrumental catharsis is an efficient means by which to reduce frustration-instigated aggression and improve frustration-impeded performance; (b) that instrumental catharsis can reduce frustration-instigated aggression and improve frustration-impeded performance more than catharsis or frustration removal can reduce frustration-instigated aggression or improve frustration-impeded performance; (c) that instrumental catharsis can reduce frustration-instigated aggression more than the simultaneous occurrence of catharsis and frustration removal can reduce frustration-instigated aggression; and (d) that instrumental catharsis is not more effective in improving
frustration-impeded performance than the simultaneous occurrence of catharsis and frustration removal.

Some other authors probably go beyond the traditional catharsis model, which involves some type of release from aggression for at least pleasure, satisfaction, or other type of tension reduction. Many see aggression as essential for survival among animals and man. Three of the most prominent are Lorenz (1966), Wynne-Edwards (1962) and Storr (1969). Storr, in beginning his book on *Human Aggression*, writes the following:

That man is an aggressive creature will hardly be disputed. With the exception of certain rodents, no other vertebrate habitually destroys members of his own species. No other animal takes positive pleasure in the exercise of cruelty upon another of his own kind. . . . each one of us harbours within himself those same savage impulses which lead to murder, to torture and to war.

Storr's position as related to the present investigation is best described in his approach and comparison of sport and nations. It is his position that we urgently need international studies to determine what political and psychological factors have enabled certain countries to avoid war in spite of man's proclivity for engaging in it. Storr feels that it is obvious that the encouragement of competition in all possible fields is likely to diminish the kind of hostility which leads to war rather than to increase it. "In the same way, rivalry between
nations in sport can do nothing but good; and it should be possible to encourage competition in other fields also."

Lorenz (1966) has discussed the biological function of sport as a ritualized, competitive struggle between members of the human species which does not result in slaughter. Storr (1966) states that Lorenz is supported in his views by Professor Wynne-Edwards (1962) in Animal Dispersion when the latter writes:

Direct competition between individuals, therefore, has generally come to assume conventional forms, and the individuals are adapted or conditioned to accept as final in the great majority of cases decisions reached by clearly symbolic methods. Brute force and mutual savagery among members of the same species has at most a residual place in social competition.

Several investigations which have been included with those that support the catharsis theory, support the theory only under very specific conditions, such as in the presence of anger or with specific groups and activities. Many of the investigations to be presented as nonsupportive or inconclusive could very well reflect some of the same conditions as well. We must remember that any investigation only examines a particular theory in light of the very specific conditions of that experiment, and may not necessarily reflect conclusive evidence for or against the theory as a whole. It is, therefore, difficult to categorize an investigation as supportive
or nonsupportive when one aspect tends to lend support and another does not.

B. Non-supportive and Inconclusive Literature. In reviewing the literature relating to the catharsis theory of aggression, Ryan (1970) states that while there is no conclusive evidence as to the consequence of aggressive contests, the available findings suggest more anxiety or guilt as a result of participation in aggressive contests rather than catharsis.

Berkowitz (1970) states that "Quantitative research has not been consistently kind to the catharsis hypothesis." In spite of the large number of studies investigating catharsis, there have been few studies dealing specifically with the cathartic effect of sports.

Stone (1970) obtained TAT records of football players before and after a practice scrimmage and again after the football season. He found no differences between the footballers and a control group during the season. After the season, however, the footballers displayed significantly less aggression in their TAT protocols than did the controls. Moreover, the violent tendencies they did exhibit, as indicated by the TAT, were impersonally, rather than personally, oriented. Stone hypothesized that the lessened, impersonal aggression was due to anxiety caused by the necessity of inhibiting overt aggression after the season.
Ryan (1970) selected 120 male subjects at the University of Wisconsin, half of whom were enrolled in elementary psychology classes who participated to earn points toward their grade, while the other half were volunteers from required physical education classes who were paid for participating. These facts are noted here because of the possibilities of inadequately representing any other population than those named above. Paid participants and volunteers do not necessarily offer the most desired experimental populations, but often are the only ones available.

Ryan selected three arousal conditions and four "cathartic" conditions. One-third of the subjects were not angered, while the other two-thirds were angered by an accomplice of the experimenter. All subjects then had an opportunity to participate in one of four cathartic conditions (sitting, pounding, competing and winning, competing and losing). Subjects were given opportunities to deliver electric shock. Half of the angered subjects first shocked the accomplice who had angered them, then shocked an innocent bystander. The other half shocked the bystander, then shocked the person who had angered them.

The results of the investigation revealed that there were significant cathartic effects. Significant differences were uncovered between the two competitive
situations (compete-win and compete-lose) with the compete-win situation resulting in less aggression. No significant difference was discovered between the non-competitive sit and pound groups. There were also significant differences between the arousal conditions. The accomplice who did the angering always received the greatest amount of shock, regardless of when he was shocked or the cathartic condition.

It is interesting to note here that in the two competitive situations significant differences did exist. One of the assumptions for this basketball fouling investigation is that a competitive atmosphere does have an effect on the degree of aggression.

In his discussion, Ryan states that the hypothesis that vigorous motor activity is an effective means of lessening aggressive tendencies was not substantiated. The results clearly indicated that there was no simple drainage of these tendencies due to physical activity.

While there was a significant difference in the amount of aggression expressed between the two competitive conditions, it should be noted that winning or losing did not interact with anger in determining general level of aggression. "Regardless of the cathartic conditions, or previous attacks on supposedly neutral partners, the greatest amount of aggression was always directed at the anger instigator."
Ryan states that in view of the results of this experiment, the suggestion that competition in itself is frustrating and leads to aggression should be qualified by specifying the outcome of competition. He writes the following:

Losing tended to raise the level of aggression, while winning tended to lower aggression. Losing can be interpreted as frustrating, and thus the increased aggression was predictable. The lowered level of aggression in the winning situation could be interpreted in a number of ways, one of which is consistent with the idea of the aggressive response sequence. The win could be considered as a successful attack on the anger instigator, and thus could help, at least partially, to attain the aggressive goal of injury to the opponent. Since, however, there was only a main effect for the cathartic conditions, and no interaction between the anger conditions, the fact of winning or losing seemed to be sufficient to lower the expression of aggression toward the second accomplice regardless of whether he was the anger instigator or not.

Ryan notes that in an actual competitive contest it is quite possible that these results would not prevail. In Ryan's experiment, the winner did not associate directly with the loser after apparently obtaining some satisfaction by defeating him. In an actual contest, the winner would be constantly forced to interact with the more aggressive loser. Thus, any aggressive act on the part of the loser directed toward the winner might result in a spiral of increased aggression by both participants.

Husman (1972) writing in relation to the aspect of
winning and losing and its relation to aggression con-
cludes with the following comments:

To my knowledge, no one, to date, has been
able to establish a relationship between
aggression and an affiliation with a win-
ning or losing team. Common sense seems
to dictate that spectators who watch their
favorite team go down to defeat would
become more hostile, while those who see
their favorite team win would be more apt
to experience a catharsis. Further research
is required to substantiate this hypothesis.

Whether Husman means that we should assume that this same
condition exists for the athlete involved in the contest
is not perfectly clear. It should be noted that in many
cases the spectators at a sporting event seem much more
aroused and aggressive than the participants. Therefore,
winning or losing could possibly have an even greater
effect on their aggressive behaviors. It should also
be observed that, generally, athletic participants are
also spectators on the bench through portions of the con-
test. Further research will be needed to understand and
answer these questions. The emphasis in this basketball
fouling investigation is not so much on the winning or
losing of a particular contest, but rather the tendency
to be a winner or loser.

Mallick and McCandless (1966) found that aggres-
sive play, with or without previous frustration, had no
cathartic value. Three experimental studies using
children as subjects were conducted. Several hypotheses
were set up and tested. Significant to this basketball fouling investigation was the hypothesis which suggested that aggression without anger lacks cathartic value, but aggressive play in the presence of a permissive adult (in basketball possibly a permissive official) may lead to increased aggression.

Often the study of aggression centers around the Dollard, Miller et. al. (1939) concept that aggression is defined as "any sequence of behavior the goal response to which is the injury of the person toward whom it is directed." Bandura (1973) states that he finds that most subsequent theorizing and research has adopted injurious intent as an essential aspect of aggression. A major limitation he finds of such a definition is that it assumes that aggression serves only a single purpose, namely, to inflict injury. Bandura believes that if aggression is restricted to behavior that is performed solely for the purpose of injuring others, then a wide range of activities that are commonly judged as aggressive, including some of the most violent forms of interpersonal assault, would be excluded from consideration. He further states that there is evidence which supports the view that much interpersonal aggression that appears to have no utilitarian value may be extensively regulated by the social consequences it produces. The point of view is one in which physical aggression is often
employed to gain control over other people to secure material resources, and to force changes in social practices that adversely affect one's everyday life. Bandura feels that people frequently resort to aggressive acts because they produce desired results that cannot as readily be achieved through non-aggressive means. A comprehensive theory of aggression must account for more than aggressive actions that are primarily reinforced by satisfactions derived from hurting others. A much broader class of aggressive behavior in which the infliction of suffering is essentially irrelevant or serves, at best, a secondary purpose must be accounted for.

Bandura does not support the catharsis of aggression position. A large body of research evidence shows direct or vicarious participation in aggressive activities tends to maintain the behavior at its original level or to increase the likelihood of subsequent aggression. Bandura describes the situation as follows:

. . . The problem of catharsis has been further reformulated (Feshbach, 1970) so that neither increases, decreases, nor absence of changes in aggressive behavior necessarily refute the occurrence of cathartic discharges of an aggressive drive. According to this revised position, direct or vicarious participation in aggression can have three separate effects that work in different directions: it can reduce the aggressive drive; it can reinforce aggressive responses; and it can alter the strength of inhibitions. Under conditions in which the aggression-augmenting effects of reinforcement and disinhibition outweigh the reductive effects
of drive discharge, it could be argued that catharsis occurred even though aggression increased. Similarly, if these hypothesized counteracting influences are of equal strength, catharsis could be claimed on the basis of no evident changes in the level of aggressive behavior. Since there exists no adequate measures of these sub-processes that are independent of changes in aggressive behavior, the catharsis hypothesis cannot be subjected to a decisive empirical test.

In Bandura's social learning approach to aggression, it is predicted that arousal decreased through non-injurious means will reduce aggression as well as, or even better than, acting aggressively. In traditional catharsis drive theories the actuated aggressive drive presumably endures until discharged by some form of aggressive activity. "From the social learning perspective, anger arousal dissipates, but it can be repeatedly regenerated on later occasions by ruminating on anger-provoking incidents."

Geen (1976) states that there are few studies that qualify as adequate tests of the catharsis hypothesis despite the large volume of literature supposedly directed at the problem.

Geen comments on Quanty's (1976) adoption of a stringent definition of catharsis. Quanty shows that most experiments fail to provide an adequate test for the hypothesis that a decrease in aggressive motivation
follows aggressive or aggression-substitute behavior, and those which do fail to support the idea of catharsis. According to the traditional formulation of the catharsis hypothesis, the reduction in physiological arousal following a retaliatory act lessens the likelihood of further aggression. Quanty states that as we adopt a social learning approach this is not necessarily the case. The reduced arousal may actually reinforce the aggression that preceded it and thus increase the likelihood of further aggression. These findings coincide with those expressed previously by Baron (1977). According to Quanty, a crucial point in applying the social learning model to aggression catharsis is that even when a person is taught to respond aggressively to provocation, he is probably also taught that "enough is enough." In other words, social inhibitions are learned which keep the person from becoming too aggressive, so that although he may feel like aggressing further, he actively restrains himself from doing so.

Hokanson (1970) reviews several investigations, most in which he was a major investigator, which suggest that the dynamics of aggression may not warrant any special privilege (particularly as regards the tension-reduction assumption). According to Hokanson, demonstrable principles of learning may be adequate to account for the observed data. The results presented show clearly
that overt aggression does not inevitably lead to either physiological tension reduction or a reduction in subsequent aggression. The data presented also suggests that under interpersonally provoking circumstances, counterresponses other than aggressive ones can also have physically tension-reducing concomitants.

Larsen (1976) suggests that the experimental literature for the idea of catharsis is, at best, ambiguous. Reference is made to findings which as of yet suggest no answer to the question of catharsis. Larsen's findings are as follows:

Feshback (1955), Thibaut (1950), and Thibaut and Coules (1952) showed less aggression following catharsis; but Kenny (1953) and De Charms and Wilkins (1963) studies showed aggression increased following catharsis. Expressing aggression may not only release energy, but may, if rewarded, maintain and increase the aggressive habit.

Cratty (1973) writes that some prominent theories of aggression suggest that aggressive behavior is a reaction to frustrations and the attempt to overcome blocks to pleasure and satisfaction. They base their argument upon the aggression that often occurs after frustrating situations and upon the subsequent lowering of aggressive behavior. "It has been proposed that physical execution of hostile tendencies will provide a catharsis, or temporary cure, for aggressive feelings, resulting in a beneficial psychological equilibrium."
He further notes that others do not accept this catharsis theory and note that a great deal of evidence suggests that "exposure to aggressive models and permissiveness toward aggression in childhood seem to elicit greater amounts of aggression rather than providing a kind of release or cure."

He concludes that measures of aggression in athletes prior to and following competitions do not uniformly indicate any significant changes in basic aggressive tendencies nor in aggressive feelings following competition.

Johnson's (1972) position on catharsis at the human level is that "research offers little support for the notion of catharsis (Bandura, 1965b; Berkowitz, 1969a; Hokanson, 1970). Aggression does not "build up like urine in the bladder until it finally has to be released."

Encouraging the "flushing out" of hostility, as in cathartic therapy, may do little good and in fact may provide a negative model for maintaining or increasing deviant behavior.

Layman (1970), in discussing the relationship of aggression and sport, finds that studies of the physiology of the emotions indicate that intense emotion serves to energize the organism for punitive emergency response. Thus, the angry individual may display greater endurance, strength and speed than when he is not angry. However, anger is difficult to control and easily develops into
disorganized rage which decreases the quality of performance.

Layman's specific findings and conclusions in respect to the catharsis hypothesis are as follows:

Controlled studies indicate that when aggression occurs in the presence of anger there is a decrease in the level of anger and a decrease in the tendency to aggress for a short period. Also, unless the individual has feelings of guilt because of the aggressive act, there will be a reduction of tension and improved feeling of well-being. However, when aggression occurs in the absence of anger, there is an increase in the tendency to aggress, unless the tendency to aggress is weakened by guilt or anxiety. Thus, reactive aggression in general supports the catharsis hypothesis but instrumental aggression does not.

Reactive aggression is defined as a goal-response which results in the injury of the person or group of persons against whom the attack is directed. Layman states that the person or group is perceived as the "enemy," who has been the agent of frustration, the source of some noxious stimulus, or the originator of a threat of frustration or unpleasantness of some kind. Both the perception of an enemy and the emotion of anger are involved.

Instrumental aggression is attack in which the primary goal is not injury to the enemy, but the attainment of a reward. Instrumental aggression does not involve anger, and it is not a response to frustration or noxious stimuli. Layman points out that it should be noted that
both frustration and noxious stimuli may lead to emotions other than anger and to behavior other than aggression. For example, they could lead to fear or anxiety, and to flight or withdrawal.

In expressing the relevance of this to sports, Layman presents a quotation from Lemkau (1952) which expresses doubt that athletics are really an outlet for aggressive impulses because the controls involved in game rules make it impossible for the participant to really express himself freely. In the beginning of an athletic competition, most of the players are probably not angry, so any aggression they might express may be instrumental aggression. If they play vigorously there will be a discharge of energy through activity and at the end of the game the players should be fatigued and therefore not eager to repeat the performance immediately. If the result of the aggressive behavior has been one which brought reward of winning the game, the players will be ready for a more aggressive attack the next time. If the result of the aggressive behavior has been one of failure to win and failure to receive approval, there will be no reinforcement of the aggression and the team members will perhaps not fight as hard the next time, unless they become angry. It should be pointed out here that no statistical evidence is presented by Layman to support these contentions; therefore they are presented as
another point of view to be examined or considered.

Layman states that some athletes try to make themselves aggressive by deliberately looking on the opponent as the enemy, so that they can be angry at him. Probably others respond to the suggestions of the coach, spectators, and other team members and work up at least mild angry feelings. Layman states the following:

... some will be angry because of a tongue-lashing by the coach or for some other reason, and can readily displace this anger onto the opponent. Still others will become angry when fouled against, hit by an opponent, or outplayed in the game. In the average athletic contest there are many frustrations, and the most usual reactions to frustration are anger and aggression.

Thus, for many players there will be opportunities to display and discharge aggression even under the restrictions imposed by the rules, although this would probably be more possible in some sports than in others.

Layman concludes that any research performed in "real-life" situations is likely to be difficult to interpret because of the impossibility of avoiding contamination with both instrumental and reactive aggression entered into the picture. It was believed that some of the reduction in aggression may be related to guilt and anxiety rather than representing a "draining off" of pent-up energy. "There seems to be little support, then, for the idea that sports provide a catharsis, and so
reduce the instigation to aggression."

Mallick (1964) hypothesized that aggression, whether angry or non-angry, direct or displaced, has no cathartic value. Instead, a reasonable positive reinterpretation of the frustration provides catharsis of hostility against the frustrator. One preliminary and two main studies were conducted in three midwestern elementary schools employing 168 third graders as subjects and 26 sixth graders as confederates. Activities included shooting at targets having various figures, shooting at plain targets and solving arithmetic problems. The findings supported the hypotheses of no cathartic value in angry or non-angry and direct or displaced aggression.

Doob (1967) states that although there have been a number of experiments that have tended to support the catharsis hypothesis, there have been a large number of other experiments which have found an increase of aggression after either the expression of aggression or the observation of an aggressive model.

It was hypothesized that subjects who were annoyed and were then given a chance to hurt the person who annoyed them would behave less aggressively than subjects who had no such chance to express their aggression. It was expected that subjects who were not annoyed would not show this effect. Two experiments were performed testing these hypotheses.
In the first experiment subjects were annoyed by a confederate or they were left alone. The subjects were attempting to teach a learning task to the confederates.

For one-half of the subjects, the confederates lost some or all of the money they were to receive for the experiment. Money was not mentioned to the other half. All subjects were given the opportunity to give electric shocks to the confederate. Annoyed subjects gave shorter shocks to the confederates who lost their money, but for the left-alone subjects, there was no effect with the lost money confederates.

In the second experiment, instead of using money, the experimenter tested the confederate, while the subject observed.

Half of the subjects were told that a buzzer would sound when electric shock was being applied to a confederate for an incorrect answer. Half of the subjects had been annoyed by the confederate; the others left alone.

When given the opportunity to apply shocks to the confederate, the non-annoyed subjects who had observed the experimenter shocking the confederate, administered longer shocks than those subjects who did not have the observational experience. Annoyed subjects gave longer shocks and tended to like the confederate more at the end of the experiment than the subjects giving shorter shocks. A
non-annoying confederate was liked more by the subjects when short shocks were given.

In attempting to test the catharsis hypothesis, Freeman (1962) predicted the following: (a) Aggression arousal would be reflected in increased fantasy aggression. (b) Aggressive expression in fantasy and physical activity would reduce aroused drive, as inferred from the subjects' ability to perform a complex task better after such activities than after a neutral task. (c) Fantasy and physical aggression would be differentially effective depending on characteristics of the subjects. She predicted that for "motorically" inactive subjects, fantasy aggression would lead to better subsequent performance than would physical activity. For "motorically" active subjects, however, physical aggressive expression would lead to better subsequent performance than would fantasy aggression.

One hundred seventeen second and third grade boys, who were rated active or inactive by teachers and peers, were the subjects for the study. The experiment was rather involved, with various subjects administering aggression-eliciting projective pictures, a coding task non-rewarded, telling stories to pictures, punching a bag, color sorting, picture description tasks, coding and reward.

(Important, and related to the present research,
are the findings that predictions based on the catharsis hypothesis were not supported. And overall the evidence from this experiment suggested that aggressive expression stimulated further aggression, thereby decreasing ability to perform a complex task.)

Contrary to a catharsis prediction, Downey (1973) hypothesized that subjects who were aroused and allowed to aggress would express more subsequent aggression than would subjects who simply waited for an equal amount of time. It was further hypothesized that subjects who engaged in an involved unrelated task would exhibit less subsequent aggression than those subjects who aggressed or those who waited. For those subjects who engaged in an unrelated, intervening activity, it was expected that they would aggress more toward the person who had presumably attacked them, than toward a stranger.

Three experimental groups of subjects were aroused by receiving eight of a possible ten buzzes in their ear, presumably administered by a fellow student. Control group subjects received two buzzes. The procedures used were, briefly, the following:

Aroused subjects then either retaliated against their attacker by ostensibly "buzzing" him using a Buss-type aggression machine, waited, or wrote stories about pictures, presumably as a personality test. Half the subjects in each of these groups were then allowed to aggress against their attacker and half aggressed against a stranger, again
using the aggression machine. Dependent variable measures were the number of buzzes subjects chose to deliver as an evaluation of the other subject, the intensity or loudness levels they chose, and the duration of the buzzes.

The hypotheses by Downey were generally supported. In addition, diastolic blood pressure readings taken between arousal and final aggression failed to differentiate between experimental and control subjects. Systolic blood pressure, however, showed a significant drop from the first measurement to the second.

Downey applied an interference theory in an interpretation of the results. He suggests that an aggressive act by angered persons constitutes rehearsal of the anger instigation and interferes with any potential distraction or stimulus change. An unrelated interfering task prevented any rehearsal of the arousal or of aggressive responding. It is assumed that such rehearsal maintains elevated levels of aggressive responding.

These findings are interesting in relation to the present investigation. Apparently an interference may have an effect on the instigation of aggression. In a basketball contest, time-out periods and other non-regular events may have a dramatic effect on the instigation of aggressive behavior.

In a study exploring some of the effects of participation in interscholastic football, Patterson (1972)
questions the cathartic value of games. If games are cathartic, the player's level of aggressiveness would be expected to lower. If games are not cathartic, the players would be expected to learn to use aggression as a means of achieving ends, thus increasing their general level of aggressiveness.

The personality traits of aggressiveness, self-esteem and innovativeness were measured using five north suburban Chicago high schools. Physical Education classes (four schools) were employed as non-equivalent control groups. All respondents completed a questionnaire containing the personality scales, once prior to the football season, and again at the close of the season. The teams at three of the schools were measured weekly on the self-esteem scale and the coaches also rated each player's performance in the weekly games. Background information for each player was also obtained, consisting of his birth order, race, and expectancy of attending college.

The personality test results revealed that the football players increased in their level of aggressiveness over the course of the football season, while the PE students decreased in aggression. Patterson stated that this finding did not support a cathartic value for aggressive acts but indicated that aggression was learned.
Aggression--The Frustration Approach

A. Supportive Literature. Indeed, much has been written about frustration in the review of catharsis. In most cases, it is difficult to separate the two topic areas. The early catharsis theories grew out of the Frustration-Aggression Hypothesis developed by Dollard and his colleagues at Yale University (1939). A review of frustration and aggression then, should begin with the position of Dollard and his colleagues.

Dollard and his colleagues assumed that aggression is always a consequence of frustration. "More specifically the proposition is that the occurrence of aggressive behavior always presupposes the existence of frustration and, contrariwise, that the existence of frustration always leads to some form of aggression."

In order to more clearly understand the position of these Yale authors, a clarification of terms is necessary. Following are some of the definitions described by Dollard and his colleagues. They do not necessarily reflect the same descriptions used in this investigation, but are presented for the purposes of a more precise understanding of their positions:

1. An act which terminates a predicted sequence will be called a goal-response. The goal-response may be defined as that reaction which reduces the strength of instigation to a degree at which it no longer has as much of a tendency to produce the predicted behavior sequence.
2. ... an interference with the occurrence of an instigated goal-response at its proper time in the behavior sequence is called a frustration.

3. A substitute response is any action which reduces to some degree the strength of the instigation, the goal-response to which was prevented from occurring.

4. ... sequence of behavior, the goal-response to which is the injury of the person toward whom it is directed, is called aggression.

5. Although the frustration-aggression hypothesis assumes a universal causal relation between frustration and aggression, it is important to note that the two concepts have been defined independently as well as dependently. The dependent definition of aggression is that response which follows frustration, reduces only the secondary, frustration-produced instigation, and leaves the strength of the original instigation unaffected. Frustration is independently defined as that condition which exists when a goal-response suffers interference. Aggression is independently defined as an act whose goal-response is injury to an organism (or organism-surrogate). (The emphasis was added by this writer.)

Dollard and his colleagues presented an all-inclusive approach to the frustration-aggression topic in their classic 1939 monograph. Although much evidence has been collected to dispute several aspects of their approach, a great many investigators are re-examining unresolved aspects. Relevant to this basketball fouling investigation are some of the psychological principles suggested in the Frustration-Aggression monograph. To acknowledge all the principles would be impractical, but several seem interestingly appropriate at this point.
The Yale investigators proposed that the following psychological principles do exist:

1. The strength of instigation to aggression varies directly with the amount of frustration. Variation in the amount of frustration is a function of three factors: (1) strength of instigation to the frustrated response; (2) degree of interference with the frustrated response; and (3) the number of response sequences frustrated.

2. The inhibition of any act of aggression varies directly with the strength of the punishment anticipated for the expression of that act. Punishment includes injury to loved objects and failure to carry out an instigated act as well as the usual situation which produces pain.

3. With the strength of frustration held constant, the greater the anticipation of punishment for a given act of aggression, the less apt that act is to occur; and secondly, with anticipation of punishment held constant, the greater the strength of the frustration, the more apt aggression is to occur.

Other psychological principles suggested in a later chapter included the following:

1. The strongest instigation aroused by a frustration is to acts of aggression directed against the agent perceived to be the source of the frustration. Progressively weaker instigations are aroused to progressively less direct acts of aggression.

2. The inhibition of acts of direct aggression is an additional frustration which instigates aggression against the agent perceived to be responsible for this inhibition and increases the instigation to other forms of aggression. There is, consequently, a strong tendency for inhibited aggression to be displaced.
to different objects and expressed in modified forms. Socially approved modifications are called sublimations.

3. Since self-punishment is necessarily involved, aggression turned against the self must overcome a certain amount of inhibition and therefore tends not to occur unless other forms of expression are even more strongly inhibited. If the amount of inhibition of various acts of aggression is held relatively constant, the tendency to self-aggression is stronger both when the individual believes himself, rather than an external agent, to be responsible for the original frustration and when direct aggression is restrained by the self rather than by an external agent.

Expanding and borrowing from earlier Freudian viewpoints, Dollard and his associates set the tone for most of the research done in the area of aggression. Their work is classic in establishing a climate for further research.

Berkowitz (1969) found that some attacks on the frustration-aggression hypothesis derive from objections to the notion of "built-in" sources of human behavior. He sees that many writers imply that the frustration-aggression hypothesis is related to an antecedent stimulus event, the frustration, and the subsequent aggressive response. This position has been the approach many learning theory opponents have used against the frustration-aggression hypothesis. Berkowitz's position is that learning and innate determination can coexist in man. The frustration-aggression relationship may be learnable
without being entirely learned.

Berkowitz believes that the failure to distinguish between deprivation and frustration can account for some of the negative results in tests of the frustration-aggression hypothesis. He finds that a good deal of psychological research is still directed toward tests of the frustration-aggression hypothesis despite considerable evidence demonstrating that frustrations can heighten the probability of aggressive behavior. He believes that "rather than merely testing the notion again and again, we should address ourselves to the inconsistent findings."

Miller (1969, 1941), one of the original Yale frustration-aggression hypothesis investigators, believes that frustration produces instigation to aggression, but that this is not the only type of instigation that frustration may produce. "Responses incompatible with aggression may, if sufficiently instigated, prevent the actual occurrence of acts of aggression. In our society punishment of acts of aggression is a frequent source of instigation to acts incompatible with aggression."

Berkowitz (1962) maintains that drives such as anger do not lead to the drive-specific behaviors (aggression in this case) unless there are appropriate cues or releasers. These cues are stimuli bearing some degree of association with the anger instigator, but they need not
be physically present, nor is the association created only by physical similarity to the instigator. "The thwarted individual may display hostile behavior after thinking of his frustrator."

Learning can affect an individual's reaction to frustrating situations. Berkowitz finds that learning experiences also affect the nature of the responses made to anger. He writes that "the nature of the thwarting reaction depends at least in part upon the person's interpretation of the situation confronting him, and these interpretations can also be habitual responses."

Layman (1969) contends that "although, as we have said, to a great extent the aggression expressed in competitive sports is instrumental aggression, in a sense competition must also be regarded as a frustration." Competition is obviously a frustration for the loser, who may be angry at having lost, but is still further frustrated by the fact that he is supposed to be a good sport and conceal his anger. Frustration is also present for the one who wins in the end, for the opponent is constantly trying to block him in attaining his goal, and this serves as an instigation to further aggression.

Layman assumes that aggression would be at a maximum when two opposing individuals or teams are quite evenly matched. The amount of frustration with an even match would be at a maximum, and the prospect of rewards
for fighting well and winning are also present. When two opponents are very unevenly matched there may not be much aggression, for the stronger opponent will experience little frustration and the weaker opponent has little prospect of a reward at the end of the match.

Layman further suggests that many athletes will go into a competitive situation with anger and resentment engendered by frustrations external to the competitive situation itself; that some of the anger generated by these frustrations conceivably may be displaced to the opponent in the sports situation.

Layman finds two social factors prevalent in connection with expression of aggression in competitive team sports. One is that the other team is perceived as the out group, and even when it is not a real threat, there may be hostile feelings that are readily expressed in aggression.

The second social factor involves a tendency for members of the group to imitate, especially the leaders, and to follow or copy the aggressive behavior demonstrated.

Layman relates this expression of aggression in the presence of frustration to other areas of learning within and outside of the athletic spectrum. She points to several studies that have shown that, regardless of the kind of activity involved, competition is a very powerful incentive to learning. Children and adults work harder
and more effectively when competing than when learning in a non-competitive setting, providing that each competitor has a reasonable chance of winning. Layman explains:

Although competition is a strong incentive for learning all through the school years, there are wide individual differences in the responsiveness of students to competition. Some put forth great effort to excel, some remain fairly indifferent to competition, and others are so frustrated or threatened by it that learning is blocked entirely.

Quite a different approach is developed by Moyer (1971) who states that frustration and stress, particularly if prolonged, are likely to result in increased irritability and aggressive behavior. "Frustration-induced irritability may stem from sensitization of certain brain areas by the particular hormone balance that characterizes the stress syndrome."

According to this naturalistic approach, "both the adrenal cortex and the thyroid are intimately involved in the stress syndrome, and dysfunctions of either gland result in increased irritability." These findings do not necessarily conflict with traditional frustration-aggression theories. Direct comparisons cannot be drawn because Dollard, et. al. (1939) did not adequately address this naturalistic approach to aggression.

Baron (1977) finds that individuals do not always aggress following frustration. Dollard, et. al., (1939)
also turned their attention to factors serving to inhibit overt aggression. Basically, they concluded that such behavior is primarily inhibited by the threat of punishment. Threatened punishment was assumed to inhibit overt aggressive actions, however, punishment was not viewed as reducing the actual instigation to aggression. Thus, if fear of punishment prevented an individual from attacking the person who had frustrated him, this individual would still be motivated to aggress. The result might then be assaults against persons other than the frustrator who are associated with weaker threats of punishment.

This description above seems to fit the athletic situation well. In a basketball contest, for example, the frustrated individual is often prevented from attacking the frustration-causing person by the possibility of fouling out. This frustrated individual would still be motivated to aggress. This aggression might involve several aspects including assaults on other players, verbal assaults directed to officials and/or spectators, or assaults on the immediate environment (the basket or backboard, ball, floor, bench, etc.).

Baron does one of the better jobs of presenting evidence suggesting that the issue of frustration facilitating aggression is unresolved. Several studies alluded to already in this report and others are presented.
Studies in an athletic setting are not discussed, but several of the basic approaches seem adequately adaptable.

As a tentative resolution to the problem of facing a confusing and contradictory set of empirical findings, Baron suggests that the issue can be resolved. Baron's position is that while the type of definitive evidence needed for the attainment of a final, elegant solution is as yet lacking, sufficient information does seem to be available for at least a tentative resolution.

The description of this position is as follows:

In particular, it seems reasonable, given existing evidence, to conclude that frustration does sometimes facilitate aggression. Whether it exerts this dangerous influence, however, seems to be strongly determined by several mediating factors. All of these have not as yet been brought sharply into focus. Two that seem to be of major importance, however, are (1) the magnitude of frustration experienced by potential aggressors and (2) the extent to which the thwarting they experience is arbitrary or unexpected.

Russell and Drewry (1976) conducted an investigation in which the seasons fouling records of a Canadian ice hockey league provided the data on aggression in relation to crowd size and competition. Crowd size was positively related to aggression in one season, but not in the preceding year. Aggression increased over the three periods of game play, but not across the season which is an aspect being considered in this investigation. League standing
and the score existing during play were both significantly related to aggression, another aspect being looked at in the present study. However, the aggression displayed by a team in a match was unrelated to their league standing "vis-à-vis" that of their opponents. The results were generally discussed within a frustration-aggression framework.

Other than the Volkamer study, the investigation by Russell and Drewry is the most closely related approach to what is being attempted in this study. Some of the areas of similarity include: (1) season records are the sources of data available for examinations, (2) aggression is the central topic of investigation, (3) an athletic setting is the framework for the approach, (4) aggression is examined over periods of play as well as across seasons of play, (5) league standing and its relation to aggression is examined, (6) the score and score difference are examined in relation to aggression, (7) a frustration-aggression framework is the general approach, and (8) data were collected covering two seasons of play.

The discussion provided by Russell and Drewry which appears relevant to this basketball investigation proceeds as the following:

First, the league standing of a team at any given point in the season may be taken as a reflection of the closeness or intensity of competition. A spirit of competition may be flagging for a team in the league cellar,
or indeed for a team far ahead in the standings. Competition is thus taken to be most intense where victory is attainable and in doubt. A team for whom victory or defeat is a virtual certainty would experience markedly less of a competitive challenge in its matches. Second, the moment-to-moment changes in score during a game signal changes in the certainty of victory or defeat for the contending teams. Thus, the levels of competition during a game are presumed to vary inversely with the size of the margin of goals separating the two teams. Third, the relative league standing of two contesting teams, as they initially take to the ice for a game, may determine the intensity of competition in the ensuing contest. Knowledge that one's team is facing the league leaders, a team of equal standing, or the team in last position may effectively define the level of competition in the play that follows.

The result of this ice hockey investigation indicated that when competition was the most intense, aggression was also the most prevalent. Aggression was found to steadily increase in magnitude as the positions in the standings approached first place, whereupon those teams actually in first place evidenced a sharp drop in level of aggression. In the Volkamer (1972) study, the higher-ranking teams committed less aggression, but the first-place team was found to be more aggressive when playing a much lower-ranked team.

Thompson (1971), using the Buss Aggression Machine, investigated the instrumentality of aggression and the strength and arbitrariness of frustration, in relation to direct physical aggression. The instrumentality of aggression referred to the effectiveness of aggression
in overcoming an obstacle to a goal.

The subjects, 120 male Introductory Psychology students, were required to teach a confederate a concept. Frustration arose from the confederate's inability to learn the concept. The measure of aggression was the mean intensity of shock ostensibly administered to the confederate for incorrect responses. Different strengths of frustration were established by blocking at a point near the completion of the learning task and at another more distant point.

The results of the study show that it was possible to establish different strengths of frustration on the basis of blocking near to or far from a goal. (This is an interesting result in light of the present basketball fouling investigation where time-out periods may serve a similar function.) The stronger frustration produced more aggression than the weaker frustration, but only when aggression was experienced as instrumental in overcoming frustration. Additional support for the frustration-aggression hypothesis was provided by the increase in aggression as the number of frustrations increased.

When comparing a basketball game to the Thompson study, the differences in the kind of punishment administered for aggression should be considered. Although shocks were encouraged in the Thompson study, fouling is generally not encouraged in a basketball contest.
Geen (1967) used 120 male subjects in a 2X4 factorial design in which variables were degree of frustration and presence or absence of reinforcement for aggressive behavior. One-half of the subjects received verbal reinforcement for delivering electric shocks to an accomplice in a bogus learning task, while the other half received no reinforcement. Several other minor procedures followed.

The results supported the hypothesis that subjects who had been reinforced for aggressing subsequently give more intense shocks than subjects who had not been reinforced. The insulted subjects delivered stronger shocks than subjects who had been frustrated or treated neutrally. No support was given that subjects who had been frustrated by the actions of another person would shock the latter more intensely than subjects who had been frustrated only through their own inability to solve a problem. Subjects in frustration treatments gave more intense shocks than did untreated control subjects.

All subjects except controls tended to continue increasing the intensity of shocks delivered over the 16 trials across blocks of four trials only for subjects who had first been reinforced for aggression and then insulted. This finding was taken as providing indirect support for a hypothesized interaction between degree of frustration and presence or absence of prior reinforcement for aggression.

In basketball, the participant is often reinforced for aggressive behavior by spectators, coaches and fellow
players' endorsements. Then in another instance the same participant may be insulted by an opponent or an official. Reinforcement undoubtedly plays some part in the presence or absence of aggressive behavior, yet in this basketball fouling investigation, no controls seem possible to fit the particular data-gathering situation. In accepting actual competitive game data some limitations are noted. In this study, actual regular season contests were the best data source for reliability and validity purposes.

In a study conducted to test the differential implications of two theoretical positions, namely, drive-reduction or response-inhibition, in accounting for the reduction of aggression under non-arbitrary frustration and isolate the influence of expectancy and reasonableness on the expression of aggression, Kregarman (1961) found the following results:

(1) The expectation of a frustration reduces the tendency to express aggression toward the frustrator; (2) the reasonableness of a frustrator does not significantly affect the amount of aggression expressed toward the frustrator; (3) both the expectation of frustration and reasonableness of frustration increase the tendency to express aggression toward the self.

These findings could be quite interesting if we discovered that they apply equally to an athletic situation. It would appear that if the athletic participant could be taught to expect a certain type of frustration, the tendency to express aggression toward the frustrator
could be reduced. This could be an essential aspect in a basketball setting. One of the major problems confronting teams is the tendency for players to express aggression in the form of fouls toward the frustrator opponent. This not only leads toward elimination of key players, but also provides the opponent with additional unchallenged opportunities for literal free points in the form of free throws or foul shots.

B. Nonsupportive and Inconclusive Literature. In discussing the conditions under which frustration leads to aggression, Buss (1961) reviews several investigations which have attempted to employ the idea. In relation to the suggestion of Dollard and his associates (1939) that the intensity and/or frequency of aggression coincides with the strength of frustration, his findings reveal no conclusive evidence. There were studies to support a positive and a negative relationship in this respect. It is Buss's contention that much of the available evidence has been confirmed in questionnaire studies but not in the laboratory. The paucity of laboratory studies in this area is due to the problem of eliciting aggression in a laboratory setting. (Additional problems in laboratory settings for this type of investigation have been alluded to previously.)

Buss states that the notion that the only antecedent of aggression is frustration has been accepted by
most psychologists who have dealt with the issue. Yet, he points to two outstanding exceptions. "Maslow (1941) denied that simple frustration would lead to aggression, which he believed would be caused only by attack or threat." Rosenzweig (1944) also emphasized that "non-threatening stimuli would not lead to aggression but that threatening, frustrative stimuli would lead to aggression." Buss states that except for these two writers, most psychologists appear to have accepted the frustration-aggression hypothesis, denying any antecedent to aggression other than frustration. He finds, however, the emphasis on frustration has led to an unfortunate neglect of the other large class of antecedents (noxious stimuli), as well as a neglect of aggression as an instrumental response. Therefore, according to the opinion of Buss, "Frustration is only one antecedent of aggression, and it is not the most potent one."

Larsen (1976), summarizing the relationship between frustration and aggression, writes the following:

Frustration is some form of interference with a goal-oriented response. The stronger the incentive value of the goal, the more intense the frustration and aggression elicited. Frustrations, however, are related to needs. Where no needs are present, frustration, by definition, will be absent. A primary incentive goal is the need for approval. The relationship of frustration to aggression has been demonstrated in both early and recent experiments.
Parameters of frustration include types of frustration stimulus, individual susceptibility to frustration or frustration tolerance, the arbitrariness of frustration, membership in socio-economic groups, and social costs.

Criticisms of the frustration-aggression hypothesis may be summarized by saying that factors other than frustration predict aggression, and responses other than aggression follow frustration.

Johnson's (1972) point of view in relation to the frustration-aggression hypothesis centers around a historical observation of the hypothesis and new decisions made as a result. His position is one in which attempting to gain independent measures of each term, it was soon discovered that defining frustration was even more difficult than defining aggression. As a result, most theorists concentrated on the problem of frustration at the expense of aggression and gradually both frustration and aggression became too complex to be explained by a single theory. It is Johnson's conclusion that today the frustration-aggression hypothesis is more of an interesting historical document than a definitive statement about aggression.

Bandura (1973) sees frustration or anger arousal as a facilitative but not a necessary condition for aggression. In this position, frustration is most likely to provoke aggression in people who have learned to respond to aversive treatment with aggressive attitudes and actions. People do not have to be angered or emotionally aroused to
behave aggressively. A culture can produce highly aggressive people, while keeping frustration at a low level, by valuing aggressive accomplishments, furnishing successful aggressive models, and ensuring that aggressive actions secure rewarding effects.

This social learning theory suggests that since aggression does not originate internally and its social determinants are alterable, a more optimistic view of man's capacity to reduce the level of human destructiveness is feasible.

In the opinion of Kaufmann (1970), the frustration-aggression hypothesis formulated by Dollard and his associates is too "global" in that it attempts to cover all possible cases under one conceptual umbrella. The author describes the situation as follows:

Both the antecedent and the consequent term in this equation have, over time, become quite vague and protean, so that almost any antecedent situation that precedes aggression can, by some stretch of the imagination, be considered as frustrating; and conversely, where a frustration has been imposed, then, even where no aggression is observed, it can always be argued that somehow, somewhere, an aggressive tendency must be present. It is easy to see that this vagueness or flexibility in the model makes it almost totally circular and therefore not very valuable in our understanding or predicting of the antecedents of aggressive behavior.

Storr (1969), an advocate of the instinctual components of aggression, feels that the traditional definitions of aggression and frustration impose limits upon
the concept of aggression. He believes that these traditional definitions are not in accord with the underlying facts of human nature which the words are attempting to express. Storr's position is stated as follows:

The aggressive part of human nature is not only a necessary safeguard against predatory attack. It is also the basis of intellectual achievement, of the attainment of independence, and even of that proper pride which enables a man to hold his head high amongst his fellows.

Instead of using a sports setting, Storr explains his position in a child-to-mother relationship:

We all know that the hungry child from which bottle or breast is prematurely removed will cry and thrash about in frustrated rage. Psychologists anxious to establish the relation between frustration and aggression on a firm statistical basis have measured the time-interval between the removal of the bottle from a baby and the appearance of crying, and have related this numerically to the child's supposed degree of hunger. It is easy to construct experiments which measure frustration, but difficult to demonstrate that, in early infancy, aggression may serve other functions than that of protest.

Storr takes a very unique position as he further expands on the concept of frustration. He sees that it is extremely important to distinguish between aggression and hatred. Storr believes that it is ridiculous to label all aggression as bad and that if human beings were never frustrated, they would not be aggressive at all.

The position taken is that frustration increases
aggression, but that even frustration has its positive aspects. The hypothesis that all aggression can be explained as a response to frustration cannot possibly be considered true, according to Storr.

May (1972), commenting on the frustration-aggression hypothesis, feels that the theoretical flaw is that it tacitly assumes that all aggression is negative, and implies that when we some day construct a society without frustration in it, there will be no aggression.

Lefkowitz, Eron, Walder and Huesmann (1977) conducted a longitudinal study of aggression and as a result they presented the following conclusions:

In our view, the theory of innate aggression as applied to man, in which spontaneously generated aggression serves as a primary drive, is untestable chiefly because of its metaphysical character. We also reject the theoretical foundation of the frustration-aggression model, although we used the suggestions offered by the Yale theorists (Dollard, et. al., 1939) as to what might be likely instigators to aggression. Aggressive drive providing the impetus to aggression from within the organism as a consequence of frustration strikes us as a concept that is lacking in parsimony and is essentially tautologous. Because the existence of this drive is always inferred from one or more aggressive acts, which are then attributed to the drive, nothing is explained. . . . With fair accuracy, for example, we can predict the behavior of animals deprived of food and sex. What forecasts can be made about animals, particularly humans, who are deprived of the expression of aggression? None! However, if we know something about an animal's past experiences and the present situation, we can make fair predictions about its aggression behavior.
These findings and views are quite interesting in light of some of the contradictory evidence. At least some potential for predicting of aggressive behavior is provided. Although the human being is an extremely complex creature, some of his most outwardly strong characteristics are predictable when the proper conditions are established. Whether this idea is adaptable to a sports situation is a question that will be addressed in light of the results observed in this basketball fouling investigation.

In a study that examines the relative effects of frustration and aggression on subsequent aggression and also with examining the behavioral consequences of expressing or not expressing anger, Apter (1972) randomly placed subjects as teachers in a two-person teaching experiment. There were a total of five tasks consisting of six trials each and the criterion for learning was two or more consecutive correct responses. A pre-arranged schedule for responding by student experimental confederates was the method of testing and observing. One group was continually frustrated (unable to teach the task to criterion) on all five tasks and always had the opportunity to aggress (administer shocks) after each incorrect trial. A second group was frustrated on three of the five tasks, succeeded on the other two, and always had the opportunity to aggress. The third group was frustrated on all five tasks but only
had the opportunity to aggress on tasks one, two, and five, while the fourth group was also frustrated on all five tasks but had the opportunity to aggress only on tasks one, two, and three.

Results indicated no significant differences between groups with regard to intensity or duration of administered shocks. It was concluded that the study did not yield substantiating evidence for either of the viewpoints concerning the antecedents of aggression mentioned previously.

In an athletic setting, especially basketball contests, often the individual player will not have the opportunity to aggress after each subsequent frustrating event. Although the events of frustration will not be as precise and on schedule as described in this investigation by Apter, it will be interesting to observe whether there are or are not significant differences between groups when frustration levels are varied or different.

Koenig (1972) investigated the relationship between aggression and aggressive anxiety under both high and low frustration (arousal) conditions.

Forty-five six-year-old kindergarten children were assigned to one of four treatment groups. Under the high-frustration conditions, subjects were exposed to filmed aggressive models. In one instance, the film was prefaced by a dialogue in which the aggression was justified. In
the second high-frustration treatment group, the aggression was not justified by the film preface. The same procedure was followed for the low-frustration conditions.

Results demonstrated that a reduction in aggressive behavior by the subjects in free play following the film presentation was directly related to the presence of aggressive anxiety. Aggression was exhibited in those instances where aggressive anxiety was not operative and in direct relation to the degree of frustration. Aggression was significantly inhibited when aggressive anxiety was extant in those situations where aggressive anxiety cues were paired with aggressive arousal. The findings of the study demonstrated that the decrease in aggression was due, not to drive reduction, but to the presence of aggressive anxiety and response inhibition.

Aggression—Other Approaches and Research

Butt (1976) takes a different approach to the idea of sports behavior and aggression. She writes that just as all human beings are equipped with innate aggressive responses and the energy to execute them, all athletes display drive and energy that seem directed toward maintaining athletic rank or defeating an opponent. This observation varies with different athletes and sports, but there is a common denominator: "a will to win over nature or an opponent." Butt sees that individuals show
variations in their levels of aggressive energy because of two factors:

First, there are genetic and constitutional variations in the individual's potential for aggression. One individual may brim over with aggression, while another is passive, even lethargic. Second, as individuals are socialized by life experiences, their energies may be redirected or transformed into other directions or shapes. Thus, athletes who are highly motivated by aggression may not have transformed their basic energies into more socialized activities. Because athletic games usually require the expression of aggressive energy, they tend to attract individuals with high activity levels, a conclusion borne out by studies of athletic participants.

Butt further contends that the athlete who is highly motivated by aggression should not be confused with the athlete who has other primary motivations, but who displays aggression because he or she is placed in an athletic situation that demands it. She explains it as follows:

A game of basketball or hockey may end in a brawl, but such behavior may have been elicited from a player with only an average level of aggression in comparison to other team members. This behavior depends upon the threshold for aggression contained within the situation.

In situations similar to that described by Butt some additional considerations should be given to a more encompassing approach to catharsis or frustration. Few would argue that athletes vary in their abilities to display aggression in an acceptable manner. Whether this
process is actual releasing of aggression, displaying aggression, hiding aggression or preventing aggression, the distinction is not readily clear.

Levin (1975), discussing theories about sports and aggression, remarks that the idea that people have an inborn destructive drive that builds up tension until it is discharged in some kind of aggressive behavior began less than a half century ago with the father of psychoanalysis, Sigmund Freud. Other psychiatrists held different theories. Levin writes that:

Some psychiatrists argue that human beings have a desire to excel and to compete, but not to destroy; others maintained that humans have the "chemical potential" to behave aggressively when instigated, but do not possess a drive that requires discharge in an aggressive act. Still others denied the idea that humans have an inborn aggressive drive.

Levin states that many psychoanalysts still believe the Freudian notion that aggressive tension builds up in individuals and within social groups and must be discharged in some way. Those psychoanalysts think that war is the usual means used by a society to release its aggressive urges and that if there is to be peace, some alternative outlet must be found for this aggressive pressure.

Those who hold to this theory often argue that sports and athletics are a good substitute for war in ridding society of the destructive urge. They apply the same thinking to individuals: the person who
releases his aggressive drive in some acceptable way will be spared the consequences of releasing it in a harmful way.

Levin further notes that other social thinkers who reject the notion of an inborn aggressive drive, also reject the idea that sports and athletic competition will spare either individuals or a society from more harmful displays of aggression. Instead, they believe that where you have an aggressive society, an aggressive culture, perhaps a warlike culture, you will also find more violent sports and athletics. The sports of any culture, they say, are a result of the same values that determine its other characteristics. "A violent society will give rise to violent sports and games. A peaceful society will produce peaceful sports and games."

Starr (1970) conducted three studies of aggression in which an examination of aggressive cues which may energize hostile responses, the effects of expressed aggression on subsequent behavior, and the ramifications of interposing a checklist between arousal and aggression measurement were considered.

Multivariate analysis of variance was applied to the data. The results did not confirm the cue theory. Furthermore, the findings did not support any of the basic theoretical positions regarding the effect of expressed aggression on subsequent behavior. However, an increase in aggressive motivation for subjects who had the
opportunity to aggress and a corresponding decrease for those with no opportunity did lead to a reliable differentiation of these groups.

Turner (1968) investigated the effects of viewing college athletic contests on the subsequent elicited aggressive responses of spectators as measured by a twenty-item Sentence Completion Test and a six-card Thematic Apperception Test.

The 44 subjects were divided into three groups--an Experimental Group who viewed a football game, a basketball game and a wrestling match. Control Group I viewed the basketball game and the wrestling match and Control Group II viewed only the wrestling match.

This study is presented here because generally all performers in a college basketball contest are on the bench as spectators during some portion of the contest.

Twenty-item Sentence Completion and six-card TAT tests were administered before and after each athletic contest. In addition, during the post-testing session, a questionnaire was administered in an attempt to determine what facets of the spectator situation affected the emotions of the subjects.

Scales were established for measuring both intensity and frequency of aggressive responses. Frequency of aggression was measured as the total number of aggressive words mentioned and intensity was measured by using a
weighted value on a four-point scale of the aggressive words.

Some of the significant findings were as follows: (1) football and basketball spectator situations increase the frequency of an individual's elicited verbal aggression; (2) football, basketball, and wrestling spectator situations do not increase the intensity of an individual's elicited verbal aggression; (3) the subjects felt that items such as coaches, cheerleaders, and referees emotionally affected the spectators.

Summary

The catharsis theory and the frustration-aggression hypothesis have been the two major areas of review for this basketball fouling investigation. These two approaches to the aggression issue are not necessarily opposing viewpoints. There are many areas of overlap when we make a close examination of the research that has been conducted. Aggression could occur because of a frustrating situation with evidence of a catharsis as a result of having the opportunity to express this aggression.

There is support for the catharsis theory and the frustration-aggression hypothesis under specific conditions. Research evidence does not support either of the two approaches in all cases. This basketball investigation endeavors to determine the relevancy of these two approaches under the specific conditions with regard to basketball fouling.
CHAPTER III

RESEARCH DESIGN AND METHODS

Introduction and Purpose

University varsity basketball game data were examined for the occurrence of fouls. Fouls were defined as aggressive behaviors.

The purpose for the investigation was to determine whether there were significant differences in the number of fouls committed by university varsity teams. The intent was to examine the possibility of predicting fouls or aggressive behaviors in basketball contests.

The dependent variables were the sums and differences in the number of fouls committed by the seven conference opponents of Oregon State University.

Independent variables included the following:
(1) score (the range at the end of the game); (2) standing of the team (top half or bottom half); (3) court (home or away); (4) time (early season or late season); (5) year (1976-77 or 1977-78); (6) half (first half or second half of the game); and (7) opponent (Oregon State University's Seven Pacific-Eight Conference opponents).

Sample

The sample for this investigation consisted of all
Oregon State University Conference games for the playing seasons 1976-77 and 1977-78. This included a total of 28 games, as Oregon State University played each of the seven opponents in the PAC-8 Conference twice each playing season, once at home and once at each opponent's home court.

More than 80 university varsity basketball male athletes from Oregon State University, University of Oregon, Washington State University, University of Washington, Stanford University, University of California at Berkeley, University of California Los Angeles, and University of Southern California participated in these 28 games.

The athletes representing these Division I National Collegiate Athletic Association (NCAA) institutions were some of the most highly skilled basketball participants at this level of competition. This observation is made in light of the number of national basketball championships won by Pacific Eight Conference teams in the last twenty years, the level of competition denoted in the NCAA (Division I), and the fact that the NCAA has given the conference an automatic berth in the National Basketball Championship tournament.

Data Sources

Data were collected from official play-by-play score
sheets and Official National Collegiate Athletic Association Box Score Sheets for the conference playing seasons 1976-77 and 1977-78. This official data-keeping process is a necessary part for official records for the NCAA, which is one of the major governing bodies for American Collegiate basketball.

Play-by-play score sheets are a second-by-second account of the scoring, fouling, shooting, time-out periods, assists and rebounds that occur in a basketball contest. Box score sheets are a summary of the individual participant and team statistics in the above named areas.

Statistical Treatment of the Data

The basic statistical tools utilized for this study were the factorial analysis of variance and one-way analysis of variance using the F statistic. According to Downie and Heath (1970), the analysis of variance technique is applied in order to allow all of the data to be treated at once, and a general null hypothesis of no difference among the means of the various groups is tested. This allows for the examination of interactions. Courtney and Sedgwick (1972) state that the use of the F statistic in the analysis of variance compares the variances in order to test for differences between means.

The .05 level of significance was adopted as indicating the minimum level of confidence used in retaining
or rejecting each of the hypotheses.

Factors and Levels

Table I represents the factors and levels under examination in this investigation for the analysis to test hypotheses 1-4, 6, and 7. The design was adjusted for opponents, standing, and the score difference at the end of the game to reduce the error. Design adjustment is a mathematical procedure that is programmed into the computer program to reduce the amount of variability in the research model or design. We adjust when we know beforehand that a particular factor will vary. In this fouling investigation, we assumed that the opponents, the team's standing, and the score at the end of the game would vary from game to game. By making a prior adjustment before examining the data, we are able to reduce the amount of error or variability. Ideally, this eliminates as much error or variability as possible.

Time-out periods with two-minute uninterrupted intervals following as well as five-minute intervals at the beginning and end of each half were also examined.

Hypotheses 1-4, 6, and 7

Hypotheses 1-4, 6, and 7 were tested in two analyses because the first and second half of a given game are very highly correlated. The halves of a particular game involve
the following identical factors: teams, court, year, time of season, and standing. The designs utilized in this portion of the analyses are closely related to split plot designs. Games are the whole plots and halves are sub-plots. Table II is the appropriate analysis of variance table for whole plots where the response or dependent variable is the sum of fouls for the entire game.

Table III is the design which tests halves. It is an analysis of variance with the difference in fouls between halves as the response or dependent variable.

TABLE I. Factors and Levels

<table>
<thead>
<tr>
<th>Factors</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year:</td>
<td>1976-77 and 1977-78</td>
</tr>
<tr>
<td>Court:</td>
<td>Home and away</td>
</tr>
<tr>
<td>Time:</td>
<td>Early season and late season</td>
</tr>
<tr>
<td>Half:</td>
<td>First half and second half</td>
</tr>
</tbody>
</table>

The design was adjusted for the following:

Opponents: The other seven PAC-8 teams
Standing: Top half and bottom half
Score: The difference in score at the end of the game.
The design has been adjusted for opponents, standing and the score difference at the end of the game to reduce the error.

TABLE II. Analysis of Variance Table for Whole Plots

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Opponents</td>
<td>6</td>
</tr>
<tr>
<td>+ Standing</td>
<td>1</td>
</tr>
<tr>
<td>+ Score</td>
<td>1</td>
</tr>
<tr>
<td>Year</td>
<td>1</td>
</tr>
<tr>
<td>Court</td>
<td>1</td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
</tr>
<tr>
<td>Year-Court</td>
<td>1</td>
</tr>
<tr>
<td>Court-Time</td>
<td>1</td>
</tr>
<tr>
<td>Year-Time</td>
<td>1</td>
</tr>
<tr>
<td>Year-Court-Time</td>
<td>1</td>
</tr>
<tr>
<td>Error</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>27</td>
</tr>
</tbody>
</table>

TABLE III. Analysis of Variance Table for Halves

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents</td>
<td>6</td>
</tr>
<tr>
<td>Standing</td>
<td>1</td>
</tr>
<tr>
<td>Score</td>
<td>1</td>
</tr>
<tr>
<td>Halves</td>
<td>1</td>
</tr>
<tr>
<td>Half-Year</td>
<td>1</td>
</tr>
<tr>
<td>Half-Court</td>
<td>1</td>
</tr>
<tr>
<td>Half-Time</td>
<td>1</td>
</tr>
<tr>
<td>Half-Year-Court</td>
<td>1</td>
</tr>
<tr>
<td>Half-Year-Time</td>
<td>1</td>
</tr>
<tr>
<td>Half-Court-Time</td>
<td>1</td>
</tr>
<tr>
<td>Half-Year-Court-Time</td>
<td>1</td>
</tr>
<tr>
<td>Error</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28</td>
</tr>
</tbody>
</table>
Ordinarily, the sum of squares for the mean is not included in the analysis and is not reflected in the sum of squares total. Because the research analyzed the difference in halves, we have included the sum of squares for the mean in the sum of squares total as shown in TABLE III.

In that there were unequal replications in the design for these hypotheses, a least squares approach was taken in determining the mean squares and F ratio. The least squares approach is the exact analysis of variance for unequal cell size.

Hypothesis 5

The number of fouls that occurred during the five minute intervals at the beginning and end of each half was summed for individual PAC-8 opponents. The analysis across three degrees of freedom was the following:

First 5 minutes of first-half - A
Last 5 minutes of first-half - B
First 5 minutes of second-half - C
Last 5 minutes of second-half - D

Summed differences between intervals was examined according to the following schedule or arrangement:

A to B
C to D
A + B to C + D
FIGURE I represents the five minute interval arrangement.

<table>
<thead>
<tr>
<th>First Half</th>
<th>Second Half</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>10 min.</td>
</tr>
<tr>
<td>5 min.</td>
<td>5 min.</td>
</tr>
<tr>
<td>10 min.</td>
<td>5 min.</td>
</tr>
</tbody>
</table>

A         | B | C | D

FIGURE I. Five Minute Interval Arrangement

The analysis is a one-way analysis of variance with an adjustment for opponent variability. Table IV presents the ANOVA table for this analysis.

TABLE IV. Analysis and Variance Table for 5 Minute Intervals

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents</td>
<td>4*</td>
</tr>
<tr>
<td>Intervals</td>
<td>3</td>
</tr>
<tr>
<td>A + B to C + D</td>
<td>1</td>
</tr>
<tr>
<td>A to B</td>
<td>1</td>
</tr>
<tr>
<td>C to D</td>
<td>1</td>
</tr>
<tr>
<td>Error</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
</tr>
</tbody>
</table>

* Only 5 opponents were included in this portion of the analysis because two of the universities failed to retain complete records and individual statistics for their home games.

Hypothesis 8

In this hypothesis, an examination was made of all time-out periods with at least two uninterrupted minutes following. The model for this analysis was a quadratic fit defined "$Y_i(x), i = 1,2.$" The variable
"x" takes on the values "10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, and 120" seconds. We determined the relationship between the number of fouls which occur in these ten second intervals and time (x). As time-outs occurred in the ith year (i.e., i = 1 implies the 1976-77 season and i = 2 implies the 1977-78 season) the number of fouls committed between time "x - 10 seconds" and "x seconds" were summed for all games. Because the total number of time-outs for the 1976-77 season are expected to be different from the total number of time-outs for the 1977-78 season, an adjustment for year variability was made. The appropriate model for this procedure has the following structure:

\[ E(Y_i(x)) = \mu + \alpha_i + \beta_1 x + \beta_2 x^2 \]

Table V presents the appropriate analysis of variance table for this hypothesis. The beginning of each half was included as a time-out interval when the appropriate 120 seconds followed without another time-out period to interrupt.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>1</td>
</tr>
<tr>
<td>Regression</td>
<td>2</td>
</tr>
<tr>
<td>Error</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
</tr>
</tbody>
</table>
Assumptions

Several basic, yet necessary, assumptions have been applied in conducting this investigation. The officials for the PAC-8 conference are assumed to be of equal ability and skill when officiating games, and are therefore equally capable in identifying fouls.

The scorekeepers and play-by-play recorders for all the PAC-8 teams are assumed to be equally skilled at accurately recording the action of a particular contest.

The number of requested intentional fouls not designated as such by game officials is relatively small and does not cause a significant difference in the total foul count.

Fouling in basketball has been operationally defined as aggressive behavior with the exceptions (i.e., the intentional foul as a game tactic, or accidental contact by opponents, etc.) previously cited. It is assumed that in basketball, the attempts by the participants to gain an advantage are aggressive behaviors that often result in fouls.

Explanation of the Model Approach

The model approach employed in this investigation was a procedure to determine if there were significant differences in the total number of fouls committed by the Oregon State University basketball opponents.
The whole model included either the sum or the difference in the number of fouls committed when all the independent variables were included. The difference refers specifically to the difference in the number of fouls between the first and second half of the game.

A reduced model is a model which has an identical whole model dependent variable, but has had a specified independent variable removed. With the specified independent variable removed, the reduced model is compared to the whole model. When no significant difference was found between the whole model and the reduced model, the independent variable that was removed to create the reduced is considered unimportant or insignificant to the whole model.

Several of the null hypotheses were tested by removing the factor or independent variable under consideration from the whole model and comparing the reduced model to the whole model. This procedure was followed for games as a whole unit and for each half of the game, as well as for all the possible interactions among the independent variables.
CHAPTER IV

RESULTS

Demography of the Sample

The data were collected from a total of 28 regular-season Pacific Eight Conference varsity basketball games. These 28 games were the home and away games for Oregon State University for the two designated playing seasons. Each playing season, seven games were held in Corvallis, Oregon. The other seven games were played at the following locations:

(1) Eugene, Oregon, with the University of Oregon;
(2) Pullman, Washington, with Washington State University;
(3) Seattle, Washington, with the University of Washington;
(4) Berkeley, California, with the University of California at Berkeley;
(5) Los Angeles, California, with the University of California at Los Angeles;
(6) Los Angeles, California, with the University of Southern California; and
(7) Stanford, California, with Stanford University.

The design for this investigation puts its emphasis on the opponents of Oregon State University. This was an appealing approach because all the opponents were compared in situations with a standard. The results obtained
reflect how each of the seven other PAC-8 schools performed with Oregon State University as a common opponent. Tables VI and VII present comparisons of the Oregon State University Basketball teams winning and losing percentages with those of all the eight teams in the PAC-8 conference for the 28 games examined in this investigation. Table VIII is a comparison of the total number of fouls committed and Table IX is a comparison of the scoring by games. This information is presented in order to establish the relative relationship between Oregon State's basketball team and the entire basketball conference. The winning and losing percentages were not used in analyzing the eight hypotheses, but is presented here to more adequately describe the population and sample.

TABLE VI. 1976-77 Winning and Losing Percentages*

<table>
<thead>
<tr>
<th></th>
<th>Won</th>
<th>Lost</th>
<th>Winning %</th>
<th>Losing %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Games</td>
<td>5</td>
<td>2</td>
<td>.714</td>
<td>.286</td>
</tr>
<tr>
<td>Away Games</td>
<td>3</td>
<td>4</td>
<td>.429</td>
<td>.571</td>
</tr>
<tr>
<td>All Games</td>
<td>8</td>
<td>6</td>
<td>.571</td>
<td>.429</td>
</tr>
</tbody>
</table>

All Eight-PAC-8 Teams

<table>
<thead>
<tr>
<th></th>
<th>Won</th>
<th>Lost</th>
<th>Winning %</th>
<th>Losing %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Teams</td>
<td>9</td>
<td>5</td>
<td>.643</td>
<td>.357</td>
</tr>
<tr>
<td>Away Teams</td>
<td>5</td>
<td>9</td>
<td>.357</td>
<td>.643</td>
</tr>
</tbody>
</table>

Difference in Winning %

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Oregon State University</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Games</td>
<td>.714</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAC-8 Teams</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Teams</td>
<td>.643</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>.071</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon State University</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Away Games</td>
<td>.429</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAC-8 Teams</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Away Teams</td>
<td>.357</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>.072</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For 14 games included in this investigation only.
TABLE VII. 1977-78 Winning and Losing Percentages

<table>
<thead>
<tr>
<th>Oregon State University</th>
<th>Won</th>
<th>Lost</th>
<th>Winning %</th>
<th>Losing %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Games</td>
<td>5</td>
<td>2</td>
<td>.714</td>
<td>.286</td>
</tr>
<tr>
<td>Away Games</td>
<td>4</td>
<td>3</td>
<td>.571</td>
<td>.429</td>
</tr>
<tr>
<td>All Games</td>
<td>9</td>
<td>5</td>
<td>.643</td>
<td>.357</td>
</tr>
</tbody>
</table>

All Eight-PAC-8 Teams

<table>
<thead>
<tr>
<th></th>
<th>Won</th>
<th>Lost</th>
<th>Winning %</th>
<th>Losing %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Teams</td>
<td>8</td>
<td>6</td>
<td>.571</td>
<td>.429</td>
</tr>
<tr>
<td>Away Teams</td>
<td>6</td>
<td>8</td>
<td>.429</td>
<td>.571</td>
</tr>
</tbody>
</table>

Difference in Winning %

<table>
<thead>
<tr>
<th>Oregon State University</th>
<th>Home Games = .714</th>
<th>PAC-8 Teams</th>
<th>Home Teams = .571</th>
<th>Difference</th>
<th>.143</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon State University</td>
<td></td>
<td>PAC-8 Teams</td>
<td></td>
<td>Difference</td>
<td>.142</td>
</tr>
</tbody>
</table>

*For 14 games included in this investigation only.

Results of the Hypotheses Tested

This study analyzed eight hypotheses concerning the occurrence of aggressive acts (fouls) in 28 university varsity basketball contests. Areas of investigation included: (1) playing at home and away; (2) scoring; (3) team standings; (4) halves of a contest; (5) five minute intervals at the beginning and end of each half; (6) time of season; (7) number of fouls per season; and (8) time-out periods followed by two uninterrupted minutes.
### TABLE VIII. Comparison of Total Number of Fouls Committed.

<table>
<thead>
<tr>
<th>Game #</th>
<th>OSU</th>
<th>PAC-8 Opponent</th>
<th>Game #</th>
<th>OSU</th>
<th>PAC-8 Opponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>20</td>
<td>1</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>18</td>
<td>2</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>19</td>
<td>3</td>
<td>34</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>21</td>
<td>4</td>
<td>28</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>17</td>
<td>16</td>
<td>5</td>
<td>23</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>18</td>
<td>6</td>
<td>26</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>16</td>
<td>7</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>20</td>
<td>8</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>9</td>
<td>19</td>
<td>17</td>
<td>9</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>25</td>
<td>10</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>11</td>
<td>20</td>
<td>15</td>
<td>11</td>
<td>27</td>
<td>22</td>
</tr>
<tr>
<td>12</td>
<td>21</td>
<td>17</td>
<td>12</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>13</td>
<td>33</td>
<td>35</td>
<td>13</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>14</td>
<td>26</td>
<td>21</td>
<td>14</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>280</td>
<td>278</td>
<td><strong>TOTAL</strong></td>
<td>311</td>
<td>291</td>
</tr>
</tbody>
</table>

Mean = 20  Mean = 19.86  Mean = 22.21  Mean = 20.79
Range = 21  Range = 21  Range = 23  Range = 20

\[(33 - 13) + 1\] \[(35 - 15) + 1\] \[(34 - 12) + 1\] \[(33 - 14) + 1\]

### TABLE IX. Comparison of Scoring by Games.

<table>
<thead>
<tr>
<th>Game #</th>
<th>OSU</th>
<th>PAC-8 Opponent</th>
<th>Game #</th>
<th>OSU</th>
<th>PAC-8 Opponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58</td>
<td>50</td>
<td>1</td>
<td>48</td>
<td>47</td>
</tr>
<tr>
<td>2</td>
<td>61</td>
<td>58</td>
<td>2</td>
<td>57</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>76</td>
<td>90</td>
<td>3</td>
<td>89</td>
<td>82</td>
</tr>
<tr>
<td>4</td>
<td>53</td>
<td>52</td>
<td>4</td>
<td>60</td>
<td>77</td>
</tr>
<tr>
<td>5</td>
<td>79</td>
<td>63</td>
<td>5</td>
<td>62</td>
<td>48</td>
</tr>
<tr>
<td>6</td>
<td>71</td>
<td>61</td>
<td>6</td>
<td>58</td>
<td>63</td>
</tr>
<tr>
<td>7</td>
<td>76</td>
<td>75</td>
<td>7</td>
<td>61</td>
<td>64</td>
</tr>
<tr>
<td>8</td>
<td>83</td>
<td>84</td>
<td>8</td>
<td>64</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>76</td>
<td>89</td>
<td>9</td>
<td>58</td>
<td>46</td>
</tr>
<tr>
<td>10</td>
<td>80</td>
<td>65</td>
<td>10</td>
<td>70</td>
<td>68</td>
</tr>
<tr>
<td>11</td>
<td>69</td>
<td>81</td>
<td>11</td>
<td>84</td>
<td>72</td>
</tr>
<tr>
<td>12</td>
<td>62</td>
<td>74</td>
<td>12</td>
<td>58</td>
<td>96</td>
</tr>
<tr>
<td>13</td>
<td>78</td>
<td>73</td>
<td>13</td>
<td>53</td>
<td>47</td>
</tr>
<tr>
<td>14</td>
<td>66</td>
<td>83</td>
<td>14</td>
<td>51</td>
<td>54</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>988</td>
<td>998</td>
<td><strong>TOTAL</strong></td>
<td>873</td>
<td>879</td>
</tr>
</tbody>
</table>

Mean = 70.57  Mean = 71.29  Mean = 62.36  Mean = 62.79
Range = 31  Range = 41  Range = 42  Range = 51

\[(83 - 53) + 1\] \[(90 - 50) + 1\] \[(89 - 48) + 1\] \[(96 - 46) + 1\]
Null Hypothesis I: No significant difference in the number of fouls (aggressive acts committed) exists between playing on their own or familiar court and playing on visiting courts.

Null Hypothesis I was presented to assess the extent to which the surroundings of the contest affected the amount of aggression displayed. As a result of the statistical analysis, the following decision was made:

\[
\alpha = 0.05 \\
df = 1,12 \\
F_{\text{tabular}} = 4.75 \\
F_{\text{computed}} = 2.1235
\]

Null Hypothesis I is retained because the computed F value (2.1235) is smaller than the tabular F value (4.75). See Table X for a complete description of the analysis of variance table.

Null Hypothesis II: No significant difference exists between the number of fouls in a game and the score at the end of a game.

Null Hypothesis II was examined to assess the extent to which aggressive behavior is reflected in the scoring by teams. As a result of the statistical analysis, the following decision was made:

\[
\alpha = 0.05 \\
df = 1,18 \\
F_{\text{tabular}} = 4.41 \\
F_{\text{computed}} = 5.5527
\]
Null Hypothesis II is rejected because the computed F value (5.5527) is greater than the tabular F value (4.41). See Table X for the complete analysis of variance table. The number of fouls in a game was found to be related to the final score. As the range in the final score for the game increased, the number of fouls increased. For each four-point spread in the score, one additional foul occurred. See Figure II for the computer printout results. In this particular analysis no adjustment for opponent was made because of the high relationship between the opponent and the score.

Null Hypothesis III: No significant difference in the number of fouls committed exists as a result of the team's standing.

Null Hypothesis III was examined to assess the extent to which aggressive behavior is reflected in the team's standing in the conference. As a result of the statistical analysis, the following decision was made:

\[ \alpha = .05 \]
\[ df = 1,12 \]
\[ F \text{ tabular} = 4.75 \]
\[ F \text{ computed} = .8744 \]

Null Hypothesis III is retained because the computed F value (.8744) is smaller than the tabular F value (4.75). See Table X for the complete analysis of variance table.
TABLE X. Analysis of Variance Table for Sum of Fouls.  
(Hypotheses I, II, III, VI, VII)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents+</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing+</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score+</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>1</td>
<td>.00392</td>
<td>.0002</td>
</tr>
<tr>
<td>Court</td>
<td>1</td>
<td>41.62875</td>
<td>2.1235</td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>63.26354</td>
<td>3.2271</td>
</tr>
<tr>
<td>Year*Court</td>
<td>1</td>
<td>2.62691</td>
<td>.1340</td>
</tr>
<tr>
<td>Court*Time</td>
<td>1</td>
<td>.96647</td>
<td>.0493</td>
</tr>
<tr>
<td>Year*Time</td>
<td>1</td>
<td>24.20486</td>
<td>1.2347</td>
</tr>
<tr>
<td>Year<em>Court</em>Time</td>
<td>1</td>
<td>6.30852</td>
<td>.3218</td>
</tr>
<tr>
<td>Error</td>
<td>12</td>
<td>19.60384</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standing--Df = 1,12  MS = 17.141628  F = .8744
Score--Df = 1,18     MS = 25.74792   F = 5.5527***
(See Figure II)

***Significant at the .05 level
+Adjusted to reduced error or variability in the design
0By not adjusting for opponents (only with the score factor) a significant difference was found.
A Whole Model

Fouls A = 2.5760E +01
+2.5607E -01 Score 2
+1.1728E +00 YT
+4.3113E -01 YCT
+1.7926E +00 C
-1.2461E +00 Stand
-1.7569E +00 T
+1.0026E +00 CT
+2.3486E -01 Y
-1.3122E -01 YC

A Reduced Model

:Drop, Score 2, F

Fouls A = 2.1454E +01
-1.6196E +00 T
+7.1214E -01 CT
+-1.2071E -01 Y
-1.2461E +00 Stand
-2.6860E -01 T
+9.8487E -01 YT
+4.7162E -02 YCT
+1.1252E +00 C
-6.0615E -01 YC

F = 5.5527 Computed

Degrees of Freedom: 1,18

Score 2 in the whole model refers to the score at the end of the game. When Score 2 was removed from the whole model and the reduced model was compared to the whole, the F was significant. We are, therefore, able to examine the whole model to determine the direction of the significant difference. In the whole model, +2.5607E -01 Score 2 means that for every 1.0 score difference at the end of the game .25 fouls occur. In other words, for every 4 points in the score spread at the end of the game, one additional foul occurs.

Figure II. Computer Print-Out Results for the Difference in the Score and the Number of Fouls.
Null Hypothesis IV: No significant difference exists in the number of fouls that occur in the first half and the second half of the contest.

Null Hypothesis IV was examined to assess the extent to which halves of a contest affect the number of fouls committed. As a result of the statistical analysis, the following decision was made:

\[ \alpha = .05 \]
\[ df = 1,12 \]
\[ F \text{ tabular} = 4.75 \]
\[ F \text{ computed} = 3.18 \]

Null Hypothesis IV is retained because the computed F value (3.18) is smaller than the tabular F value (4.75). Table XI presents the computed analysis of variance table.

Null Hypothesis V: No significant difference exists in the number of fouls that occur during the last five minutes of each half and the first five minutes of each half.

The purpose of Null Hypothesis V was to assess if there were any differences in the extent of fouling in intervals at the beginning and end of each half. As a result of the statistical analysis, the following decision was made:

\[ \alpha = .05 \]
\[ df = 3,12 \]
\[ F \text{ tabular} = 3.49 \]
\[ F \text{ computed} = 11.4902 \]
### TABLE XI. Analysis of Variance Table for Difference in Fouls.

(Hypotheses I, II, III, IV, VI, VII)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degree of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents+</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing+</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score+</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halves</td>
<td>1</td>
<td>56.85674</td>
<td>3.1800</td>
</tr>
<tr>
<td>Half*Year</td>
<td>1</td>
<td>11.49471</td>
<td>.6429</td>
</tr>
<tr>
<td>Half*Court</td>
<td>1</td>
<td>49.22400</td>
<td>2.7531</td>
</tr>
<tr>
<td>Half*Time</td>
<td>1</td>
<td>30.14838</td>
<td>1.6862</td>
</tr>
<tr>
<td>Half<em>Year</em>Court</td>
<td>1</td>
<td>1.69497</td>
<td>.0948</td>
</tr>
<tr>
<td>Half<em>Year</em>Time</td>
<td>1</td>
<td>8.06365</td>
<td>.4510</td>
</tr>
<tr>
<td>Half<em>Court</em>Time</td>
<td>1</td>
<td>0.00000</td>
<td>.0000</td>
</tr>
<tr>
<td>Half<em>Year</em>Court*Time</td>
<td>1</td>
<td>6.81745</td>
<td>.3813</td>
</tr>
<tr>
<td>Error</td>
<td>12</td>
<td>17.87948</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+Adjusted

### TABLE XII. Analysis of Variance Summary Table for Hypothesis V.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degree of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervals</td>
<td>3</td>
<td>78.1334</td>
<td>11.4902**</td>
</tr>
<tr>
<td>AB to DC</td>
<td>1</td>
<td>115.192</td>
<td>16.94**</td>
</tr>
<tr>
<td>A to B</td>
<td>1</td>
<td>3.599</td>
<td>.5294</td>
</tr>
<tr>
<td>C to D</td>
<td>1</td>
<td>115.6</td>
<td>17.00**</td>
</tr>
<tr>
<td>Error</td>
<td>12</td>
<td>6.800</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Significant at the .05 level.
Null Hypothesis V is rejected because the computed F value (11.4902) is greater than the tabular F value (3.49) at the .05 level of significance. Least significant difference test results revealed that a significantly greater number of fouls occur during the last five minutes of the game. In addition, a significantly greater number of fouls occur in the first five minutes of the second half when compared to the first and last five minutes of the first half. No significant difference was found in the number of fouls in the first and last five minutes of the first half. See Table XII for the complete analysis of variance table.

Null Hypothesis VI. No significant difference exists in the number of fouls that occur during designated intervals of the playing season--early season and late season.

The purpose of Null Hypothesis VI was to determine if differences exist in the number of fouls committed early in the season and late in the season. As a result of the statistical analysis, the following decision was made:

\[ \alpha = 0.05 \]
\[ df = 1,12 \]
\[ F_{\text{tabular}} = 4.75 \]
\[ F_{\text{computed}} = 3.2271 \]

Null Hypothesis VI is retained because the computed F value (3.2271) is smaller than the tabular F value (4.75).
See Table X which contains the complete analysis of variance table.

Null Hypothesis VII: No significant difference exists in the number of fouls committed between the 1976-77 and 1977-78 seasons of play.

As a result of the statistical analysis, the following decision was made:

\[ a = 0.05 \]
\[ df = 1,12 \]
\[ F_{\text{tabular}} = 4.75 \]
\[ F_{\text{computed}} = 0.0002 \]

Null Hypothesis VII is retained because the computed F value (.0002) is smaller than the tabular F value (4.75). See Table X for the complete analysis of variance table.

Null Hypothesis VIII: No significant difference exists in the number of fouls committed in two-minute intervals following selected time-out periods.

Null Hypothesis VIII was examined to assess whether trends of fouling are evident in uninterrupted two-minute intervals following time-out periods. The beginning of each half was included as a time-out period when the required uninterrupted two minutes followed. As a result of the statistical analysis, the following decision was made:
\[ \alpha = .05 \]
\[ df = 2,20 \]
\[ F_{\text{tabular}} = 3.49 \]
\[ F_{\text{computed}} = .4436 \]

Null Hypothesis VIII is retained because the computed $F$ value (.4436) is smaller than the tabular $F$ value (3.49). See Table XIII for the complete regression table.

### TABLE XIII. Analysis of Variance Summary Table for Hypothesis VIII.

(Regression--Quadratic Fit)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>2</td>
<td>1.98751</td>
<td>.4436</td>
</tr>
<tr>
<td>Linear</td>
<td>1</td>
<td>3.79624</td>
<td>.8473</td>
</tr>
<tr>
<td>Quadratic</td>
<td>1</td>
<td>3.24023</td>
<td>.7232</td>
</tr>
<tr>
<td>Error</td>
<td>20</td>
<td>4.48040</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clarification of the Results

The assumptions associated with the model approach utilized in this investigation were the following: (1) the residuals were normally distributed; (2) they had constant variance; and (3) they were independent. The residuals were the differences between what the model says the dependent variables should be, and what the dependent variables actually were. The dependent variables were the sums and the differences in the number of fouls.
committed under the specified conditions of the investigation.

A major portion of the investigation was conducted utilizing a system of comparing models. This procedure involved the establishment of a whole model which included either the sum of the number of fouls committed or the difference in the number of fouls committed per half as the dependent variables and the following independent variables: (1) score at the end of the game; (2) location of the game (court); (3) time of season; (4) standing of the teams; (5) season of play (year); (6) the different opponents; and (7) the possible interactions.

When one of the null hypotheses was tested, the procedure involved removing an independent variable from the whole model creating a new reduced model. The reduced model was then compared to the whole model to determine if there was a significant difference in the number of fouls. When a significant difference was found, the independent variable that was removed had a significant effect on the number of fouls in the whole model. For the tests of the null hypotheses involving this model approach, the following were the results:

(1) Court 1976-77 1977-78 Mean

<table>
<thead>
<tr>
<th></th>
<th>1976-77</th>
<th>1977-78</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Teams</td>
<td>144 fouls + 149 fouls = 293 fouls</td>
<td>20.93</td>
<td></td>
</tr>
<tr>
<td>Away Teams</td>
<td>134 fouls + 142 fouls = 276 fouls</td>
<td>19.50</td>
<td></td>
</tr>
</tbody>
</table>

Although the teams playing at home committed 17 more fouls,
this difference was not significant.

(2) Team Standing 1976-77  1977-78  Mean

   Top Half--163 fouls + 193 fouls = 356 fouls  20.94
   Bottom Half --115 fouls + 98 fouls = 213 fouls  19.36

In this 28 game sample, more teams (17) were in the top half of the standing than in the bottom half (11); this accounts for the 143 more fouls committed by top half teams. On a per game, mean, and per season basis, however, the difference in the number of fouls committed was not significant.

(3) Halves  1976-77  1977-78  Mean

   First Half--137 fouls + 125 fouls = 262 foul  9.36
   Second Half--141 fouls + 166 fouls = 307 fouls 10.96

Although 45 more fouls were committed during the second half, this difference was not significant.

(4) Time  1976-77  1977-78  Mean

   Early Season--133 fouls + 133 fouls = 266 fouls 19.00
   Late Season--145 fouls + 158 fouls = 303 fouls 21.64

Although 37 more fouls were committed during the late season, this difference was not significant.

(5) Year  Total  Mean

   1976-77 = 278 fouls  19.86
   1977-78 = 291 fouls  20.79

Although 13 more fouls were committed during the 1977-78 conference playing season, this difference was not significant.
(6) Score at the end of the game

<table>
<thead>
<tr>
<th>Points Scored</th>
<th>1976-77</th>
<th>1977-78</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents</td>
<td>998 pts. + 879 pts. = 1877 pts.</td>
<td>67.01</td>
<td></td>
</tr>
<tr>
<td>Oregon St.</td>
<td>988 pts. + 873 pts. = 1861 pts.</td>
<td>66.46</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Game Winning Margins</th>
<th>1976-77</th>
<th>1977-78</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents (mean)</td>
<td>11.5 pts.</td>
<td>13.2 pts.</td>
<td>135 pts./11 games = 12.27</td>
</tr>
<tr>
<td>Oregon St. (mean)</td>
<td>9.83 pts.</td>
<td>6.67 pts.</td>
<td>119 pts./17 games = 7.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fouls</th>
<th>1976-77</th>
<th>1977-78</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponents</td>
<td>278 + 291 = 569 fouls</td>
<td>20.32</td>
<td></td>
</tr>
</tbody>
</table>

A regression analysis revealed that the number of fouls was related to the score difference at the end of the game at the .05 level of significance. This linear relationship between fouls and score difference is described in Figure II.

All the possible interactions (i.e., year-court-time or half-court-year) were tested with none being significant at the .05 level of significance (See Tables X and XI).

The two remaining hypotheses involving the five minute intervals and the time-out periods were analyzed using regression techniques and a quadratic fit. The results from this portion of the investigation were the following:
The F statistic revealed that there was a significant difference across all intervals, as well as between intervals C and D and intervals A + B and C + D. The least significant difference test was used as a follow-up to the F statistic in order to assess differences among individual means. Interval D was found to be the significantly different five-minute interval. Significantly more fouls occur during the last five minutes of the game. Approximately 38.7% of the fouls occur during interval D, which is equivalent to the number of fouls for intervals A and B combined.

(1) Five minute intervals study

<table>
<thead>
<tr>
<th>Number of Fouls</th>
<th>1976-77</th>
<th>1977-78</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval A</td>
<td>23 + 21</td>
<td>= 44 fouls</td>
<td>2.2</td>
</tr>
<tr>
<td>(1st 5 min. of the game)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval B</td>
<td>20 + 18</td>
<td>= 38 fouls</td>
<td>1.9</td>
</tr>
<tr>
<td>(Last 5 min. of 1st half)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval C</td>
<td>27 + 21</td>
<td>= 48 fouls</td>
<td>2.4</td>
</tr>
<tr>
<td>(1st 5 min. of 2nd half)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval D</td>
<td>38 + 44</td>
<td>= 82 fouls</td>
<td>4.1</td>
</tr>
<tr>
<td>(Last 5 min. of game)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval (A + B)</td>
<td>43 + 39</td>
<td>= 82 fouls</td>
<td>2.1</td>
</tr>
<tr>
<td>Interval (C + D)</td>
<td>65 + 65</td>
<td>= 130 fouls</td>
<td>3.3</td>
</tr>
</tbody>
</table>
In the 1976-77 playing season (11 games), there were 36 time-out periods with no fouls following and 41 time-out periods with 60 fouls following in the next two minute intervals. In 1977-78, the figures were 40 time-out periods with no fouls following and 52 time-out periods with 77 fouls.

The statistical analysis revealed that there were no significant differences in the number of fouls occurring for two minute intervals following time-out periods.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This investigation was undertaken to assess differences in fouling behavior (aggressive actions) under conditions peculiar to university varsity basketball contests.

Volkamer (1972) had examined soccer games in Northern Germany and found he was able in many cases to predict aggressive actions throughout the contest. This opened the way for examinations with other sport settings and populations.

In selecting the Pacific-Eight Conference basketball teams, we were able to examine data from some of the most highly skilled basketball performers at the collegiate level.

Although the discussion and emphasis of this investigation has been in the sport setting, the approaches and purposes for investigation possibly have applications in various other settings, especially in physical education, psychology, sociology and other behavioral sciences.

Examining data from two seasons of play was appealing in that the personnel and psychological make-up of a particular team very often appears to change radically from
Several players were included in both sample years, but generally, there were key player changes from year to year. Many players who were not starting players, or who played very little in the 1976-77 season, were the principal participants in the 1977-78 season. When we consider these players along with freshmen and transfer team members, as well as graduates, the active rosters of the teams were different from the 1976-77 to the 1977-78 season.

The null hypotheses were developed as a result of several research questions which were presented in Chapter I. The review of literature was directed toward two major approaches related to the causes and results of aggressive behavior. These approaches, the Frustration-Aggression Hypothesis and the Catharsis Theory dominate the research literature on aggression. Supportive, non-supportive, and inconclusive research findings were reviewed for each approach. Rather than attempting to support the approaches in all situations, the approaches were examined in relation to the specific conditions and circumstances in this investigation.

Fouls were operationally defined as aggressive behaviors recognizing that intentional coach-requested fouls were usually a game tactic.

A secondary intent for the investigation was to determine if aggressive behaviors were as predictable
Conclusions and Implications

It is quite evident that the sport, setting, and level of competition has a dramatic effect on the occurrence of aggressive behavior.

As a result of this investigation, the following major conclusions were made:

(1) Teams are equally aggressive whether they are playing at home or playing on an opponent's court. This is an interesting finding because in most of the previous research literature, the visiting team has been found to be the most aggressive. In this study, the home teams actually committed more fouls than the visiting teams, although this difference was not significant. The amount of aggression displayed by basketball teams is the result of factors other than the location of the contest. Few would argue that spectators do have some effect on basketball teams, but in relation to the amount of aggression expressed in the form of fouling behavior, there does not seem to be any difference between home and visiting teams.

Volkamer (Cratty, 1973) concluded that many fouls
are subtle aggressions directed by athletes toward spectators as well as toward their opponents. In this study, however, it seems that fouls are aggressive behaviors directed by athletes with spectators in the case of the home team, as well as against spectators by visiting teams.

(2) The team's standing is an insignificant factor in the number of fouls it commits. This finding contradicts other research findings when the standings of teams have been examined. According to Cratty (1973), lower standing teams have generally been found to be the most aggressive. This higher level of aggression has been attributed to a higher level of frustration incurred by lower standing teams losing more contests.

In this basketball sample, the frustration of losing and being lower in the standings did not cause a significant difference in the number of fouls. Apparently, the awareness of being lower in the standings does not cause the frustration level to be great enough to cause a significant difference in the number of fouls.

(3) Although more fouls were committed during the game's second half, this difference was not significant. In order to offer support for the Frustration-Aggression Hypothesis, we would have expected the foul count to increase significantly as the players' frustration levels increased. To support the catharsis
theory, we would have expected possibly a release or reduction in the foul count after initial opportunities to foul. Neither position was supported in this portion of the investigation. The teams were equally aggressive when each whole half was compared.

In addition to examining halves as a complete interval of 20 minutes, five minute intervals at the beginning and end of each half were examined. In this five-minute interval analysis, a significantly greater number of fouls were found to occur during the last five minutes of the game. This finding seems to offer support for the Frustration-Aggression Hypothesis. The increased aggression expressed as fouling behavior is a result of the frustration experienced by teams as they attempt to maintain or gain control of the game with time running out. Players apparently become acutely aware of the circumstances surrounding the particular situations near the end of the game; this causes increased frustration and results in a significantly greater number of fouls.

(4) More fouls were committed in the late season, although this difference was not significant. This finding dispels support for the Frustration-Aggression Hypothesis over an extended period of time. Without increased incidents of aggression as a result of frustrations
associated with prolonged competition, no support seems possible.

In addition, no evidence was found to support the catharsis theory. Because the data were analyzed over both seasons, on a per game basis, as well as per half basis, evidence of a reduction in the aggression level was not found. Trends suggesting the presence of pleasure as a result of having the opportunity to express aggressive feelings were not uncovered.

(5) It is quite interesting to note that the difference in the number of fouls committed between the two seasons of play was only 13 fouls. Although the teams had changed radically in personnel from season to season, the number of fouls appears highly consistent. The findings of this portion of the analysis suggest that there is a general level of aggressiveness which can be predicted in basketball games. The frustrations within a typical basketball game create a situation in which aggressive responses are predictable.

(6) The range in the final score of the game was found to be significantly related to the number of fouls committed. For each four point increment, one foul was committed. This significant finding lends support to the frustration-
aggression hypothesis. The frustration experienced by teams as the time remaining in the game becomes more critical creates a predictable aggressive response level. This level of aggressiveness is predictable without regard to the winner or loser of the contest. From these findings it appears that the winner may be just as aggressive or more aggressive than the loser. Although losing may be a frustrating experience, winning or attempting to maintain the winning advantage may be equally frustrating.

(7) Two-minute intervals were examined after time-out periods to determine patterns of aggressive behavior. The two minute intervals were divided into 10 second segments with an examination of the number of fouls occurring in each segment. As a result of the analysis, no clear-cut patterns were noted, although at the 60 second segment the greatest number of fouls occurred. This portion of the study was conducted to determine if a pattern of catharsis would be present. To support the catharsis theory, a dramatic drop-off of aggressive responses would be expected after having several opportunities to express aggression.
In basketball games, it appears that the expression of aggression in the form of fouling opportunities has no effect on subsequent aggressive behavior.

The time-out periods were expected to serve as frustration lowering periods. Therefore, after time-out periods, incidents of aggressive behavior were expected to be minimal. Within the two minute intervals following time-out periods, no real substantial decrease in the number of fouls occurred. Therefore, time-out periods probably do not significantly lower frustration levels to a degree in which the number of fouls are significantly reduced.

Suggestions for Further Study

One of the primary problems with any research design is that the design can only examine a limited number of factors. The research approach in this basketball fouling investigation has been to group individuals into teams and look at the hypotheses in terms of team statistics. Indeed on an individual participant basis the results may be completely different.

Several suggestions for further study are as follows:
(1) Examine fouling on an individual participant basis.
(2) Include such aspects as personality type, race,
sex, family income, playing experience, career aspirations, player position, physical size, grade point average and I.Q.

(3) Employ the use of video-media techniques to specifically record the actions of individual participants.

(4) Correlate information from this or similar investigations with aggression-measuring instruments.

(5) Compare individual game officials to examine the extent to which a particular official affects a particular team or individual.

(6) Compare playing arena size, number of spectators, and closeness of spectators to the playing court.

(7) Examine aggression and its effects on learning and performance.

(8) Isolate and examine aggressive responses other than physical fouls.

(9) Examine the coach's role in eliciting aggressive responses from his players.

Recommendations

This investigation has provided some interesting findings relative to the Frustration-Aggression Hypothesis and the catharsis theory. In several instances, the findings of this study contradict the positions in previous investigations.
To fully implement the findings that this research study has found would call for radical changes by basketball coaches. Following are several recommendations which are based on the findings of this investigation:

(1) Time-out periods should not be called for the sole purpose of reducing frustration levels. It appears that the time-out period is not sufficiently long enough to lower frustration levels. Only for about 30 seconds after a time-out were there actually fewer fouls; the largest incidence of fouls occurring about one minute following the time-out period.

(2) A team winning a particular game should be carefully observed for increased aggressive behavior as the margin of winning widens. This aggressive behavior increase may serve as an undesired factor when sufficient time remains in the game for the losing team to make a comeback. What might possibly happen is key players on the winning team become more aggressive and therefore pick up undesired unnecessary fouls and are eliminated for the critical last minutes of the contest.

(3) Players should be exposed to the frustrating conditions associated with the last five
minutes of the game during practice sessions. Exposure should enable the athlete to learn proper responses to increased frustration, therefore, reducing the subsequent aggressive behaviors.

(4) Players should not be encouraged to express aggressive behaviors in order to lower frustration levels or to gain fully control of their emotions during the contest. No release, satisfaction or catharsis was found as a result of aggressing.

(5) Coaches should be extremely cautious when adopting policies relating to aggressive activity in other sports. The responses of aggression in this basketball investigation were quite different when compared to previously reviewed soccer and ice hockey studies. The evidence seems generally clear that the aggressive expressions and responses of athletes varies with the sport, setting, and possibly the level of competition.

If any one idea or decision is primary to the findings of this study, it is that aggressive behavior in a sport appears to be unique to that sport. Decisions relating to approaches to gain control of this aggressive behavior must be based on research evidence, rather than
subjective judgments. When fouling becomes a problem for a coach with a particular team, the approaches to solve the problem must be research based. It has been demonstrated in this investigation that aggressive behaviors are predictable under specified conditions.


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